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Mr. G. F. Becker
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FIRST REPORT

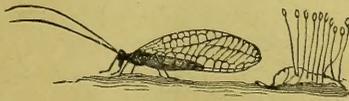
OF THE

Board of State Horticultural Commissioners

OF CALIFORNIA.

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A copy of this Report can be obtained by any citizen of California, by addressing Secretary Board State Horticultural Commissioners, 111 Leidesdorff Street, San Francisco.



"A friend in need is a friend indeed."

SACRAMENTO:

STATE OFFICE : : : J. D. YOUNG, SUPT. STATE PRINTING.

1882.

STATE HORTICULTURAL COMMISSION.

FIRST REPORT

OF THE

California.

Board of State Horticultural Commissioners.

OFFICE, - - - 111 LEIDESDORFF STREET,
San Francisco, California.



SACRAMENTO!

STATE OFFICE : : : J. D. YOUNG, SUPT. STATE PRINTING.

1882.

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OFFICERS AND MEMBERS

OF THE

BOARD OF STATE VITICULTURAL COMMISSIONERS.

ARPAD HARASZTHY, President,
Commissioner for the San Francisco District.

CHAS. A. WETMORE, Vice-President,
Commissioner for the State at Large.

CHAS. KRUG, Treasurer,
Commissioner for the Napa District.

- I. DeTURK Commissioner for the Sonoma District.
- R. B. BLOWERS Commissioner for the Sacramento District.
- GEORGE WEST Commissioner for the San Joaquin District.
- L. J. ROSE Commissioner for the Los Angeles District.
- G. G. BLANCHARD Commissioner for the El Dorado District.
- J. DeBARTH SHORB Commissioner for the State at Large.

JOHN H. WHEELER, Secretary.

CHAS. A. WETMORE,
Chief Executive Viticultural and Health Officer.

STANDING COMMITTEES.

- Executive* CHAS. A. WETMORE, GEORGE WEST, and I. DeTURK.
- Auditing* R. B. BLOWERS.
- Finance* L. J. ROSE and J. DeBARTH SHORB.

Phylloxera, Vine Pests, and Diseases of the Vine:

I. DeTURK, GEORGE WEST, CHAS. KRUG, R. B. BLOWERS, and CHAS. A. WETMORE.

On Conference with Board of Regents of State University:

ARPAD HARASZTHY, CHAS. A. WETMORE, and CHARLES KRUG.

On Instructions for the Office of the Chief Executive Viticultural Officer:

ARPAD HARASZTHY, CHARLES KRUG, and I. DeTURK.

On Horticulture:

GEORGE WEST, R. B. BLOWERS, and J. DeBARTH SHORB.

On Distillation, Counterfeits, and Adulterations:

J. DeBARTH SHORB, CHARLES KRUG, and GEORGE WEST.

Office of the Board:

NO. 111 LEIDESDORFF STREET, SAN FRANCISCO.

OFFICERS AND MEMBERS

OF THE

STATE BOARD OF HORTICULTURAL COMMISSIONERS.

CHARLES H. DWINELLE, President,
Commissioner for the State at Large.

W. W. SMITH	Commissioner for the Napa District.
M. T. BREWER	Commissioner for the Sacramento District.
W. B. WEST	Commissioner for the San Joaquin District.
FELIX GILLET	Commissioner for the El Dorado District.
ALBERT S. WHITE	Commissioner for the Los Angeles District.
S. F. CHAPIN	Commissioner for the San Francisco District.
A. CADWELL	Commissioner for the Sonoma District.
MATTHEW COOKE	Commissioner for the State at Large.
E. J. WICKSON*	Commissioner for the State at Large.
ELLWOOD COOPER	Commissioner for the State at Large.

JOHN H. WHEELER, Secretary.

MATTHEW COOKE,
Chief Executive Horticultural and Health Officer.

STANDING COMMITTEES

ON THE OCCURRENCES AND RAVAGES OF AND REMEDIES AGAINST INSECT PESTS:

On Citrus Trees	ALBERT S. WHITE.
On Olive Trees	ELLWOOD COOPER.
On Deciduous and Ornamental Trees	S. F. CHAPIN.
On the Codlin Moth	MATTHEW COOKE and FELIX GILLET.
On Red Spider, Mites, etc.	W. B. WEST.
On Fruit Packages	W. W. SMITH and W. B. WEST.
On Transportation and Quarantine	MATTHEW COOKE, E. J. WICKSON, and C. H. DWINELLE.
On Rules and Regulations	CHARLES H. DWINELLE.
On Conference with Shippers and Commission Merchants	M. T. BREWER.
On Borers Injurious to Fruit and Fruit Trees	FELIX GILLET.

Office of the Board:

NO. 111 LEIDESDORFF STREET, SAN FRANCISCO.

* Vice Charles H. Shinn, resigned October, 1882.

ACTS OF THE LEGISLATURE.

CHAPTER LXII.

An Act for the Promotion of the Viticultural Industries of the State.

[Approved April 15, 1880.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. There shall be appointed by the Governor a Board of State Viticultural Commissioners, to consist of nine members, two to be appointed from the State at large, and one to be appointed from each of the seven viticultural districts, which shall be constituted as follows:

First—The Sonoma District, which shall include the Counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou.

Second—The Napa District, which shall include the Counties of Napa, Solano, and Contra Costa.

Third—The San Francisco District, which shall include the City and County of San Francisco, and the Counties of San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito, and Monterey.

Fourth—The Los Angeles District, which shall include the Counties of Los Angeles, Ventura, Santa Barbara, San Luis Obispo, San Bernardino, and San Diego.

Fifth—The Sacramento District, which shall include the Counties of Sacramento, Yolo, Sutter, Colusa, Butte, Tehama, and Shasta.

Sixth—The San Joaquin District, which shall include the Counties of San Joaquin, Stanislaus, Merced, Fresno, Tulare, and Kern.

Seventh—The El Dorado District, which shall include the Counties of El Dorado, Amador, Calaveras, Tuolumne, Mariposa, Placer, Nevada, Yuba, Sierra, Plumas, Lassen, Modoc, Alpine, Mono, and Inyo.

SEC. 2. The Commissioners, excepting the two appointed from the State at large, shall be residents of the districts from which they are appointed, and shall be specially qualified by practical experience and study in connection with the industries dependent upon the culture of the grapevine in this State. They shall each hold office for the term of four years, excepting that, of the nine first appointed, four, to be determined by lot, shall retire at the end of two years, when their successors shall be appointed by the Governor.

SEC. 3. The Board shall elect from among their own number a President, a Vice-President, and a Treasurer, and they shall appoint a Secretary, who shall not be one of their number, and whose salary shall not exceed one hundred dollars per month. And the Board shall determine and fix the amount of bonds that shall be given by the Treasurer and Secretary for the faithful performance of their duties.

SEC. 4. It shall be the duty of the Board to meet semi-annually to consult and to adopt such measures as may best promote the progress of the viticultural industries of the State. It shall be their duty to select and appoint competent and qualified persons to deliver at least one lecture each year in each of the viticultural districts named in section one of this Act, for the purpose of illustrating practical viticultural topics, and imparting instruction in methods of culture, pruning, fertilizing, fermenting, distilling, and rectifying, treating diseases of the vine, raisin drying, etc., for the better instruction of the people interested therein, as the requirements of each district may show to be necessary and important, and to disseminate all such useful knowledge relating to viticulture, by printed documents or correspondence, as may be within their power to do. The Board shall devote special attention to the study of the phylloxera and other diseases of the vine, and shall make such recommendations in their semi-annual reports as they may deem best for the protection of vineyards.

SEC. 5. The Commissioners constituting the Board shall serve without compensation, and shall be allowed only their actual transportation expenses to and from their places of residence when attending the semi-annual meetings of the Board.

SEC. 6. The office of the Board shall be in the City of San Francisco, and shall be kept open to the public, subject to the rules of the Board, every day, excepting legal holidays, and shall be in charge of the Secretary during the absence of the Board.

SEC. 7. It shall be the duty of the Secretary to attend all regular meetings of the Board, and to preserve records of proceedings and correspondence; to collect books, pamphlets, periodicals, and other documents containing valuable information relating to viticulture, and to preserve the same; to collect statistics and other information, showing the actual condition and progress of viticulture in this State and elsewhere; to collect information concerning lands suitable for

viticulture, and to impart to the public, upon proper demands being made, information concerning the localities of such lands, prices, cost of cultivation, and means of transportation, provided, that he shall receive no fee for such services; to correspond with agricultural and viticultural societies, colleges, and schools of agriculture, and other persons and bodies, political or private, and disseminate information, printed or otherwise, as he may be directed by the Board of Commissioners, and to prepare, as required by the Board, semi-annual reports for publication.

SEC. 8. And for the further promotion of viticultural interests, it shall be the duty of the Board of Regents of the University of California to provide special instruction, to be given by the Agricultural Department of the University, in the arts and sciences pertaining to viticulture, the theory and practice of fomentation, distillation, and rectification, and the management of cellars, to be illustrated by practical experiments with appropriate apparatus; also, to direct the Professor of Agriculture, or his assistant, to make personal examinations and reports upon the different sections of the State adapted to viticulture; to examine and report upon the woods of the State procurable for cooorage, and the best methods of treating the same; and to make analyses of soils, wines, brandies, and grapes, at the proper request of citizens of the State; also, to prepare a comprehensive analysis of the various wines and spirits produced from grapes, showing their alcoholic strength and other properties, and especially any deleterious adulterations that may be discovered. The Regents shall also cause to be prepared, printed and distributed to the public, quarterly reports of the Professor in charge of this work, relating to experiments undertaken, scientific discoveries, the progress and treatment of the phylloxera, and other diseases of the vine, and such other useful information as may be given for the better instruction of viticulturists.

SEC. 9. The Board of Regents of the University shall be authorized to receive and accept donations of lands suitable for experimental vineyards and stations, and shall submit in their next annual report an economical plan for conducting such vineyards, and for the propagation and distribution of specimens of all known and valuable varieties of grapevines.

SEC. 10. There is hereby appropriated, for the purposes mentioned in this Act, the sum of seven thousand dollars, to be apportioned as follows: For the necessary and contingent expenses of the Board of State Viticultural Commissioners, four thousand dollars, and for the University of California, three thousand dollars; and the State Controller shall draw his warrants upon the State Treasurer in favor of the Treasurers of the said Board of State Viticultural Commissioners, and of the University of California, for the amounts of four thousand and three thousand dollars respectively, as hereby appropriated, upon proper demand being made for the same; *provided*, that the said Board of State Viticultural Commissioners shall, in the month of December, submit to the Governor annual statements, duly verified by the oaths of the President and Treasurer, and attested by the Secretary of said Board, showing in detail the manner in which moneys received from the State have been expended, and also the amount remaining unexpended, together with an estimate of expenses for the ensuing year, beginning on the first day of July next thereafter.

SEC. 11. This Act shall take effect and be in force from and after its passage.

CHAPTER LI.

An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, and to authorize the appointment of certain officers, and to protect the interests of horticulture and viticulture.

[Approved March 4, 1881.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. The Board of State Viticultural Commissioners, in addition to the duties and powers provided for by the Act entitled "An Act for the promotion of viticultural industries of the State," approved April 15, 1880, shall, in respect to diseases of grapevines and vine pests, constitute a Board of Health. It shall, in addition to laboratory work, cause practical experiments to be made to determine or demonstrate the utility of known and new remedies against such diseases and pests.

SEC. 2. The Board shall elect of their own number, or appoint from without their number, a competent person to serve as Chief Executive Viticultural Officer, who shall perform also the duties of Viticultural Health Officer, under direction of said Board, and subject to removal from such office at any time by the Board.

SEC. 3. The Viticultural Health Officer shall have power, subject to the approval of the Board, to prevent the spread of vine diseases and vine pests, by declaring and enforcing rules and regulations in the nature of quarantine, to govern the manner of, restrain, or prohibit the importation into the State, and the distribution and disposal within the State, of all vines, vine cuttings, debris of vineyards, empty fruit boxes, or other material on or by which the contagion of vine diseases and germs of vine pests may be introduced into the State, or transported from place to place within the State; to declare and enforce regulations approved by the Board for the disinfection of vines, vine cuttings, vineyard debris, empty fruit boxes, and other suspected material dangerous to vineyards, while in transit, or about to be distributed, or transported into, or

within the State; to classify the vineyards and viticultural regions of the State, according to the degree of health, or vine disease prevailing therein, and to change the same as circumstances may require to be done, subjecting each class to such varying rules and relations, respecting the introduction or transportation of vines, vine cuttings, and other material liable to spread contagion of disease among vines, as may, in the opinion of the Board, become necessary and expedient for the preservation of vineyards. Such rules and regulations shall be circulated in printed form by the Board among the vine growers and fruit dealers of the State, shall be published at least thirty days in two daily newspapers of general circulation in the State, not of the same city or county, and shall be posted in a conspicuous place at the county seat of each county affected by their provisions.

SEC. 4. The Viticultural Health Officer may appoint local resident Inspectors in any and all of the viticultural regions of the State, whose duties shall be to report to him concerning the health of grapevines, the progress of vine diseases and pests, and all violations of the rules and regulations of the Board; to certify to the proper disinfection of vines, vine cuttings, empty fruit boxes, and other transportable articles required by the Board to be disinfected before transportation, or while in transit, or after delivery at any point of destination, the methods of disinfection to be determined and approved by the Health Officer and the Board; to seize upon and destroy all vines, vine cuttings, debris of vineyards, empty fruit boxes, and other material liable to spread contagion, which may be found in transit, or delivered after transportation, not certified to as required by the Board; *provided*, that the same may be exempt from such destruction if the cost of disinfection by such Inspector shall be provided for by the owner or agent in charge thereof, as may be prescribed for such cases of negligence, carelessness, or violation of quarantine rules, and to keep a record of all proceedings as such Inspectors; *provided*, that there shall be no compensation for such services of inspection, excepting a fee, not to exceed one dollar for each certificate of disinfection, in case of compliance with quarantine regulations, and not to exceed five dollars for each certificate of disinfection after seizure for non-compliance; *provided, however*, such inspection may be employed at the option of the owners of property requiring disinfection to disinfect the same. All vines, or other articles absolutely prohibited of importation or transportation, may be promptly destroyed by any Inspector discovering the same transported or in transit, in violation of regulations, and the cost of such seizure, together with a fee of ten dollars, shall be paid to such Inspector out of any fine that may be collected from the party or parties guilty of such violation. Willful violation of the quarantine regulations of the Board shall be considered a misdemeanor, and punishable by a fine of not less than twenty-five nor more than one hundred dollars. Whenever required for the convenience of vine or fruit growers, or fruit dealers, a resident Inspector shall be appointed upon petition of any three neighboring vine or fruit growers, or dealers in grapes, to reside in their vicinity, if not already provided for; and there shall be not less than two Inspectors appointed for each county which is subjected to such quarantine regulations, and they shall each be subject to removal at the will of the Viticultural Health Officer, if incompetent, or they fail to perform their duties, or are unreasonably distasteful to vine growers and grape dealers.

SEC. 5. It shall also be the duty of the Chief Executive Viticultural Officer to personally visit, examine, and report upon the several viticultural regions of the State; to prepare documents for publication, as required by the Board, relating to any and all branches of viticultural industry, including treatises for the instruction of the public; to supervise the preparation of reports for publication, and especially report upon the practicability and means of eradicating diseases from vineyards, and to superintend experiments with known and new remedies.

SEC. 6. All printing heretofore ordered by the Board shall be paid for out of the appropriations heretofore made for its use. All printing required hereafter shall be done by the State Printer.

SEC. 7. The salary of the Chief Executive Viticultural Officer shall be fixed by the Board, not to exceed one hundred and fifty dollars per month, for services while engaged as such officer, and his actual traveling expenses shall be allowed, not to exceed five hundred dollars per annum.

SEC. 8. The Board of State Viticultural Commissioners shall also appoint an officer, who shall be especially qualified by practical experience in horticulture for the duties of his office, to perform similar duties respecting the protection of fruit and fruit trees as are provided for in this Act in reference to grapevines, with like powers; and the salary and traveling expenses of such officer shall be fixed by the said Board at the same amounts provided for in the case of the Chief Executive Viticultural Officer; and the said Board shall have power to establish such quarantine rules and regulations as are required for the protection of fruit and fruit trees from the spread of insect pests.

SEC. 9. There is hereby appropriated for the uses of the Board of State Viticultural Commissioners, as set forth in this Act, and in the Act providing for its organization, out of any moneys in the State treasury not otherwise appropriated, the sum of ten thousand dollars for the year commencing July 1, 1881, and ten thousand dollars for the year commencing July 1, 1882; and the State Controller will draw his warrants upon the State Treasurer in favor of the Treasurer of the said Board for the said sums, or any part thereof, when they become available, upon proper demand being made for the same by said Board; *provided*, that no claim shall be paid out of such appropriation until the same shall have been presented to and approved by the State Board of Examiners.

SEC. 10. This Act shall take effect and be in force from and after its passage.

CHAPTER LXXV.

An Act to protect and promote the horticultural interests of the State.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. Whenever a petition is presented to the Board of Supervisors of any county, and signed by five or more persons who are resident freeholders and possessors of an orchard, or both, stating that certain or all orchards, or nurseries, or trees of any variety, are infested with scale bug, codlin moth, or other insects that are destructive to trees, and praying that a commission be appointed by them, whose duty it shall be to supervise their destruction, as hereinafter provided, the Board of Supervisors shall, within twenty days thereafter, select three Commissioners for the county, to be known as a County Board of Horticultural Commissioners. The Board of Supervisors may fill any vacancy that may occur in said Commission by death, resignation, or otherwise, and appoint one Commissioner each year, one month or thereabouts previous to the expiration of the term of office of any member of said Commission. The said Commissioners shall serve for a period of three years from the date of their appointment, except the Commissioners first appointed, one of whom shall serve for one year, one of whom shall serve for two years, and one of whom shall serve for three years, from the date of appointment. The Commissioners first appointed shall themselves decide, by lot, or otherwise, who shall serve for one year, who two years, and who three years, and shall notify the Board of Supervisors of the result of their choice.

SEC. 2. It shall be the duty of the County Board of Horticultural Commissioners in each county, whenever they shall be informed by complaint of any person residing in such county, that an orchard, or nursery, or trees, or any fruit packing house, storeroom, saleroom, or any other place in their jurisdiction, is infested with scale bug, codlin moth, red spider, or other noxious insects liable to spread contagion dangerous to the trees or fruit of complainant, or their eggs or larvæ, injurious to fruit or fruit trees, they shall cause an inspection to be made of the said premises, and, if found infested, they shall notify the owner or owners, or the person or persons in charge or possession of the said trees, or places, as aforesaid, that the same are infested with said insects, or any of them, or their eggs or larvæ, and shall require such person or persons to disinfect the same within a certain time to be specified. If, within such specified time, such disinfection has not been accomplished, the said person or persons shall be required to make application of such treatment for the purpose of destroying them as said Commissioners shall prescribe. Said notices may be served upon the person or persons owning or having charge or possession of such infested trees, or places, or articles, as aforesaid, by any Commissioner, or by any person deputed by the said Commissioners for that purpose, or they may be served in the same manner as a summons in a civil action. If the owner or owners, or the person or persons in charge or possession of any orchard, or nursery, or trees, or places, or articles, infested with said insects, or any of them, or their larvæ or eggs, after having been notified as above to make application of treatment as directed, shall fail, neglect, or refuse so to do, he or they shall be deemed guilty of maintaining a public nuisance, and any such orchards, nurseries, trees, or places, or articles thus infested, shall be adjudged, and the same is hereby declared a public nuisance, and may be proceeded against as such. If found guilty, the Court shall direct the aforesaid County Board of Horticultural Commissioners to abate the nuisance. The expenses thus incurred shall be a lien upon the real property of the defendant.

SEC. 3. Said County Board of Horticultural Commissioners shall have power to divide the county into districts, and to appoint a local Inspector for each of said districts. The duties of such local Inspectors shall be prescribed by said County Board.

SEC. 4. It shall be the duty of said County Board of Commissioners to keep a record of their official doings, and to make a report to the Board of State Viticultural Commissioners on or before the first day of November of each year, who shall incorporate the same in their annual reports.

SEC. 5. It shall be the duty of the Commissioners at large, appointed by the Board of State Viticultural Commissioners for such purpose, to recommend, consult, and act with the County Board of Commissioners, in their respective counties, as to the most efficacious treatment to be adopted for the extermination of the aforesaid insects, or larvæ, or eggs thereof, and to attend to such other duties as may be necessary to accomplish or carry out the full intent and meaning of this Act.

SEC. 6. Each County Commissioner and local Inspector may be paid five dollars for each day actually engaged in the performance of his duties under this Act, payable out of the county treasury of his county; *provided*, that no more shall be paid for such services than shall be determined by resolution of the Board of Supervisors of the county for services actually and necessarily rendered.

SEC. 7. Each of said Commissioners may select one or more persons, without pay, to assist him in the discharge of his duties, as he may deem necessary.

SEC. 8. If any County Board of Commissioners, after having received complaint in writing, as provided for in section two of this Act, shall fail to perform the duties of their office, as required by this Act, they may be removed from office by the Board of Supervisors, and the vacancy thus formed shall be filled in the same manner as provided for in this Act.

SEC. 9. Nothing in this Act shall be construed so as to affect vineyards or their products.

SEC. 10. This Act shall take effect immediately.

QUARANTINE RULES

FOR THE

Protection of the Viticultural and Horticultural Industries of the State.

VITICULTURAL QUARANTINE RULES AND RECOMMENDATIONS.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
OFFICE OF CHIEF EXECUTIVE VITICULTURAL OFFICER,
No. 111 Leidesdorff Street, San Francisco. }

To all whom it may concern: Be it known, that I, Charles A. Wetmore, Chief Executive Viticultural and Health Officer of the Board of State Viticultural Commissioners, being duly authorized and instructed by said Board, do declare the following quarantine rules and regulations for the protection of the viticultural industries of this State; and due notice is hereby given, as provided by law, thirty days of publication in two daily newspapers of general circulation, not of the same city or county, in this State, and by posting notices in all counties affected by these rules. All parties concerned therein are required to conform thereto, subject to penalties provided for by law for any infraction or evasion of said rules and regulations:

RULE 1. All cuttings of grapevines made in this State for sale, gift, or distribution outside of the vineyard or vineyards where the same were grown, and intended for new plantations, shall be made solely of the wood of the preceding year's growth; all older wood to be carefully and thoroughly removed before leaving the vineyard where made, and to be immediately destroyed by fire, if removed from such cuttings, wherever seized by any duly authorized Inspector for any invasion or infraction of this rule. The reason for this rule is, that the Winter egg of the phylloxera vastatrix is, according to the best authorities, found only on the old wood.

RULE 2. All cuttings of grapevines, and rooted grapevines, imported from any region or country outside of this State, intended for sale, gift, or distribution for plantation in this State, shall be disinfected at the place of first consignment within this State before being further distributed or planted, the method of disinfection to be at the option of the owner or agent in charge of the said cuttings or vines, according to any one of the following methods, viz.:

First—Dissolve sulpho-carbonate of potash in cold water; proportions, ten pounds of sulpho-carbonate to one hundred gallons of water; immerse cuttings and rooted vines fifteen minutes.

Second—Dissolve Little's soluble phenyle by pouring upon it cold water in the proportion of fifty gallons of water to one gallon of the phenyle; immerse cuttings and rooted vines ten minutes.

Third—Take two parts heavy oil of coal tar, two parts water, and one part carbonate of potash or carbonate of soda; put in a covered vessel and heat gently to boiling point for one hour; replace water lost by evaporation; pour into suitable vessels and agitate violently; dilute with fifty parts of cold water; immerse cuttings and rooted vines ten minutes.

Fourth—Dissolve carbolic acid crystals in water, in proportion to one pound of acid to twenty gallons of water; immerse cuttings and rooted vines ten minutes.

Fifth—Dissolve sulphide of potash in the proportion of one pound to twenty gallons of water; immerse cuttings and rooted vines twenty minutes.

Sixth—Dilute one part of "liver of lime" in twenty parts of water; immerse cuttings and rooted vines ten minutes. [N. B.—To make "liver of lime," take one pound quicklime, one pound sulphur, one gallon water; mix; boil over quick fire to one half of volume; agitate before using; dilute with twenty parts of water to one part of "liver of lime."]

Any other efficacious method may be used, provided due notice is given to this office and the same be approved.

INSPECTORS.

For the convenience and protection of all interested parties throughout the State, there will be appointed local resident Inspectors, as provided for by law, for each section or region where vine growers desire the same, and upon the application of any three such neighboring growers, or parties intending during the coming season to plant vines, such application to be addressed to this office, and to be accompanied, whenever practicable, with nominations of suitable persons for the office of Inspector. The other Inspectors required by law will be appointed by this office.

RECOMMENDATIONS FOR THE FURTHER PROTECTION OF VINEYARDS.

All persons planting new vineyards within the State are advised and strongly urged to consider all roots and cuttings suspected, regardless of origin, and to thoroughly disinfect them, thereby accomplishing the destruction of all possible germs of insect pests upon them, as well as also those of fungoid disease, which are becoming dangerous in all parts of the country.

CERTIFICATES.

For the further convenience of vine growers, certificates shall be issued by any Inspector residing near the vineyard of the applicant, or the person in charge of cuttings or rooted vines, setting forth that the provisions of Rule Two have been complied with, and shall be entitled to charge in each case not exceeding fifty cents for such certificates made out in duplicate, one certificate being sufficient to cover any quantity of cuttings or rooted vines in the possession of the applicant that may be satisfactorily shown to the said Inspector to have been disinfected. Certificates of disinfection shall likewise be given any applicant who desires the same, and who shall satisfactorily show to the Inspector that cuttings and rooted vines, other than such as are required to be disinfected by Rule Two, have been properly disinfected in accordance with the recommendations of this office.

INFECTED WRAPPINGS, ETC.

RULE 3. All packages and the packing materials coming into the State with imported cuttings and vines (referred to in Rule Two) shall be disinfected at the time of disinfecting the contents thereof, by immersing in or washing with any of the solutions named in Rule Two, provided that the strength of the same, in case of mere washing, shall be increased by the reduction of the water in the same to one fourth the relative proportions named. If not disinfected, such packages and packing materials shall be destroyed by fire.

PENALTIES.

All infractions or evasions of these rules will be punishable according to law.

CHARLES A. WETMORE,
Chief Executive Viticultural and Health Officer.

SAN FRANCISCO, November 16, 1881.

HORTICULTURAL QUARANTINE RULES.

To all whom it may concern: Be it known, that I, Matthew Cooke, Chief Executive Horticultural and Health Officer of the Board of State Viticultural Commissioners, being duly authorized and instructed by said Board, do declare the following quarantine rules and regulations for the protection of the horticultural interests of the State, and due notice thereof is hereby given as provided by law, to wit: thirty days of publication in two daily newspapers of general circulation in the State, and by posting notices in all counties to be affected by these rules. All parties concerned therein are required to conform thereto, subject to penalties provided for by law, for any infraction or evasion of said rules and regulations:

QUARANTINE RULES AND REGULATIONS FOR THE PROTECTION OF FRUIT AND FRUIT TREES

From insect pests, namely, insects injurious to fruit and fruit trees, authorized and approved by the State Board of Viticultural Commissioners of California. In pursuance of an Act entitled "An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, and to authorize the appointment of certain officers, and to protect the interests of Horticulture and Viticulture," approved March 4, 1881, the Chief Executive Horticultural and Health Officer may appoint local resident Inspectors in any and all of the fruit-growing regions of the State, whose duties shall be as provided in section four of an Act entitled "An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, and to authorize the appointment of certain officers, and to protect the interests of Horticulture and Viticulture," provided, that there shall be no compensation for such services of inspection, excepting a fee, not to exceed one dollar for each certificate of disinfection, in case of compliance with quarantine regulations, and not to exceed five dollars for each certificate of disinfection after seizure for non-compliance; provided, however, such inspection may be employed at the option of the owners of property requiring disinfection, to disinfect the same. And, also, said local resident Inspectors will be entitled to such other fees as are provided for in cases of conviction and seizures.

1. All tree or plant cuttings, grafts or scions, plants or trees of any kind, infested by any insect or insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, that are known to be injurious to fruit or fruit trees, and liable to spread contagion; or any tree or plant cuttings, grafts, scions, plants, or trees of any kind, grown or planted in any county or district within the State of California, in which trees or plants, in orchards, nurseries, or places, are known to be infested by any insect or insects, or the germs thereof, namely, their eggs, larvæ, or pupæ,

known to be injurious to fruit or fruit trees, and liable to spread contagion, are hereby required to be disinfected before removal for distribution or transportation from any orchard, nursery, or place where said tree or plant, cuttings, grafts or scions, plants, or trees of any kind are grown, or offered for sale or gift, as hereinafter provided.

2. All tree or plant cuttings, grafts or scions, plants, or trees of any kind, imported or brought into this State from any foreign country, or from any of the United States or Territories, are hereby required to be disinfected immediately after their arrival in this State, and before being offered for sale or removed for distribution or transportation, as hereinafter described; provided, that if on examination of any such importations by a local resident Inspector or the Chief Executive Horticultural Officer, a bill of health is certified to by such examining officer, then disinfection will be unnecessary.

3. Fruit of any kind, infested by any species of scale insect or scale insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, known to be injurious to fruit and fruit trees, and liable to spread contagion, is hereby required to be disinfected, as hereinafter provided, before removal off the premises where grown, for the purpose of sale, gift, distribution, or transportation.

4. Fruit of any kind, infested by any insect or insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, known to be injurious to fruit and fruit trees, and liable to spread contagion, imported or brought into this State from any foreign country, or from any of the United States or Territories, are hereby prohibited from being offered for sale, gift, distribution, or transportation.

5. Fruit of any kind, infested by the insect known as codling moth, or its larvæ or pupæ, is hereby prohibited from being kept in bulk, or in packages or boxes of any kind, in any orchard, storeroom, salesroom, or place, or being dried for food, or any other purposes, or being removed for sale, gift, distribution, or transportation.

6. Fruit boxes, packages, or baskets used for shipping fruit to any destination, are hereby required to be disinfected, as hereinafter provided, previous to their being returned to any orchard, storeroom, salesroom, or place to be used for storage, shipping, or any other purpose.

7. Transportable material of any kind, infested by any insect or insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, known to be injurious to fruit or fruit trees, and liable to spread contagion, is hereby prohibited from being offered for sale, gift, distribution, or transportation.

8. Tree or plant cuttings, grafts, scions, plants, or trees of any kind, may be disinfected by dipping in a solution composed of not less than one pound (1 lb) of commercial concentrated lye to each and every two (2) gallons of water used as such disinfectant, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

9. Empty fruit boxes, packages, or baskets, may be disinfected by dipping in boiling water, and allowed to remain in said boiling water not less than two minutes; said boiling water used as such disinfectant to contain, in solution, not less than one pound (1 lb) of concentrated potash, or three fourths ($\frac{3}{4}$) of one pound (1 lb) of concentrated lye, to each and every twenty gallons of water, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

10. Fruit on deciduous and citrus trees infested by any species of scale insect or scale insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, may be disinfected before removal from the tree, or from the premises where grown, by washing or thoroughly spraying said fruit with a solution composed of one pound (1 lb) of whale oil soap and one fourth of one pound of flour of sulphur to each and every one and one quarter ($1\frac{1}{4}$) gallons of water used as such disinfectant, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

11. Owners of fruit of any kind grown in any orchard, nursery, or place in which trees or plants are known to be infested with an insect or insects, or the germs thereof, namely, their eggs, larvæ, or pupæ, known to be injurious to fruit or fruit trees, and liable to spread contagion, and all persons in possession thereof or offering for sale, gift, distribution, or transportation, are hereby required to procure a certificate of disinfection before removal for sale, gift, distribution, or transportation.

12. Any tree or plant cuttings, grafts, scions, plants, or trees of any kind, empty fruit boxes, fruit packages, or fruit baskets, or transferable material of any kind, offered for sale, gift, distribution, or transportation, in violation of the quarantine rules and regulations for the protection of fruit and fruit trees, approved by the Board of State Viticultural Commissioners, may be seized by the Chief Executive Horticultural and Health Officer, or by any of the local resident Inspectors appointed by him; said seizure to be the taking possession thereof, and holding for disinfection, or for an order of condemnation by a Court of competent jurisdiction.

13. Any person violating the above quarantine rules and regulations shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by fine of not less than twenty-five nor more than one hundred dollars.

MATTHEW COOKE,

Chief Executive Horticultural and Health Officer.

RULES RECOMMENDED

By MATTHEW COOKE, Chief Executive Horticultural Officer,

For the Protection of Fruit and Fruit Trees from the Ravages of Insects.

RULE 1. It shall be required of every fruit grower, owner of an orchard or orchards, or lands containing fruit trees, or persons in possession of lands on which there are any fruit tree or trees which are infested with codlin moth, its larvæ or pupæ (chrysalids), to destroy said codlin moth, its larvæ, or pupæ, before the first day of March each year, by scraping off all rough bark on said trees, and cleaning all crevices in bark and crotches. The scrapings must be gathered carefully and destroyed by burning or otherwise. (A spread made of old grain sacks, or other cloth material, should be spread on the ground around the body of the tree before scraping.) After scraping, the tree should be washed with an alkaline wash made from a soft soap containing at least nine per cent. of potash. This soap, when made, mixed with twenty-five per cent. of its weight with flour of sulphur. One pound of this mixture to each gallon of water used for washing trees. Instead of this wash, the whale oil soap and sulphur mixture known as codlin moth wash, one pound to each gallon of water; or, a mixture containing not less than one pound of commercial concentrated lye to three gallons of water.*

RULE 2. All vegetable and other growth must be cleaned off the ground around trees infested with codlin moth, its larvæ or pupæ, before the fifteenth† day of May of each year, and the soil made as smooth as possible, provided that all premises under water at that time may be excepted as to date.

RULE 3. All boxes or packages stored in orchards or adjoining storerooms, sheds, or premises, from one season to another, especially those used for the shipment of apples, pears, and quinces, from orchards known to be infested with codlin moth, etc., or boxes and packages known to have been in contact with such, must be disinfected by dipping in boiling water for at least two minutes, such water to contain in solution not less than one pound of commercial potash or five eighths of a pound of commercial concentrated lye to each twenty-five gallons of water used for such disinfection.

RULE 4. All salerooms, storerooms, and packing-houses where fruit or fruit boxes, or packages used in shipping pears, apples, or quinces, or any other kind of fruit infested with codlin moth, its larvæ or pupæ, or scale bugs (insects), or any noxious insects known to be injurious to fruit or fruit trees, have been used or stored for any purpose, must be thoroughly disinfected as prescribed by the Chief Executive Horticultural Officer, or local Inspector, or County Horticultural Commissioner of district in which the premises are located.

RULE 5. All fruit infested with codlin moth, scale bugs (insects), or any noxious insects known to be injurious to fruit and fruit trees, must be picked off the trees and destroyed by cooking or feeding to hogs, or in any other manner satisfactory to the County Horticultural Commissioner or local Inspector of the district where such tree or trees bearing such fruit are located.

RULE 6. Before the fifteenth† day of May in each year, one or more bands of cloth or paper must be placed around each apple, pear, or quince tree contained or growing in any orchard where such trees or their fruit are known to be infested with codlin moth, its larvæ or pupæ. (Burlap, cut or torn in slips about eight inches wide, preferred.) The band or bands to be fastened around the body of the tree by cord or wire, or in any manner satisfactory to the Horticultural Commissioner or local Inspector of the district where such tree or trees are located.

RULE 7. The bands must be examined every seventh day, and the larvæ or pupæ found therein destroyed.

RULE 8. All fruit trees, plants, or scions (excepting grapevines and cuttings), infested by scale bugs (insects), must be thoroughly disinfected by dipping or otherwise washing in an alkaline mixture containing not less than one pound of commercial concentrated lye to every two gallons of water, or by such wash as may be satisfactory to the Horticultural Commissioner or local Inspector of the district where such trees are located or in store.

RULE 9. Any fruit tree or trees, plants, or scions, in any orchard or in any place, infested by

* Where the washes containing sulphur have been used, they have proved an excellent preventive against mildew.

† In districts where fruit ripens later than at Sacramento, the dates in Rules Nos. 2 and 6 may be made fifteen days later, viz.: thirtieth day of May.

red spider (mite), must be thoroughly washed with an alkaline wash as prescribed in Rule 8, or by such wash as may be satisfactory to the Horticultural Commissioner or local Inspector of the district where such trees are located or in store.

RULE 10. Empty boxes or packages returned from market, or any place whence shipped, with fruit infested with codlin moth, its larvæ or pupæ, or scale bugs (insects), or any noxious insects known to be injurious to fruit or fruit trees, or known to have been in contact with any boxes or packages containing fruit infested by said insects, must be disinfected by dipping in boiling water as prescribed in Rule 3.

RULE 11. In cases where notice is served to disinfect empty boxes or packages just returned from market or in transit, the time allowed from date of notice shall not be less than one day.

RULE 12. In cases where notice is served to disinfect empty boxes or packages used the previous year, the time allowed from date of notice shall not be less than three days.

RULE 13. In cases where notice is served to destroy fruit on trees infested with codlin moth, its larvæ or pupæ, or any noxious insect or insects known to be injurious to fruit or fruit trees, the time allowed from date of notice shall not be less than six days.

RULE 14. In cases where notice is served to place bands on trees as prescribed in Rule 6, the time allowed from date of notice shall not be less than ten days.

RULE 15. Any tree or trees, plants, or shrubs (grapevines excepted), infested by any species of scale bug (insect), red spider (mite), or any noxious insect or insects liable to spread contagion to fruit or fruit trees, must be disinfected with an alkaline wash as prescribed in Rule 8, or such wash as may be satisfactory to the Chief Horticultural Officer, or local Inspector, or County Horticultural Commissioner of the district where such trees are located.

REPORTS OF C. H. DWINELLE,

PRESIDENT AND COMMISSIONER AT LARGE.

PROTECTIVE MEASURES NEEDED.

[Remarks of C. H. DWINELLE, at the quarterly meeting of the Board September 29, 1881.]

If there was before any doubt as to the need of protection for our horticultural interests against the insect pests which are being imported and disseminated through our State, the experience of the last six months must have removed it. While these visits were comparatively few in number, and the fruit which they injured low priced, the damage done was not considered serious. Now matters are changed. The pests have increased enormously, and at the same time the market price of many kinds of fruit has risen very much. Foreign markets have been secured where our products are highly appreciated, and climatic disasters have fallen upon other producing regions, which have reduced the world's supply of choice fruit. Meanwhile rates of interest have fallen so much on this coast that capitalists are more inclined to loan money in the country, and not a few of them are themselves investing in orchards. From these various causes horticulture has received a great impetus. Methods of culture and desirable varieties are much better understood than formerly; so that it is comparatively easy to secure good crops of profitable fruit. The greatest dangers to the industry are now from insect enemies. It is known that most if not all of these can be mastered by vigilance and industry. The important question now is, who are to be one's neighbors? Will they breed pests for the orchards of the thrifty, or will they have intelligence enough to study the habits of noxious insects, and pluck to fight them? Many who formerly denied the need of a war on insects now advocate it, as they see that the prosperity of the whole neighborhood depends upon it. Education in economic entomology is the first step towards changing an obstructionist to an ally in this movement. The patient and zealous labors of our Executive Officer, Mr. Matthew Cooke, both in the field, and latterly at the State Fair, deserve the highest commendation.

The elements of general entomology should be taught in all of our public schools, and also the life history of our most common injurious and beneficial insects.

Return packages, boxes, and baskets still continue to be most efficient means of disseminating pests. The fruit growers about a common shipping point should combine to establish facilities for disinfecting packages on their return from market, by scalding, or other means. Prizes should be offered for the best and cheapest free packages to go with the fruit. A fifty-pound apple package is particularly needed. Fruit infested with insects should be driven from our markets; and in this matter municipal regulations could be called in as efficient aid.

The tenant system threatens to be a serious obstacle to a high standard in horticulture. This is particularly the case where orchards are let to foreigners having an imperfect knowledge of our language. Orchards should never be let without a stipulation that they are to be kept free from noxious insects, in accordance with existing laws and the interests of the owners.

THE FRUIT INTERESTS.

At the quarterly meeting of the State Board of Horticulture, held June 29, 1882, President Dwinelle made the following report, as Committee on Rules and Regulations:

It seems fitting at this time to look back a few months and see what has been accomplished in the matter of horticultural quarantine against the spread of pests injurious to fruit and fruit trees, and to consider the present state of affairs, and see what is needed in the future. I am happy to say that leading nurserymen have maintained their high standing by adopting willingly the rules commended in regard to disinfection of trees and other plants sold.

San José will soon be noted for the healthy and clean condition of its nurseries, which some time ago had such an unenviable reputation. No one can now plead ignorance of the law, nor of the existence of insect pests. Any one selling infested nursery stock in ignorance is, to say the least, criminally careless. When he does it knowingly, he is a swindler of the worst description, who not only defrauds his customer of his money, but also sows the seeds of destruction in his orchard. Against such men should be brought to bear all of the resources of the law. Even if the Acts of March fourth and eleventh, 1881, be declared unconstitutional, or swept away, there are, fortunately, still statutes under which one can punish those who take his money and in return give that which is worse than valueless. The traffic in infested fruit has also been checked to a notable degree, but there is still too much of it that is exposed for sale which is neither creditable to the grower nor profitable to the consumer. The Board of Health would do well to turn their attention to this matter. Does any one cry out that I am hurting his business by these statements? I reply that it must be a bad business that depends for profits on the sale of trees infested with scale bugs, apples and pears riddled by worms, or plums and currants coated with bark-lice. Any honest man can clear his reputation by inviting an impartial examination of his commodities, and their mode of treatment, by competent and unprejudiced persons of known high character.

IMPORTING PESTS.

For several years I have been warning the public against the importation of new pests from abroad with nursery stock, seeds, or other transportable material. I am pleased to know that this warning, coupled with that of others, has had some effect. Our Chief Horticultural Officer has several times been called upon by consignees or their neighbors to inspect trees arriving from the East. This is well, but such inspection should be made universal. We know of at least one carload of peach trees that were imported from

a noted peach-growing region of the Atlantic coast—noted alike for its fine fruit and the insects which prey upon it—which seems to have escaped inspection. It is to be hoped that the importer and his customers may not have an experience similar to that of the Spanish, who are reported to have eluded the quarantine officers in importing vines from France so successfully as to introduce phylloxera in their before favored country. I do know that last Spring I received a letter from a gentleman residing in Wilmington, Delaware, asking how he could fight the curculio in his peach orchards. He stated that his loss in fruit last season, through the ravages of that insect, was \$20,000, and that my answer would be of interest to the owners of 3,000,000 peach trees. The curculios infesting fruit might be imported by the dozen, and pass under the eye of any one not trained to look for them, without being perceived. They are small gray beetles, about the size of a grain of wheat, which, if alarmed, simulate death, and are easily mistaken for a bit of dry earth. There is one for the plum, apricot, peach, and nectarine, another for the apple, and so on. I cannot say whether they now exist in this State, but I can assert most emphatically that their general dissemination would be a calamity which, in its pecuniary effects, could be measured by nothing short of millions. I have raised in Western New York as fine crops of apricots and plums as ever grew, while my neighbors hardly knew these fruits, excepting in a worm-eaten state. The labor and expense involved in so doing were, however, such as no California orchardist would voluntarily add to his present burdens.

WORMY PEACHES AND APRICOTS.

Some growers of stone fruits, whose knowledge of insect ravages has been mainly limited to those of the codlin moth, have objected to quarantine on the ground that their fruit needed no protection. All such show their ignorance of their business, and of the myriad of pests which threaten it. They cannot have seen the various scale insects (coccidæ) which not only render those fruits unfit for food, but also kill the trees themselves, root and branch. This Spring I found a small brown speckled larva attacking the young shoots of the apricot at Berkeley. It is about as long as, but more slender than, the larva of the codlin moth, and entering the young shoot near the tip, it hollows it out downward, causing it to wither and turn black. From one of these I bred a dark colored moth, but have not yet determined its species. I am told that the same pest has appeared in the interior, and has done considerable damage, particularly where it has attacked newly budded stocks. On the twenty-fourth of this month (June) I bought a peach in Oakland which contained a larva closely resembling that of the codlin moth. Subsequent investigations among the commission houses of San Francisco showed that the new enemy had made an attack in force. In some lots of peaches the majority contained these worms. Its presence is usually indicated by the brown castings which it throws out from a small hole, which may be next the stem or at any other part of the fruit. In its early stages it is white, with black head and six black feet. Later the body becomes of a smoky hue. It will probably prove to be a close relative to the codlin moth. If it has a second and third generation this season, what are

the canners to do for choice late peaches? The cherries and apricots have also been attacked in places by caterpillars, which ruin their market value.

NEED OF CLEAN PACKAGES.

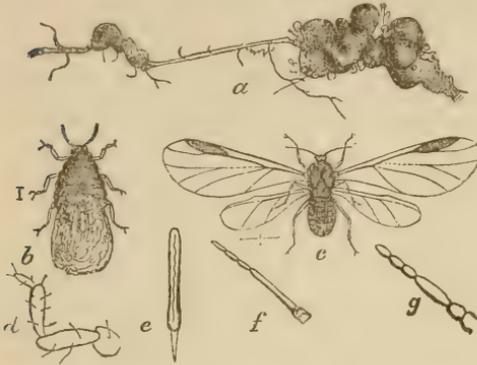
All of these pests are brought to our city markets in greater or less quantities with fruit and its packages. What are we to think of the judgment of orchard owners who wish to have their packages returned from such a pest-house without disinfection? I predict that, in the not distant future, men now opposed to horticultural quarantine will look back with amazement at their present position. Let us hope that it may not then be too late to save their property from destruction. Professor J. Henry Comstock says, in the United States Agricultural Report for 1880, "The system of exchange of fruit boxes which is practiced in some markets, notably in San Francisco, is a very dangerous one * * * and, in any case, when boxes are sent to a market where fruit from infected orchards is received, they should be scalded on their return. This precaution will tend to check the spread of the codlin moth and other pests, as well as scale insects." Professor C. V. Riley gives similar advice as to apple barrels in Missouri.

We are pleased to know that many of our California orchardists have given orders to have all of their packages scalded before leaving San Francisco. They are men noted for their success in horticulture, achieved by intelligent attention to the details of the business. Others have solved the problem by adopting the free box, to go with the fruit. This can now be had at a very low price. Where the canner allows half of the original cost of the package, the actual value of the empty package to the producer is reduced to one or two cents.

In my conversation with orchardists I have found none opposed to the execution of the laws intended for their protection, excepting such as had not yet an adequate knowledge of the danger threatening them. Others, who have felt the scourge, ask that all return of packages be forbidden, and that the importation of fruit and fruit trees from infested regions outside of our borders be absolutely prohibited, or subjected to the strictest quarantine. As to what step must be taken in this latter regard I leave to the suggestion of those who have their money invested in the industry threatened. It is not too much to say that the man who has any interest in fruit production or selling in this State, and yet places obstructions in the way of the execution of laws intended to foster that industry, is his own worse enemy, and a blind leader of the blind.

WOOLLY APHIS ON APPLE AND PEAR TREES.

At the meeting of September 28, 1882, President C. H. Dwinelle made a statement of observation and experiment upon the woolly aphis, to the following effect:



WOOLLY APHIS OF THE APPLE TREE.

Schizoneura lanigera. Hausman.

a, Infested root; *b*, reddish brown larva with woolly matter on its back; *c*, winged insect, with the woolly matter removed from the body, which is dark brown; *d*, leg of the perfect insect; *e*, beak; *f*, antenna of winged insect; *g*, antenna of larva—all greatly magnified.

Synonymous names:

Aphis lanigera. Hausman.
Coccus mali. Bingley.
Eriosoma mali. (Leach MSS.) Samouelle.
Myzozylus mali. Blot.
Schizoneura lanigera. Hartig.
Penpligius pyri. Fitch.
Aphis (*Schizoneura*) *lanigera*. Ratz.

against the pest. In answer to my inquiries, John Lewelling stated that he had found seedlings of the Golden Russet and Rawle's Jennet to be free from the attacks of the woolly aphis, and that in selecting young stocks he found those with deep, straight roots to be better than such as had fibrous roots near the surface. He also commends placing lime and wood ashes about the crown of the tree as a remedy for the aphis. Afterwards John Rock, of San José, presented to the University two trees of a local seedling stock, which, as far as he had observed, was free from woolly aphis. They were planted in an infested orchard, and repeated attempts have been made to colonize them by placing twigs covered with the insects about them in the soil. Thus far none have been observed upon them. If they withstand for another year, we shall think that a very valuable stock has been discovered.

SPRAY FOR TOPS.

In fighting this insect on the tops of trees, admirable results have been obtained in the University orchard by spraying in Summer and early Autumn with a hot decoction of tobacco. One pound of tobacco to one gallon of water is the strength when first made, but from one to three times as much water is added before use. The tobacco used is the refuse stems and sweepings from the San Francisco factories. To secure efficiency the greater strength is preferred.

Some months ago, at a meeting of the State Horticultural Society, I called attention to the woolly aphis as the most threatening enemy to apple culture on this coast. While the codlin moth thins out the fruit, this aphis stunts or destroys the whole tree. On the limbs it causes unsightly swellings and distortions, checks the growth of wood and fruit, encourages the growth of the leaf fungus (*Fumago salicina*), and makes the tree a foul and disgusting object. Where it attacks the roots, they, too, show excrescences, and eventually become decayed and useless. The similarity of the insect to the phylloxera of the vine suggested to me the search for a resistant stock on which to work apples, and thus render them proof

The liquid is strained, and applied by means of a Merigot force pump and bug spray. The wire gauze is removed from the nozzle, and the diaphragm having the largest opening is used, so as to secure a free passage for the fluid. The nozzle is held within a few inches of the infested limbs, so that the process is more a washing than a spraying one. The leaves are also drenched as far as practicable, both under and upper sides. The temperature of the liquid in the barrel from which it is pumped is maintained as nearly as practicable at 130° Fahrenheit. This is not very difficult to do by adding a pailful hot from the boiler occasionally. This is the same remedy recommended by Ellwood Cooper, of this Board, after using it with success against the black scale of the olive (*Lucanium oleæ*). Trees that were languishing under myriads of the aphid were vastly improved by the washing. The destruction of the aphid allowed the sap to nourish the apples, and they increased very rapidly in size.

APPLICATIONS FOR THE ROOTS.

We have not as yet had satisfactory results in treating the roots of the infested trees. Gas lime destroyed the insects, but injured the roots badly, where drainage was imperfect. It may prove to be safe on deep, well drained soils, in small quantities—say a shovelful on a circle of six feet in diameter. Experiments should be tried cautiously, and at first on trees of little value. The effect on the insects and trees cannot be judged of until there has been a good deal of rain or irrigation to carry the solvent parts of the gas lime down through the soil. Carbon bisulphide is on trial, and may prove to be the remedy sought when we know just how to apply it.

DANGER AHEAD.

The season's experience has shown a wonderful increase in the pest in its old haunts, and its appearance in new ones. An active campaign against it should be begun at once. The owners of some of the oldest and heretofore most productive apple orchards in the State tell me that, unless a remedy is found, there will be no profit in apple culture in the future. The Chilean Consul says that at one time this pest swept off the wild apple trees in Chili. This season the pest has been observed in Alameda County, on the pear as well as the apple. Further observations as to resistant stocks should be made by those who have opportunity. The winged form of the woolly aphid will appear within the next few weeks, and it is important that as many of them as possible should be destroyed before that time. Infested trees that are not worth fighting for should be destroyed at once; grub them out, with at least two feet of the roots, and burn them. An old stump, with a few suckers about it, would breed enough of it to keep up the stock of the neighborhood. The pest is well established in many of our nurseries, and the greatest care should be exercised to insure the disinfection of trees bought this winter. The roots as well as the tops should be dipped in weak lye—one pound of the commercial article to one gallon of water—or soaked in soapsuds or tobacco decoction, after cutting off and burning all roots that have been injured by the aphid.

REPORT OF W. B. WEST.

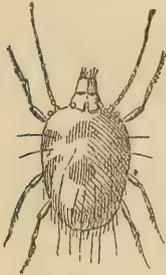
THE RED SPIDER.

STOCKTON, September 20, 1882.

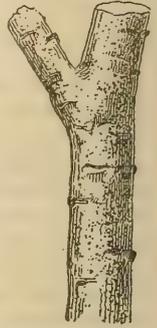
To the Board of State Horticultural Commissioners :

GENTLEMEN: I beg leave to report the following account of my work with the red spider:

Among the most serious insect pests with which the warm and dry portions of our State are affected, is the red spider, or mite. It is probably indigenous, as it is found upon the oaks and willows, and even upon the grass, weeds, and shrubs, along our streams. This insect attacks the leaves of the almond, plum, walnut, chestnut, and gooseberry, and does great damage by checking their growth. Upon the apple and pear its work is not so destructive, and the apricot suffers but little. The damage to nursery trees is considerable. On very dry years, it attacks the fruit tree stocks, rendering budding difficult, also checking the growth of yearling trees. In my



RED SPIDER OR MITE.
(Greatly magnified.)



Branch covered with
eggs of Red Spider.

experiments upon nursery trees, I have used water syringed upon them, afterwards dusting with sulphur. I have also used the codlin moth wash made of whale oil soap and sulphur successfully. This is for the live insect.

Experiments upon my orchard of 2,000 prune trees, three and four years old, commenced in June of 1881—the trees badly infested with the green aphid and red spider. Used the codlin moth wash as strong as the leaves, then mature, would bear it—one pound to one gallon of water. The experiment was only a partial success, as most of the spiders were on the under side of the leaf and some escaped; although most of the insects were destroyed. The aphides were destroyed, so that I had no further trouble with them. A similar syringing was given later in the season, with about the same results. By the first of August, the leaves showed the effects of the work of the red spider, being quite yellow.

The next experiment was upon the egg. It commenced on the eighth of January, 1882. Used a solution of concentrated ley, one pound to the gallon of water. The experiment, like the previous ones, was not a perfect success. Some of the eggs were destroyed, but a majority of them escaped; a portion of them protected by rough bark, and others fully exposed, were not killed. I find the eggs of the red spider to be very difficult to get rid of. There is trouble in getting a solution of ley to act upon them; they being round, and perhaps covered by some secretion which resists the ley.

Subsequent experiments with different washes, seems to prove that a strong solution of codlin moth wash, to which has been added *tobacco* is the most efficient. It is difficult to give the strength of the solution of tobacco used, as tobacco itself differs so much in strength. This must be determined by experiment.*

On or about May 23, 1882, I found that some of the insects were hatched out and at work upon the leaves. About the middle of June I again applied the codlin moth wash and tobacco, which killed nearly all the insects and many of the eggs, but not all, the solution being much weaker than should be applied in the winter for the egg.

The eggs seemed to be nearly all hatched out by this time, but still I found a supply of the spider, and the leaves showed their ravages, but not nearly as much as they did the year previous.

I found a large number of eggs on the sacks with which the bodies of the trees were wrapped. These should be burned in the fall, also all weeds and trash in the orchard.

Old, and badly infested trees, such as almonds, apple, and pear, should be scraped and the scrapings burned, as the eggs will hatch on the ground just as well as on the trees.

The result of my experiments is, that although my orchard is not entirely free from the insect, it shows a marked improvement, and I would say to those similarly situated, use a solution of whale oil soap and sulphur, to which has been added tobacco. Use this strong in winter, and weaker after the leaves are out. By persistent syringing you will find the enemy to be nearly exterminated and your trees very much benefited.

W. B. WEST,
Commissioner for San Joaquin District.

* One pound of average tobacco, well boiled in one gallon of water, makes a decoction which can be diluted by an equal measure of water, and will prove fatal to aphides and young scale insects. Probably this strength will be about right for use in connection with the codlin moth wash of whale oil soap and sulphur.—C. H. Dwinelle.

REPORTS OF FELIX GILLET,

COMMISSIONER FOR THE EL DORADO DISTRICT.

HORTICULTURAL INTERESTS.

[Presented at the meeting held June 30, 1881.]

To the President of the Board of State Horticultural Commissioners, San Francisco:

DEAR SIR: Being unable to absent myself from home for the present to attend the meeting of the Board of State Horticultural Commissioners, to be held at San Francisco on the thirtieth of this month, I beg leave to lay before the Board my views on the important questions to be considered at that meeting.

The situation in which the horticultural interests of this State are placed by the ravages of noxious insects is certainly alarming, and justly creating a general uneasiness among those engaged in the various branches of agriculture; for California, which, for years, was relatively free of such pests, has to-day to confront a world of destructive insects, like scale bugs, aphids, borers, codlin moths, worms, flies, mites, phylloxera, etc., and which, as if giving each other the word, are falling upon this "promised land" of ours as a band of ravens on a dead animal, to devour and ruin it. But the alarm has been sounded in time, and to help the ever vigilant agriculturist in his fight against those insect pests, a Horticultural Commission, composed of men known to be foremost in the field of practical pomology, was formed under the auspices of the State, its duty being to advise and suggest, after a careful examination of the situation, what could be done to check if not stop the alarming march of that army of minute but redoubtable and relentless enemies. So rapid, however, has been the spreading of the obnoxious insects all over the country, and so great is the alarm caused by their devastations, that, without waiting for the results of the numerous experiments now in progress throughout the State, a great many people, and at their head the leading papers of San Francisco, are clamoring for the appointment of a State Entomologist, as the best and quickest way of checking the invasion and repelling the insects' attacks.

I do not doubt for a moment that a competent person, with a salary that would enable him to give the subject his whole time, would be highly beneficial to the agricultural and horticultural interests of the State. But to think that nothing short of an entomologist will make the insects go, and that the appointment by the State of such an officer would be the surest way of rescuing this land from the grip of that great pest, is, let me tell you, a mere delusion. To fight successfully those insects, the first thing we have to do, I am well aware, is to acquaint ourselves with their habits. Now, to find out the habits of insects, some of them so minute that a microscope is required to detect them at all, is not a very easy work; it requires a great deal of time, patience, and observation, and with, sometimes, no satisfac-

tory results to reward us for years of research and study. In this way would the entomologist be of great service and value to us, but to leave it altogether into the scientist's hands would be unwise. See what has been going on in some parts of Europe for the last twenty-five years. What have they achieved there, with an army of the best scientists in the world, in fighting out these destructive pests that attacked their orchards and vineyards, and also in dealing against those maladies that devastated their cocooneries? Science, after proving a failure, left the field entirely to the practical men of the land—those who owned the orchards and vineyards, and those who raised silkworms. A State Entomologist, I repeat it, would be a good help in making known the various kinds of insects that prey on the green things of the land, so that we might fight, with a chance of success, all those of whose habits something definite is known. Otherwise a full description by the entomologist of the noxious insects, though it might prove highly interesting, would only satisfy our curiosity concerning our enemies, and, in most cases, amount to nothing else.

Take the twig-boring beetle, for instance, or *Polycaon confertus*, as our State Entomologist, if we had one, would say, and whose ravages are commencing to tell throughout the State. "Where they come from," says a correspondent of the Rural Press, "is a mystery." Still they keep on boring into twigs of olive, almond, chestnut, etc. What does the learned entomologist say about that little beetle? Professor Comstock, of the Department of Agriculture at Washington, to whom specimens of the beetle were sent, says: "So far as I know, its habits have never before been published. The only remedy is to cut the infested twigs, and burn them before the insect escapes." Well, this boring beetle is nothing else but a California production; it is a parasite of the oak, upon which I have traced it myself right in our forests; and I assure you, by what I know of this beetle, that the remedy suggested by Professor Comstock is totally impracticable. If our oak forests were replaced, instead of being made less and less every year, it may be that this *Polycaon confertus* would let alone the various trees of our orchards, and be content to feast upon the native trees.

The simplest remedies are very often the best. At a time when there was no official entomologist, they had their own way of fighting the destructive insects. To get rid of the common cabbage lice, which in certain years were becoming too thick around, they had the little coccinalla, or lady bug, which, both as a perfect insect, or in larva state, accomplishes an incredible consumption of plant lice: to go after the innumerable beetles, snails, spiders, worms, etc., that infested their gardens, and that bred thicker than was desirable, they had the toad, one of the most useful animals to be had in gardens, and which in some countries constitutes an article of commerce, being bought by gardeners to be let loose on their land: insectivorous birds were protected by law; animals, like the land turtle, the hedgehog, and others were, with the toad, made regular members of the garden household, while an immense amount of insect hunting was done by hand. But this is an age of progress; all that has been changed, and in lieu of those primitive modes of fighting garden pests we have entomologists, well versed in insects' anatomy, and infernal drugs, from bisulphide of carbon to cyanide of potassium.

I should think that in a State like ours, composed of intelligent farmers, of practical horticulturists, of men of learning, we could, by uniting those separate forces, get quicker and surer at the root of the evil; find remedies and devise means to do away with the insect pests. The formation of the Viticultural Commission was a step in the right direction, and subsequently the formation of this Horticultural Commission was another step as good and wise as the former. Next, what we want is the formation in every county interested of a local Horticultural Commission, which Commissions would act as so many branches of the Central or State Commissions. This is what Mr. Cooke, Chief Horticultural Officer, has been urging since his appointment, and Mr. Cooke's idea is correct.

The Board of Supervisors of this county will be petitioned at their next meeting, on the fifth of July, for the appointment of a County Horticultural Commission; and it is to be hoped that Mr. Cooke's suggestions will be also heeded in every other county in the State. It is by such means, and by giving cohesion to our separate efforts, that we may be able at last to check successfully, and before the damage done to our orchards, vineyards, and fields, be irreparable, the invasion of the noxious insects.

To recapitulate, I would, as a member of this Advisory Board of Horticulture, advise the appointment of a competent entomologist, to be provided and maintained by the State; the formation in every county in the State of local Horticultural Commissions; and the enlargement of powers of the central organizations. I would also recommend to have the entomologist under the direct control of the State Commissions, and with a salary large enough to enable him to go to any part of the State where his services may be required, and to there study the habits of the destructive insects, and with the local Horticultural Commissioners devise means for destroying or at least checking their devastations.

As to the codlin moth, I will here state that its ravages in this part of the country are quite alarming. As my time has been so far all taken up by the various occupations on my place, I have had yet but few opportunities to study this redoubtable pest, and as I do not wish to speak upon a subject that I have not thoroughly investigated, I will postpone to some future time my report on both the codlin moth and fruit trees borers.

Yours, very respectfully,

FELIX GILLET.

NEVADA CITY, June 25, 1881.

THE CODLIN MOTH.

To the Board of State Horticultural Commissioners:

GENTLEMEN: At the first meeting of the State Advisory Board of Horticulture, held on the fifth of April, 1881, a committee consisting of Messrs. Cooke and Gillet, was appointed to report on the occurrence and ravages of, and on the remedies against the codlin moth. Having been unable to confer with the other member of said committee in regard to a common report, I take the liberty of submitting the following one, independent of any report to be submitted by Mr.

Cooke. In the great fight of man against those minute enemies of fields and orchards, whose ravages on the plants and trees that furnish us with what constitute a larger part of the commodities of life, we have to contend against such forces as:

First—The minuteness of the enemy.

Second—Its facility as winged insects to evade our pursuit, and also to spread in an incredible short time over a large extent of land, thus foiling at every step our attempts at capturing them.

Third—Its immense numbers and its appalling breeding propensities.

No wonder that in this unequal contest of man against those minute animals, the former has to call to his help all his science, all his talent of observation, all his cunning and patience. Then he has to study the habits of the insects, look round for allies, and taking example on nature herself, take from her the very means that she lays within his reach to fight the ravagers' hordes. But let us see how nature proceeds wherever trees and plants are left entirely to her care. There, for instance, springs up a luxuriant growth, so fresh, so green, so inviting as to call forth the ravagers' coming, and sure they will not be long in coming, for caterpillars and bugs of all kinds will soon be at work devouring everything before them; and under such favorable surroundings breeding in immense numbers, so much so that those species of the vegetable kingdom they are feasting upon are doomed and bound to be completely annihilated. But nature, always wide-awake, is watching closely over that destruction, and as she does not mean to have a single species of plants destroyed altogether, she sends forth against the too numerous insects an army of parasites, birds, and insects, large and small, to prey on them, and thus prevent their too fast production, or in other words, keep them within bounds, and at the same time, save the plants from utter destruction. In this way does nature keep up the balance of power between the vegetable and animal divisions of her domain.

Now, how is it with man's productions? Here is a field, there's an orchard—all the work of man. The insects, and their name is legion, are not slow to come round, and everything is so favorable for their over production, that in a very short time they have spread all over the land. What is man going to do?

The presence of insects is hardly noticed at the start; but as their ravages increase, it creates uneasiness, though hardly anything is done towards driving out the invaders from field or orchard; everything is left to nature—a cold or wet winter, it is hoped, will get rid of the pest. But no; the ensuing year the insects are again at work, and in larger numbers yet. This time man is pretty well scared, and he implores nature to do something to save his crops and come to his aid. Well, nature is certainly a good mother that takes as good care of the smallest plant or insect as she does of the largest tree or animal; but it is not nature's mission to defend the productions of man and preserve his fields against the ravages of noxious insects. Nature has nothing to do with those trees and plants raised and cared for by the latter, so that nothing is left to man but to imitate nature, and, getting hold of those insects that prey upon other insects, hurl them against the marauders that infest his land. I have reference to the large family of ichneumonidæ, those minute insects, so small, and yet so capable of rendering to man the greatest services, for, small as

they are, by their preying as they do upon the noxious insects of our fields, they in reality keep man from starving. This may be, in fact, regarded as the key to the whole situation.

Foremost among those pests that cause us so much trouble, is the codlin moth, the old *Pyrallis pomona* of the French, better known now under the name of *Corpocapsa pomonana*, or *pomonella*; a new comer on this coast. There was none a few years ago, and now it is found all over this State; it is a regular invasion. No matter how large or small is the orchard, not a tree escapes its ravages. Distance is no obstacle to its spreading. It started from the valleys a few days ago, yesterday it reached the foothills, to-day it is right up in the mountains, to-morrow it will be everywhere. So far, the codlin moth has had its own way—almost a clear field before it. The beautiful climate of California has even been an incentive to its already great breeding propensities, and instead of two broods a year as in the Eastern States, it is breeding here continually from April to October. If its ravages are not checked pretty soon, the apple and pear crop of California is in great danger of being annihilated. What is to be done? In view of the steady spreading and ravages of this and other insect pests, Commissions have been formed throughout the State, and under the supervision of the State, whose duties it is to study those pests, devise means toward checking their ravages, and see that the law in regard to their destruction be enforced.

Rules have been adopted by all those Commissions, wherever formed; by those rules the orchardist is requested to make an incessant war on the larvæ and pupæ of this codlin moth or any other insects injurious to fruit or fruit trees; scrape off the loose bark of the trees under which the larvæ find a ready place where to build their little nests; apply a sulpho-alkaline wash upon the body and main branches of the tree; tie bandages around the trees so as to entrap the larvæ hunting for a resting place where to spin their cocoons; disinfect boxes used for packing fruit, and so forth. This is very good, and, if it were done to the letter by every owner of fruit trees, whatever be the number of trees he may own, it is reasonable to expect that it would do much toward lessening the numbers of the enemy and thus preventing still greater destruction in our orchards. But it is very hard to make every one comply with those rules, simple and easy to be applied as they are. There will always be certain people that will neglect what they are requested to do, though those rules are for their and the general public's good. Some will say that they will have enough apples and pears left, anyway; others, that apples are not worth picking, and they don't care; and this and that. And what will the consequences be? That the work done by those of our people who "care" to destroy the larvæ and pupæ of the codlin moth, will have been almost done in vain.

But even if those rules could be strictly enforced wherever there is an apple, pear, or quince tree, I doubt very much whether it could eradicate from the land that pest. Something else has to be done, something more easy of application; it seems to me that our efforts ought to be directed also against the perfect insect, particularly at the opening of spring, when fruit trees are blooming out, and the codlin moth is escaping from its pupal tomb, where it has passed the whole winter, and before it has had time to deposit its eggs in the calyx of the blossom. I admit that there are many obstacles in the way; that we are groping in the dark, so small, so swift, so seldom

to be met with is the dreaded little moth. But I maintain that we shall never be masters of the field unless we make a general war against the three forms under which we find the codlin moth, viz.: the larva, pupa, and perfect insect. In fact there are many obscure points to clear up concerning the habits of that moth; and if we want to be successful in driving it out of our orchards, it is of the first importance to ascertain whether it has any parasites, and to what extent, and on what it does feed when a perfect insect, if feeding on anything at all. To fight, capture, or destroy the perfect insect or moth, three ways present themselves, viz.: First, poison; second, light traps; third, ichneumon flies. If the codlin moth feeds on something when in the perfect state, then poison may be resorted to; and as it is a nocturnal moth, light traps may be invented to capture it. (I intend myself to use some kind of traps next spring.) But the simplest and most efficient way of fighting the codlin moth, and all other like pests, and fighting them all round at the same time, without any rules to be enforced, ought to be to pitch against them ichneumon flies. When we consider what immense services those hymenopterous insects do render to agriculture, when in numbers large enough to do any good, it is surprising that those States that have spent already such large sums of money to fight noxious insects, and that have lost still more through their depredations, have never tried to raise ichneumon flies by the million, and let them loose wherever there are any insect pests to destroy. Why, in fact, should not we raise predaceous insects to fight noxious insects? If we want to imitate nature, and it is the best thing we could do, why not do like her and hurl the ichneumonidæ against all those pests?

In three hundred species of ichneumonidæ, we ought to find the very kind that prey on the larvæ and pupæ of the codlin moth. In the perfect state the ichneumonidæ, which are insects of very active habits, are found on flowers or leaves; but in the larval state they live upon and within the larvæ of larger insects. The ichneumonid female may be seen running and flying with agility upon leaves and plants, moving all the time right and left her antennæ or horns, searching between the leaves, in the smallest cracks of the bark, in crotches and crevices, where she expects to find something; and that something is a grub or a pupa into which to thrust one solitary egg. Every species has its own way of depositing its eggs in the body of the grub, destined to feed its little ones; and as soon as a grub is found, the little ichneumon fly will, without hesitating, and quick as lightning, thrust its sting, fine as the finest silk, into the flesh of the unconscious grub, and there deposit one egg. Whether her ovipositor, which is saber-shaped, is short or long, stout or light, curved or straight, the ichneumon goes after her prey, or rather her little one's prey, right under the bark of trees, in the ground, anywhere; she may not see it, but, guided by an admirable instinct, she will deposit that egg, through that ovipositor, on that part of the grub's body, where it has to be laid to permit the young larva to subsist and grow into the flesh of the grub, with the least hindrance; and by the time the grub it has been feeding upon will be ready to accomplish its metamorphosis, the parasite will gnaw into a vital organ, kill the grub, and itself issue, after awhile, from its dead body a perfect insect, to go to work again, without stopping, and accomplish the same series of marvelous metamorphoses.

When we see what a desolation and ruin is caused by insect pests nowadays in wheat, cotton, and other fields—in vineyards, orchards, and forests—I ask again, why shouldn't we take hold of such means as nature has placed within our reach in fighting the noxious insects, and oppose to those bands of ravagers, armies of ichneumonidæ, chalcididæ, and syrphidæ? Why shouldn't we go to work and raise those insects, as we do already coccinellæ, toads, and other predaceous animals—as we do maggots for hens' feeding, and silkworms for the silk they spin? There is no reason why we shouldn't, after finding out what species of ichneumonidæ, chalcididæ, and syrphidæ we would have to oppose to the various species of noxious insects that are presently devastating our fields and orchards; then we could at the proper time hurl armies of those domesticated or civilized insects against the invaders' wild cohorts, and no doubt that victory would be ours. I am well aware that such a result cannot be obtained without very long and tedious efforts; that we would have first to call to our help the entomologist's services; educate our people on the importance of acquiring a certain knowledge of the natural history of insects; call for the aid of the State to establish "stations" where to raise the predaceous insects, and teach the farmer and his sons how to do it themselves. Let me tell you that this question of insect warfare has never been yet properly handled. As well in the old world as in the new it is altogether in its infancy; and here we have to depend mainly on ourselves, so little have we to profit by the experience of all other countries on this vexed insect question, of such vital importance to the agriculturist and horticulturist of California.

In conclusion, therefore, I would suggest to this Board of Horticultural Commissioners, to recommend to the Commission under whose auspices it is acting, the adoption of certain measures necessary to put in operation the suggestions made through this report, viz.:

First—The appointment of an Entomologist to be provided and maintained by the State, and whose duties it would be to act with the Horticultural and Viticultural Commissions of the State in their war against insect pests.

Second—The encouragement by all possible means of the study of entomology, as it would be almost indispensable for our farmers and horticulturists to acquire some knowledge in the natural history of insects, and be able to tell the difference between predaceous and noxious insects—the study of entomology being an easy and very attractive study.

Third—The awarding of premiums by the State and horticultural commissions or societies for the best traps to capture perfect insects.

Fourth—The establishing by the State, and under the supervision of the State Horticultural and Viticultural Commissions and Entomologist, of "stations," where to raise and learn how to raise predaceous insects of the kinds that prey upon the noxious insects that are making such ravages in our orchards, vineyards, and fields.

FELIX GILLET,

Commissioner for the El Dorado District.

Nevada City, September 12th, 1881.

ENEMIES OF THE MULBERRY TREES.

To the President of the Board of Horticultural Commissioners :

SIR: I would beg to call the attention of the Board of Horticultural Commissioners to a statement made at the last meeting of the State Horticultural Society, in regard to scale bugs having been discovered on mulberry trees. The reports of that society's meetings being given a widespread publicity, as it should be, throughout the State, what otherwise had passed almost unnoticed or been treated as a harmless statement, becomes, under the present circumstances, an injury, wantonly or thoughtlessly done, to a growing interest of the State.

It is a well known fact, that no parasites whatever have ever been seen feeding on the leaves of the mulberry tree, with the exception of the *Bombyx mori*, or silkworm; and neither have any insects, so far, been found on the roots or bark of that tree. This immunity from parasites with the mulberry tree is, indeed, very remarkable. There are numerous instances of this kind in Italy and France, when all the trees around the mulberry were infested with insects, while the latter was entirely free from them. But Dr. Gibbons, of Alameda, showed a branch of a mulberry at the last meeting of the Horticultural Society, which was covered with scale bugs; though the learned doctor was unable to tell whether they were of the same kinds as the other kinds so plentiful in Santa Clara and Alameda Counties. We all know that in the beautiful but insect-struck valley of Santa Clara, scale insects have multiplied in such immense numbers, that they are found almost on everything, on all kinds of fruit trees, on eucalyptus, locusts, poplars, rose bushes, live hedges, etc.; and so thick are they in some places, that it is no wonder the few mulberry trees scattered about have, like everything else, fallen a victim to that pest.

But when the mulberry tree is publicly denounced as a "pestiferous" tree, because of some scale bugs being found on its wood in that scale-covered valley, I believe it is nothing but justice to that young industry, silk culture—that may or may not succeed in establishing itself in our midst—to investigate that matter; and, in my judgment, the Board of Horticultural Commissioners is the proper body to ascertain whether the mulberry tree in California is a "pestiferous" tree, unfit to be raised on account of being attacked by scale bugs.

I would, therefore, offer the following resolution:

WHEREAS, It has been publicly reported that the mulberry in California is a "pestiferous" tree, and unfit to be raised on account of being infested with scale insects; and, whereas, we consider such a report as doing great injustice to a growing industry in this State, silk culture; be it, therefore,

Resolved, That the Chief Executive Horticultural Officer is hereby instructed to investigate the condition of mulberry trees throughout the State, as far as insect pests is concerned, and report at the next meeting of the Board in what counties are scales or any other insects to be found on mulberry trees, and to what class of scales or insects they belong.

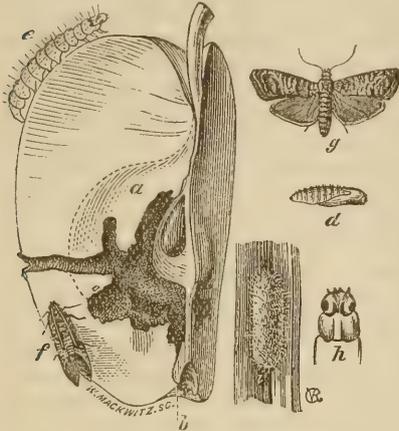
FELIX GILLET.

(See the report of the Chief Executive Officer on this subject, page 50.)

THE CODLIN MOTH.

To the Board of State Horticultural Commissioners:

GENTLEMEN: As a member of the above committee, now that the campaign against the codlin moth may be considered as over for the season, I deem it proper to lay before you, and for your consideration, this second report on the occurrence and ravages of, and the remedies against, the codlin moth.



CODLIN MOTH AND APPLE WORM.

Work of the apple worm or codlin moth and the insect in various stages;* *a*, section of an apple ruined by the burrowings of the larva, and channel by which it leaves when full grown at the left; *b*, the point at which the egg, for the first brood, is usually laid, and at which the young worm enters; *c*, the worm or larva, full grown, with black or brown head, body white when young, cream colored at maturity, and pink just before changing to chrysalis; *e*, head of larva magnified; *f*, the cocoon which it spins, usually under a scale of bark; *d*, the chrysalis to which the larva changes in the cocoon, of an amber or chestnut-brown color; *g*, the moth which escapes from the chrysalis, at rest; *h*, the same with wings expanded.

Size of moth: Length, seven sixteenths of an inch; spread of wings, nearly three fourths of an inch. Color of moth: Body, richly bronzed light drab; fore wings, mottled gray and drab, with dark coppery bar across hind margin, or a golden eye spot near inner angle; hind wings, plain drab, a little darker than body. Cocoon: White inside, but usually so covered with minute pieces of surrounding bark, etc., as to be overlooked by a careless observer.

* After Riley. Cut loaned by civility of Pacific Rural Press.

Thanks to the experience of last year, our County Commission was better prepared this year to meet that dreaded little pest, watch its march and progress, check its ravages, and last, tell how well those remedies recommended for its destruction did their work. We, therefore, came to the conclusion that the best thing proposed yet for entrapping the worms as soon as they leave the fruit, was a band of barley sack, doubled up around the tree, and two inches above the ground, and an old burlap sack, or any old cloth, thrown right into the forks of the tree. Of course, it is understood that the bodies of the trees have been scraped clean during the winter, and all loose bark removed. It is surprising how many worms will lodge themselves under the sack or cloth thrown into the forks of the tree, and under the band near the ground. So much so that I am convinced that in any isolated orchards, the whole of the first brood may thus be captured, and the most of the crop of fruit saved.

Mr. Cooke, in his treatise on noxious insects, recommends to examine the bands every seventh day. Now I do not see the necessity of examining the bands so often, for we must take into consideration the trouble, and even expense, it puts the owner of fruit trees to. Let us simplify, as much as we can, our rules, if we want people to observe them more generally, and do what is recommended towards fighting that pest of our orchards. Every twelfth day will do, and this is obvious from the fact that the moth does not emerge as a perfect insect until the fifteenth day after the larvæ has crept under the band to accomplish its metamorphosis, it taking the worm five days to assume the pupa or chrysalis state, and another ten days to issue a perfect insect from the chrysalis. This is the way I do: The day I examine the bands I put it down on my memorandum

book, so as to recollect the date, and the twelfth ensuing day I examine again, and so on to the first or tenth of September, according to the character of the season; but from that time I let the bands stay till after every apple is off the tree, when I examine the bands for a last time, removing all the larvæ found therein. From the first of September no more moths will hatch out as perfect insects, and all the worms found under the bands from that time have already gone into winter quarters.*

This year, and in this part of the country, the codlin moth made its first appearance about the fourth of May, and kept on hatching out rather irregularly every day during the whole month; it is very likely that irregularity in hatching as perfect insects that induced some of our horticulturists to put forward the opinion that there were in California three broods, if not four, of the codlin moth during the whole season. Having watched very closely all the movements of the codlin moth around this place, I am positive that it did not go through more than two generations. The second brood of moths hatched out from the twenty-eighth of June on, and it is the worms from that brood that since the twenty-fifth of August have gone and are going into winter quarters. I figured that it took fifty-four days for each brood, or that many days for the moth to develop after the egg from which it originated had been deposited by the female moth on the fruit. I consider it of the first importance to have bands on the trees at the time the worms of this second or last brood are leaving the fruit and in search of a place where to build their winter nest. The bands may stay on from that time for weeks or months without being examined; any time during the winter will do to examine them for the last time and remove all the nests or worms found under the bands.

Thus it is plainly shown how admirably this band system works for entrapping the worms; the only trouble is, that where orchards are close together the work of entrapping the worm is not, as it ought to be, attended to by every one, so as to render it more effectual yet. When examining the bands, I kill with a knife all the worms that I find under them, and put back against the body of the tree the very same side of the cloth with the dead bodies of the worms on. I have found out that it serves as a bait for a voracious minute little ant that gets under the bands, and, after doing away with the dead bodies of the worms, attacks the live ones before they have had time to finish their nests. Everything helps, and though the worms devoured by the ants would have probably been captured when examining again the bands, still I believe that it is well to cultivate in those little ants that taste for the larva of the codlin moth.

Now, in regard to washing the trees with the alkaline wash recommended by your Commission, my opinion is that it ought to be dispensed with. The scraping of the trees and removing of all loose bark during the winter or before the first of April is sufficient to

* These observations are interesting and valuable for the region in question, but in some portions of the State the insect has been repeatedly observed to change from larvæ to chrysalis and moth in eight days, in others nineteen days. Some orchardists also report the date at which it is safe to neglect the frequent examination of the bands as a month later than that given by Mr. Gillet.

The best results attained this season by the band system have been where they were examined every seventh day. One gentleman thus saved all but one or two per cent of his yellow Newtown pippins, and sold them at a handsome price, while his neighbors lost between fifty and one hundred per cent of theirs.—C. H. DWINELLE.

remove all the worms that may have built their nests under the rough bark or in crevices; and the application of a wash, which in ninety-five cases out of a hundred does not get at a single worm, is only putting the orchardist to more trouble and useless expense. When people ask what has to be done towards fighting the codlin moth, and they are told to first scrape their trees, then wash them, and on the fifteenth of May put on bands, which have to be examined every seventh day, they almost invariably say that it is too much work, that it is too complicated, and they finally let the thing go by default. So I say again, let us simplify our rules as much as we reasonably can, if we want to have them more generally observed by owners of fruit trees.*

In my first report to your Commission, I dwelt at length on the importance of finding parasites of the codlin moth, as being the simplest and surest way of fighting that pest and putting a stop to its depredations. In that view, I corresponded with some of the leading entomologists of France, but they didn't know, and in every case they referred me to Prof. Riley, the eminent American entomologist who occupies the chair of entomology at the Department of Agriculture at Washington. It is to say that we have nothing to expect in that line from the old world, with their fine body of "savants;" and we have to rely solely on our own resources and the intelligence and energy of our people. Entomology may be regarded so far as nothing else but a "negative" science, which is of very little help to us, for it is not so much the anatomy or Latin name of the noxious insect that we care for as its habits. To successfully fight all insect pests, the first thing we have to know is their habits and all about their parasites. "Practical" entomology is yet a myth, and it will not be before it has been completely developed that entomology may be called a "positive" science.

Here is a very good illustration of the services rendered to us by some of these parasites or predaceous insects. The cabbage lice, you are all well aware, are very troublesome insects, and which on certain years spread out so fast and thick that it is almost impossible to grow any cabbage heads. This very Summer, these scourges of the king of the crucifereæ, made suddenly their appearance in immense numbers, all over the State. Of course I had my share of them, though



LADY-BIRD.
Dormant pupa and
active beetle.

I did not care, being prepared for them. I immediately hunted up the little coccinella or lady-bird, which is very common in all gardens; to that effect I took along with me a little steel pen box with a hole big enough to slip in the little beetle. Then, after having captured a certain number of the beetles, I carried them to my cabbage and rutabaga patch, and let them loose among the lice. They literally cleaned them out, no matter how fast the latter multiplied. The lady-bird's larvæ also fed on the lice, and whenever I found any, I carried them to the cabbage patch.

In 1872, when the cabbage lice were a great deal worse than this year, I paid boys fifty cents for a hundred of those lady-birds, through

* The alkaline wash not only destroys such larvæ as it touches, but also invigorates the tree, and destroys moss and lichens. The bark becomes smooth, and there is much less chance for the larvæ to hide until they come to the traps which are set for them. Many who have tried the alkaline wash commend it highly, aside from its effects on the codlin moth.—C. H. D.

whom I got rid of all the lice that had spread all over the cabbages, after I had tried all kinds of washes, soap suds, ashes, lime, etc. It is a simple and rational remedy, and a cheap one, too. The reason why the lady-birds have to be carried from other parts of the garden to the very spot where cabbages and rutabagas have been planted, is that like all coleoptera, they fly with some difficulty, usually a very small distance at one time; and it might take them the whole Summer before traveling from one end of the garden to the other. The shortest way, for the lice multiply very fast, is therefore to hunt up the lady-bird all over the place and carry it where its services are so much needed.

In conclusion, I will say that in regard to the codlin moth, I will be more able another year to tell how successful will have been our present way of fighting that pest. In the meantime, I would respectfully suggest to your Board to simplify your rules when the time will have come to adopt new ones, in the manner recommended in this report.*

FELIX GILLET,
Of Committee on the Codlin Moth.

NEVADA CITY, September 8, 1882.

SULPHO-CARBONATE OF POTASSIUM,

AS A REMEDY AGAINST THE APPLE ROOT LOUSE.

To the Board of State Horticultural Commissioners:

GENTLEMEN: If the codlin moth has to be dreaded for the damage it causes to the apple crop, the root louse may be feared as much for the injury it does to the tree itself. I do not believe that there is an orchard in the whole State that is not more or less infested with that scourge of the vegetable kingdom. In most cases, the trees very badly affected manage to live, but show real signs of decay, that tell on the fruit, which does not grow so large and fine; and after lingering in that condition for some years, dragging along as stunted trees, they finally die, killed by that minute little pest.

Having two apple trees on my place, bearing trees, with roots pretty well infested with root lice, I tried, last Spring, the following experiment: First I dug all around the trees, on a radius of four feet, a hole funnel shaped, carrying away the dirt and whatever of the roots came out with it, the latter so badly affected with lice that they had no shape at all. Then I filled the hole with a solution made of a strong decoction of tobacco stems and sulpho-carbonate of potassium, and filled up with new clean dirt. On the twenty-third of September I examined the roots of those trees, and found them as much infested with lice as they were before I applied the solution. The experiment was a failure.

I had also a little apple stock, one year old, whose roots were covered all up with lice when taken up from the seed-bed; I washed the

* See Rules Recommended, page 12.

roots well with cold water, and let the trees soak for twenty-four hours in a light solution of sulpho-carbonate of potassium, and set them out at once. I examined the trees lately, which in the meantime had grown nicely, and didn't find a single root-louse around them.

I therefore concluded that sulpho-carbonate of potassium was powerless to destroy lice on the roots of large trees, for the reason, probably, that it couldn't reach them, but that it might be used with advantage on young stock. Want of time prevented me from performing, during the Summer, more experiments with sulpho-carbonate of potassium, and to better test its insecticide properties; so that I could not, for the present, either reject or recommend it as a good insecticide.

FELIX GILLET.

NEVADA CITY, September 8, 1882.

REPORTS OF ELLWOOD COOPER,

COMMISSIONER FOR THE STATE AT LARGE.

DISEASES OF THE OLIVE.

ARTICLE No. 1.

To the Board of State Horticultural Commissioners:

GENTLEMEN: I have the honor herewith to submit a partial report on the insect pests that have committed such terrible ravages on the olive; not only in California, but in almost every part of the world where the olive is grown.

The history of the olive is full of interest, as it carries us back to the earliest history of man, and where we find him in his most primitive state or condition, regarding the tree with a value almost sacred; an appreciation that recent generations have not respected, otherwise we would not be called upon to-day to make the struggle in fighting the diseases of which I propose to discuss in this communication. My attention was called as early as 1874 to the condition of the trees in and around Santa Barbara, from the ravages of the *Coccus olio*, commonly known as the black scale,* and which was always followed by the black fungus. In 1875 I visited the mission orchards of San Diego, San Gabriel, San Buenaventura, and Santa Barbara, and in 1876, San Luis Obispo. At the latter place I learned from the mission fathers, through the late Hon. Judge Murray, that the disease had appeared about fourteen years before that date, fixing the date of its appearance in California at about 1862. Prior to that time they had had uninterrupted success with their olive trees. These examinations, very carefully made, determined in my mind one of two alternatives: either to keep the trees free from the scale bug, or root them out. I chose the former, and have been fighting it without any cessation ever since. I believe all my olive trees are clean, and are at this writing loaded with a beautiful fruit crop.

An olive tree once attacked with the scale bug, unless cleaned, will be soon infested so that it cannot bear fruit. Such fruit as is borne during the period of rapid increase of the insect, will not make oil. There are trees enough in the southern part of the State, if properly cleaned and cared for, to produce many thousands of gallons of oil, while, with a few exceptional orchards, I do not believe one single gallon could be made. This is the condition everywhere where the insect is prevalent. The attack is fatal unless it is at once destroyed, and it is useless for any orchardist to fortify himself behind theories that something will turn up to counteract the ravages, or that the ants will destroy them, or that some enemy or parasite will appear to do the work which he cannot escape. The whole business will be

* See Black Scale, *Lecanium oleæ*, in Dr. Chapin's report.

bankrupted anything short of total annihilation of the insect. In some districts on the northern coast of the Mediterranean the spread of this insect has become so alarming that the question of abandonment is contemplated. The ravages have baffled the efforts of their wisest men. To give some idea of the rapidity with which it will spread, I quote from a very interesting treatise, a pamphlet of ninety pages, written by Alfred Lejourdan, Agricultural Engineer; published in Marseilles in 1864; title *Maladie Noire*. It is in this work estimated that one female coccus will produce from two thousand to four thousand eggs. By one author that one coccus in five generations will produce *five billions ninety-four millions*; by another that ten generations are produced in one year, and allowing only one hundred as the reproduction of each, we will have at the end of the year from one single female *one billion billions*. Fortunately for us there are too many things contingent that prevent the possibility of such increase—high winds, birds, and insects of various kinds destroy the greater number; still, in favorable years the rapidity with which they will spread will require our greatest energies and intelligence to counteract. In a very exhaustive work on the olive, compiled by A. Coutance, Professor of Natural Science in the School of Medicine, published in Paris in 1877, it is claimed that the silence of authors on this malady caused during a period of twenty years great ravages. Let us not commit the same blunder; and, if we are to foster the culture of the olive in this country, the valuable portions of such works as above mentioned, and of other books on the subject, should be translated into English and made accessible to all the cultivators where the olive can be grown.

The ravages of this insect are of quite recent date. Lejourdan states that it appeared for the first time at Nice, in 1743, and that Bernard wrote on the subject in 1783; that there were no other writers before that time; that all the Roman authors of the first half of the eighteenth century were silent upon the subject. It was in 1783 that all the proprietors in some localities trimmed down their trees to mere trunks in order to clean them, and commence with new trees. It is certain that a malady, so characteristic with such a disagreeable aspect, could not have escaped the observation of authors. Abbe Conture presented a memoir to the Academy of Marseilles, about the same time that Bernard wrote, in which he declared that the *Coccus olio* was observed for the first time in 1781. Captain Cousin states that in 1861 this malady made terrible havoc in Kabylie (a part of Algeria), where the olive formed almost the only resource of the people. It was the more alarming because they could find no successful remedy.

In Cousin's report, he makes the statement that the greater part of the Kabyles preferred to leave the trees without any effort to remove the insects or the black fungus, and that an orchard attacked would not give fruit before ten years, thus intimating that the disease would die out of itself in about that time. I have found in no other writings any intimation or possibility of the let-alone theory accomplishing the work. Regarding the coccus and the black fungus there are various opinions. Some contend that the black is caused by the humidity and the want of ventilation and sunlight in the tree. This theory is accompanied by the statement that the black fungus is seen without any appearance of the coccus, and that the

coccus is to be seen without any appearance of the black fungus; some that it is caused by the smoke from chimneys; others that it is caused by the northern winds, carrying the sea air through the trees; others still that it emanated from the ground. But the principal and accepted theory is that it is caused by the attack of the coccus; the piercing of the bark of the limbs and twigs by these little insects causing the emanation of sap or some substance from the tree or from the insect, or both, which falls on the upper side of the leaves, as also on the trunk and branches, and produces the fungus.

In my examinations and observations I have never seen the black fungus unless preceded by the insect, and that where the tree was affected the black was always on a lower level than where the insect was working, proving conclusively that the black was only a consequence of the insect work. And sometimes where there are comparatively few insects on a tree, it may be several months before there is any appearance of black. When the black fungus completely covers a tree it is quite possible to destroy the insects, and the black will remain for a long time afterwards; in fact when the trunk and limbs or branches are completely coated, it is very difficult to get it off; it becomes a paste and adheres as firmly as glue, and cannot be removed without the application of strong soap or some other substance equally powerful.

It is my opinion that with little care large districts could be kept free from this scale insect. I do not believe they would spread a distance of ten miles, unless carried on plants. Birds will spread them readily a distance of two miles.

In closing this part of the subject I lay down the following facts:

First—That severe frosts will kill the insects, but the number of degrees and limit as to time through which the cold should be extended, and yet not do serious injury to the tree, is beyond my knowledge, for the reason that I have had no opportunity to extend my investigations.

Second—That trees planted close to the sea will resist the attack better than anywhere else. The cold sea winds evidently counteract the spread of the insect.

Third—That high table lands or plateaus will be easier to keep free from the insects than bottom lands, where there is more moisture in the soil, and generally more humidity in the atmosphere.

In my next article, which I hope to have ready for our next regular meeting, I shall treat of the remedies for the prevention, as well as for the extermination of this insect pest.

ELLWOOD COOPER.

SANTA BARBARA, September 29, 1881.

DISEASES OF THE OLIVE.—REMEDIES.

ARTICLE No. 2.

To the Board of State Horticultural Commissioners:

GENTLEMEN: In regard to remedies for the diseases named in my first article, pruning is the most essential thing and the remedy of the greatest vital importance. If trees are properly pruned, so as to admit of free circulation of air and sunlight, more than half the battle is made; in fact, trees in such condition, where the ground is well tilled and kept free from rubbish, are not so liable to the attack, and if attacked, each scale insect can readily be seen and should be removed without delay. Orchardists who adopt this plan will have very little trouble even in badly infected districts. A casual examination of several different parts of each orchard should be made as often as once a month—this can be done on horseback or in a light wagon—and in the event of the appearance of scale insects, then a careful examination in that part, and a remedy applied to exterminate them. The insects will be found to inhabit that portion of the tree where the foliage is most dense, where the sunlight is shut out and free circulation prevented. There is not so much in the remedy as in its application. While certain remedies may be effectual in the hands of some, in the hands of others they will not be sufficient. "Eternal vigilance is the price of success." Constant watching and constant fighting is the only sure plan to prevent the spread of insect pests in localities where trees are affected.

There are doubtless very many remedies, that if properly applied would accomplish the work; and the expense would not be so great as to absorb the profits to be derived from the products of well kept orchards. On young olive trees, not badly affected, whale oil soap can be applied with a stiff brush very successfully, and at cheap cost; but on large trees this plan is impracticable. I find in French books, where the subject is treated at great length, numerous remedies advised, which I translate as follows: Scraping off, powdered sulphur, petroleum, boiling water, lime water, hyposulphite of lime, wash with alkaline, smoking with coal tar. Also, "proper drainage, the tillage, removing rubbish, the lopping off of every useless twig are necessary precautions; the application is difficult and the success uncertain where there are millions of insects. The pruning is of the greatest importance, and the orchardist who neglects this important part will find that the pests will resist all efforts at extermination."

In my correspondence several years ago with Professor J. E. Planchon, President of the Horticultural Society of Montpellier, France, the following was recommended: "Syringe the trees with a solution of sulphate of soda, and powder them immediately after with powdered lime—a caustic soda is then produced which destroys the insects." Bisulphide of carbon has been used with deadly effect on the most dangerous enemy to citrus fruit that was ever known.

The cost is moderate, and the application not difficult, so that it should attract the attention of fruit growers as an insect destroyer.

The remedies that I have experimented with are whale oil soap, a decoction of tobacco, phenyle, and pyroligneous acid.

First—Whale oil soap, as I have already stated, can be used effectually on small olive trees at very cheap cost.

Second—A decoction of tobacco is simple, inexpensive, and, if properly applied, an effectual remedy for every class of insect pests that I have come in contact with. Forty pounds of good, strong leaf tobacco, thoroughly boiled in water, will make about eighty gallons. This can be thrown upon the trees with a garden syringe,* but it is necessary that the decoction should be kept, while using it, at the uniform temperature of 130 degrees. Hotter than this will destroy the embryo fruit; less hot, less effectual. I would recommend four applications each year, until the orchards are entirely free from insects. Then, if the neighborhood was free, and proper precautions taken, with pruning alone, could be kept free for generations to come. Every orchardist must grow his own tobacco, which he can do in a small way, if he attends to it properly, at a cost of two cents per pound. One acre will produce 4,000 pounds. We have, therefore, allowing two gallons of the decoction to a tree for each application, the following cost: One pound of tobacco, two cents; two men can boil the tobacco and syringe 100 trees daily; \$1 25 for each man, and board, would be \$2 50, or two and a half cents per tree, which, with the cost of tobacco (two cents), equals per tree four and a half cents; four times each year, eighteen cents. On olive trees producing fifty gallons of berries (valued at four cents to the pound), the whole cost of thorough cleaning would be less than two and a half per cent of each yearly crop. On orange, lemon, and lime trees, about the same.

Third—Phenyle. With this remedy my personal knowledge is limited, but from experiments made by others, I am satisfied it has very valuable properties, and do not hesitate to recommend it. It costs \$1 50 per gallon; can be diluted with fifty parts of water to one part of phenyle, making the cost of the dilution for a tree wash only three cents for each gallon.

Fourth—Pyroligneous acid is probably more effectual than any other known remedy, but the present cost of seventy-five cents per gallon makes it too expensive for common use in syringing trees. It is my opinion that it can be manufactured for ten cents per gallon, perhaps less, then diluted one half with water, would make the admixture cost five cents per gallon.

The labor in applying either in swabbing or syringing trees is much less than with tobacco, as it does not require to be heated. The most important properties that any remedy can possess, provided that it has about the same insect destroying power, is that it should not be disagreeable to handle, no unsafety in keeping it in any place, and that it should not require to be heated to be effectual. If it be dangerous in itself, the orchardists will always be in dread; if it require heating to a certain number of degrees, the many little necessary preparations will afford ample excuses for delays, or if it be exceedingly disagreeable to handle, the putting-off plan will always be resorted to, until dire necessity compels its use. This remedy is not disagreeable to handle, and can always be kept at hand and

* See Fountain Pump, figured above.

ready for use. It, therefore, recommends itself for universal application. To sum up, it is my conviction, based upon the results of my experiments, that there is no excuse for not keeping olive trees free from scale insects. In fact, it is great economy to do so. It is a source from which to derive an income on the one hand, and total worthlessness on the other. Those who neglect this important duty, either from indifference or the want of knowledge, will expend their money only to see it melt away before them, and will have for their reward unsuccess, discouragement, and despair.

ELLWOOD COOPER.

SANTA BARBARA, December, 1881.

SESSIONS OF THE BOARD.

MINUTES OF THE PROCEEDINGS OF THE BOARD OF STATE HORTICULTURAL COMMISSIONERS.

OFFICE OF BOARD OF STATE HORTICULTURAL COMMISSIONERS, }
111 Leidesdorff Street, San Francisco, April 5, 1881. }

This being the day appointed by the Board of State Viticultural Commissioners for the organization of an Advisory Board of Horticulture, the meeting was held at 111 Leidesdorff Street, San Francisco.

The appointment of this Board was made to better facilitate the carrying out of Section 8 of "An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, etc.," approved March 4, 1881, which section reads as follows :

SEC. 8. The Board of State Viticultural Commissioners shall also appoint an officer, who shall be especially qualified by practical experience in horticulture for the duties of his office, to perform similar duties respecting the protection of fruit and fruit trees as are provided for in this Act in reference to grapevines, with like powers; and the salary and traveling expenses of such officer shall be fixed by the said Board at the same amounts provided for in the case of the Chief Executive Viticultural Officer; and the said Board shall have power to establish such quarantine rules and regulations as are required for the protection of fruit and fruit trees from the spread of insect pests.

Pursuant to this section, the Viticultural Board, at their last meeting, held on March twelfth, adopted the following resolution :

Resolved, That before taking any definite action in relation to horticulture, there shall be organized, under the auspices of this Board, an Advisory Board of Horticulture, to consist of eleven members, to be selected and appointed as follows: Each District Commissioner shall nominate one member to represent the horticultural interests of his viticultural district, and each Commissioner for the State at large shall nominate one member for the State at large, and the Executive Committee of the State Horticultural Society shall be invited to nominate two members for the State at large. The members of said Advisory Board of Horticulture shall be selected among citizens of this State especially qualified, by practical experience and study, in horticultural pursuits. The nominations shall be made to the President of this Board, who shall immediately notify the persons selected, and request them to convene in this city, at the office of this Board, on the fifth of April next, for the purpose of permanent organization and consultation. Said Advisory Board shall be requested to cooperate with this Board, and to make such recommendations relating to the horticultural interests of the State, and the appointment of a horticultural officer, as they may think proper. Said Advisory Board shall have the privilege of using the general meeting room at the offices of this Board, when suitable accommodations shall be provided for their meetings, and the Secretary of this Board shall keep a record of their proceedings, and issue all notices of their regular and special meetings, which shall be held at their offices at such times as shall not conflict with the work of this Board, in accordance with the will of said Advisory Board; *provided, however*, that they shall not hold less than four regular quarterly meetings. In case of any vacancy in said Advisory Board, caused by the failure of the Executive Committee of the State Horticultural Society to nominate, within thirty days after being requested to do the same, such vacancy shall be filled by the vote of a majority of the members, nominated by members of this Board.

NOMINATIONS.

The nominations made to the President of the Viticultural Commissioners consist of the following named:

- A. Cadwell,* Commissioner for the Sonoma District.
- W. W. Smith,† Commissioner for the Napa District.
- M. T. Brewer, Commissioner for the Sacramento District.
- W. B. West, Commissioner for the San Joaquin District.
- Felix Gillet, Commissioner for the El Dorado District.
- Albert S. White, Commissioner for the Los Angeles District.
- S. F. Chapin,‡ Commissioner for the San Francisco District.
- Charles H. Dwinelle, Commissioner for the State at large.
- Matthew Cooke, Commissioner for the State at large.
- Charles H. Shinn, Commissioner for the State at large.
- Ellwood Cooper, Commissioner for the State at large.

These all accepted the nomination, and were appointed by President Haraszthy, of the Viticultural Commission. At this meeting there were present all of the above named and appointed Commissioners, except Mr. Felix Gillet, of El Dorado, Albert S. White, of Los Angeles, and A. Cadwell, of the Sonoma District, who were necessarily detained.

The meeting was called to order by Mr. Haraszthy, of the Board of State Viticultural Commissioners, at eleven o'clock A. M., there being present Messrs. DeTurk, Shorb, Rose, and Wetmore, of the Viticultural Board.

Mr. Haraszthy stated that the object of the meeting was for the organization of a Board to act independently of the Board of State Viticultural Commissioners, in the interest of horticulture; and, reading the resolution offered by Mr. West, of the Viticultural Commissioners, at their meeting held on March 12, 1881, in which the purposes of the Horticultural Commission are more fully defined, stated, on behalf of the Viticultural Commissioners, that they would indorse all legal measures adopted by the Board now about to be formed.

Section five of "An Act to protect and promote the horticultural interests of the State," approved March 14, 1881, was read by the President, and other sections from the same Act referred to.

The meeting was then left to organize and proceed with its business of electing officers, etc. Charles H. Dwinelle, of Berkeley, was elected President, and John H. Wheeler, Secretary pro tem.

The order of business adopted by the Viticultural Board was decided upon as the regular order of business for this Board.

It was moved, seconded, and carried, that six constitute a quorum for meetings of the Board.

The Board then adjourned to one o'clock P. M. of the same day.

At 1 o'clock P. M. the Board assembled, and entered upon the election of a nominee to the Viticultural Board for Chief Executive Horticultural Officer. Communications were received commending for the above nomination the names of Messrs. L. D. Morse, Matthew

* Vice Wm. McPherson Hill, declined.

† Vice John Lewellyn, declined.

‡ Vice J. P. Pierce, declined.

Cooke (Commissioner), John Britton, Dr. S. F. Chapin (Commissioner), and J. L. Sanford. As a result, the following was the ballot:

Mr. Cooke, 6; Dr. Chapin, 1; whereupon Dr. Chapin withdrew his name, and rendered the election unanimous in favor of Mr. Cooke.

Mr. Cooper was appointed as a committee of one to present the name of Mr. Matthew Cooke, of Sacramento, to the Board of Viticulture, as the choice of the Horticultural Board for Chief Executive Horticultural Officer, and to recommend that he be elected and appointed as such.

The work of appointing committees was here entered upon, with the following results:

Committee on the Occurrence and Ravages of and on the Remedies against Insect Pests on Citrus Trees—Albert S. White.

On Olive Trees—Ellwood Cooper.

On Scale Insects of Deciduous and Ornamental Trees—Dr. S. F. Chapin.

On Codlin Moth—Messrs. M. Cooke and Felix Gillet.

On Red Spider, Mites, etc.—Mr. W. B. West.

On Fruit Packages—Messrs. W. W. Smith and Mr. W. B. West.

On Transportation and Quarantine—Messrs. Charles Shinn and M. Cooke.

On Rules and Regulations—President C. H. Dwinelle.

On Conference with Shippers and Commission Merchants—Mr. M. T. Brewer.

On Borers Injurious to Fruit and Fruit Trees—Mr. Felix Gillet.

It was decided that the regular quarterly meetings should be held on the last day of March, June, September, and December. All other meetings to be called by the President, and only at the request of six members of the Board.

Adjournment followed.

JOHN H. WHEELER,
Secretary.

OFFICE OF BOARD OF STATE HORTICULTURAL COMMISSIONERS, }
111 Leidesdorff Street, San Francisco, June 30, 1881. }

The regular quarterly meeting of the Board of State Horticultural Commissioners was called to order at the rooms of the Board at 10:45 A. M. President C. H. Dwinelle in the chair. Present: W. W. Smith, M. T. Brewer, W. B. West, S. F. Chapin, Matthew Cooke, and C. H. Dwinelle. The minutes of the preceding meeting were read and approved, after correcting to make the regular time for quarterly meetings the Thursday preceding the last Friday of March, June, September, and December. On call for reports of standing committees, Mr. Cooke reported his progress as follows: County Commissioners have been appointed in the following counties: Sacramento, Yolo, Solano, El Dorado, Santa Barbara, Santa Clara, San Joaquin, Contra Costa, Amador, Santa Cruz, and San Bernardino.

The Board of Supervisors—the officers upon whom devolves the appointment of County Commissioners of Horticulture—of the fol-

lowing counties, have promised the appointment of County Commissioners: Placer, Napa, Tuolumne, Los Angeles, Marin, Nevada, and Butte.

A system of quarantine rules and regulations was presented by Mr. Cooke for adoption, which, after some discussion, was laid over for future consideration.

At 12:15 P. M. a recess was declared by the President, allowing one hour for noon.

AFTERNOON SESSION.

At 1:15 P. M. Commissioner A. Cadwell, of the Sonoma District, was added to the list of Commissioners present.

Communications from F. Gillet, Commissioner for the El Dorado District, and from Ellwood Cooper, of Santa Barbara, Commissioner for the State at large, were read. Mr. Gillet made reference to the extensive work to be performed by the Commission; of the commendable action taken by Mr. Cooke; of the necessity of a State Entomologist, etc.; closing with a promise, at the next regular meeting in September, to render his report on codlin moths and insects injurious to fruit and fruit trees. Mr. Gillet also excused his absence.

Mr. Cooper stated his inability to be present at the meeting, and promised his report on the insects infesting olive trees at the next regular meeting, viz., in September.

The following resolution was offered by Mr. Dwinelle for consideration by the Board, after which it was unanimously adopted:

In view of the rapid spread of noxious insects injurious to fruit and fruit trees, the State Board of Horticulture most earnestly calls the attention of fruit growers to the following matters:

"Too great care cannot be used in procuring tree cuttings or scions, whether from foreign countries or local nurseries, to be sure that they are free from scale insects, borers, or other like pests. All empty fruit packages should be thoroughly disinfected on their return from the market to the farm, in order to destroy insects or their germs. To accomplish these desirable results, the rules for the protection of fruit and fruit trees from the ravages of insects, as prepared by Mr. M. Cooke, Chief Executive Horticultural Officer, are especially commended. Copies of these rules can be obtained by addressing Mr. Cooke, at Sacramento, or on application to members of the County Boards of Horticultural Commissioners. Active steps should be taken to secure the appointment of County Boards, where not already made, as, in general, in coöperation lies our only hopes of preserving our valuable horticultural interests from the many threatened dangers."

PRACTICAL ENTOMOLOGY.

Following this came a discussion on the feasibility of informing the public on practical entomology and the principal remedies against obnoxious insects, by means of a pamphlet or descriptive treatise. As a result, the following resolution was adopted:

Resolved, That the Chief Executive Horticultural Officer be requested to prepare for publication, in pamphlet form, a brief popular treatise on the more prominent insects injurious to fruit and fruit trees, giving a description of their appearance, life-history, and the best means of their destruction.

It was decided to request, through Mr. Cooke, the State Board of Agriculture to make proper provision at the next State Fair for the prominent exhibition of the pests destructive of fruit and fruit trees, the same to be under the supervision of the Chief Horticultural Officer, Mr. Cooke.

To further the quarantine work in the State, it was resolved that

the Chief Executive Horticultural Officer be authorized to appoint local resident Inspectors in any part of the State where needed.

Again, work was begun for the obtaining of an entomologist on this coast—one to consult as well as instruct. Mr. Cooke thought the most feasible plan for securing immediate results was that which had been proposed by President Dwinelle, viz.: to educate a young man at the University of California for entomological work. President Dwinelle explained that the entomological correspondence addressed to him at the College of Agriculture had assumed such proportions that it was impossible for him to find time to attend to it properly. He had offered to hire some one of the students to give a portion of his time as entomological assistant, and to direct and supervise his work, on condition that the horticulturists would furnish the needed funds. His estimate was for about \$600, to make the experiment for a year, including needed apparatus, books, etc. Nearly one half of that sum was already subscribed, and he hoped that the rest would soon be pledged. A valuable foundation might then be laid for the needed collection of insects, with notes upon their history, and the best means of destroying them.

JOHN H. WHEELER,
Secretary.

OFFICE OF BOARD OF STATE HORTICULTURAL COMMISSIONERS, }
111 Leidesdorff Street, San Francisco, September 29, 1881. }

The regular quarterly meeting of the Board of State Horticultural Commissioners was held at the office of the Board on September 29, 1881, President Chas. H. Dwinelle in the chair. Present—Felix Gillet, S. F. Chapin, Matthew Cooke, Thomas H. Shinn, Chas. H. Dwinelle, Ellwood Cooper, and John H. Wheeler, Secretary.

The society passed at once, after the reading of the minutes, to the consideration of quarantine laws, it being the request of fruit growers from many counties that immediate action be taken and rules adopted which would enable them in their several counties to protect their orchards and fruit interests by proper disinfection, especially with regard to the coming season, for planting and receiving from nurseries.

Quarantine rules for the protection of horticultural industries of the State, which had been laid over at the last meeting of the Board, were read, discussed, altered, and adopted by sections, and the whole was approved, to be presented to the Board of State Viticultural Commissioners at their next meeting.

The above mentioned rules were unanimously agreed upon by the Commission to be presented for adoption to the Board of State Viticultural Commissioners.

Messrs. Cooke and Chapin were appointed as a committee to present these rules to the Attorney-General, and to make such alterations in the remedies mentioned for disinfecting purposes as the said State officer, by his experience and knowledge, might deem advisable.

To obtain concerted action in the carrying out of these rules and to insure the coöperation of fruit growers throughout the State, it was agreed, on the suggestion of Mr. Cooke, that a convention of horticulturists from all parts of the State be called by the Board.

The following resolution was adopted :

Resolved, That the Chief Executive Horticultural Officer be authorized to call a general meeting of the horticulturists of California, to consider their interests in the matter of destroying insects injurious to fruit and fruit trees; the said meeting to be held at some convenient place in San Francisco, early in the month of December next. The above officer shall confer with the representatives of the leading transportation lines, with a view to securing reduced rates of fare to those horticulturists attending the above meeting.

At this convention there will also be displayed apparatus for disinfecting, washes, insecticides, and free packages for fruits. (By "free package" is meant one to go with the fruit when sold.)

At the afternoon session, on call for reports of standing committees, Mr. Cooper, of Santa Barbara, offered his report on the olive and insects injurious thereto, and Mr. Gillet presented a report on the codlin moth, with proposed remedies. Both of these reports were accepted, and ordered placed on file.

Some remarks on the work of this Commission were made by President Dwinelle, after which the following resolution, presented by Mr. Gillet, was unanimously adopted :

Owing to the failure of certain counties in appointing Horticultural Commissioners, after having been petitioned as required by law, and such action being injurious to the horticultural interests of the State at large, for the reason that the transgression of this law will lead to great injury, owing to the fact that these counties being doubtless afflicted with insects injurious to fruit and fruit trees might cause much deception to the public and to those who are engaged in the planting or contemplating to plant orchards in counties thus afflicted, we therefore deem it highly essential that this Board, which is formed for the protection of our horticultural interests, shall prevent such action by these counties; and that it is the duty of its members to take such steps as will frustrate any deception sure to be practiced if not immediately stopped. And we do think it is but right and our duty to acquaint the public of the ravages done by insect pests in any portion of the State, regardless of the injury that may affect the interests of the county where noxious insects may exist. Be it, therefore,

Resolved, That the Chief Executive Horticultural Officer be instructed to make out a list of every county in the State where the codlin moth has made its appearance, and also to make out a list of all counties where scales and other insects injurious to fruit and fruit trees have so far made their appearance, and to report to this Board the extent and nature of the damages done by such insects.

Some interesting specimens of insects infecting chestnut trees in Nevada City, the same inhabiting the oak tree, were exhibited by Mr. Gillet, and adjournment followed.

Approved June 29, 1882.

JOHN H. WHEELER,
Secretary.

OFFICE OF MATTHEW COOKE, }
SACRAMENTO, December 8, 1881. }

The regular quarterly meeting of the Board of State Horticultural Commissioners was called to order at 9:15 A. M., President Dwinelle in the chair.

Present—Commissioners Dwinelle, Brewer, West, Gillet, White, Chapin, Cooke, and the Secretary, J. H. Wheeler.

Absent—Commissioners Smith, Cadwell, Cooper, and Shinn.

The reading of the minutes of the previous meeting was dispensed with and reports of standing committees were taken up.

Mr. Gillet, of Nevada, of Committee on Borers Injurious to Fruit and Fruit Trees, requested further time, stating that he had at present under consideration a certain borer which he has as yet been unable

to identify, which is a habitant of the chestnut trees and indigenous to the oak.

Albert S. White, of Riverside, as representing Los Angeles District, requested of the Board to exercise their utmost power to absolutely prohibit the importation of infected trees into all of that part of his district which is at present free from noxious insects of any considerable importance.

In consideration of this request the following resolution was moved by Dr. S. F. Chapin :

Resolved, That the Board of State Horticultural Commissioners recommends to the Board of State Viticultural Commissioners the adoption of a quarantine resolution prohibiting, whenever it shall be necessary, the transportation from one place to another within this State, or from abroad into this State, of any trees, cuttings, fruit, or other transportable material infested with any insect or insects, or the germs thereof, viz. : their eggs, larvæ, or pupæ, when it shall in the judgment of the Chief Executive Horticultural Officer be required for the protection of non-infested localities or places.

Dr. Chapin's resolution was seconded and unanimously adopted.

Mr. Cooper's communication was read, being an expression of regret at not being able to be present. Mr. Cooper's report was read and adopted for publication.

Mr. West reports that although the plan of his report has been mapped out, it is not now prepared for the Commission. He was requested to write it out for publication.

The Committee on Rules and Regulations reported that success has followed them thus far in their work of establishing and enforcing quarantine laws.

Mr. Cooke reported what work had been done under the quarantine laws.

On call of the Committee on Fruit Packages, etc., Mr. Brewer reported that although the commission merchants want free boxes, and many growers also; still there are objections to it offered by some, which render the adoption of the free package, and the making of it general, a matter whose postponement would, until after another State Convention, in the opinion of the committee, be advantageous. Fruit shippers and commission merchants are in favor of any means to be adopted which will prevent the spread of insects, and recommended the adoption of the free box system.

Recess of thirty minutes declared and a reassembling had at 1 P. M.

Mr. Cooke mentioned the advisability of publishing the reports of the Commissioners, and also of such synopsis as he shall choose of reports sent him from County Commissioners.

Dr. Chapin's report on scale insects of deciduous and ornamental trees was submitted and adopted.

Dr. Chapin offered the following:

Resolved, That it is hereby requested of the Board of State Viticultural Commissioners that the reports of the State Horticultural Commissioners, as submitted and approved by this Board, together with such synopses of the reports of County Commissioners as the Chief Executive Horticultural Officer shall choose in connection with his general report on the condition of the fruit growing interest of the State, be published as soon as possible in pamphlet form, for general circulation; the work to be supervised by the Chief Executive Horticultural Officer.

The resolution was adopted.

The following resolution was offered by Dr. Chapin :

Resolved, That the Committee on Transportation and Quarantine be requested to call upon the various transportation companies throughout the State, and ask their assistance in the enforcement of the quarantine rules and regulations established by the Chief Executive Horticultural and Health Officer for the preservation of our endangered fruit industries.

Adopted unanimously.

On motion, Professor C. H. Dwinelle was added to the committee.

Adjourned.

Approved June 29, 1882.

JOHN H. WHEELER,
Secretary.

OFFICE OF BOARD OF STATE HORTICULTURAL COMMISSIONERS, }
111 Leidesdorff Street, San Francisco, June 29, 1882. }

The regular quarterly meeting of the Board of State Horticultural Commissioners was called to order at 11:30 A. M. President Dwinelle in the chair.

Present—Commissioners C. H. Dwinelle, W. W. Smith, W. B. West, S. F. Chapin, A. Cadwell, Matthew Cooke, and the Secretary, J. H. Wheeler.

Absent—Commissioners M. T. Brewer, Felix Gillet, Albert S. White, Charles H. Shinn, and Ellwood Cooper.

Excuses were presented and accepted from Messrs. Brewer and Cooper.

In answer to a communication from Mr. Cooper, calling attention to the cottony cushion scale infesting certain orchards at Santa Barbara, the following resolution and recommendations were presented and adopted by the Board:

Resolved, That a special committee be appointed to consider means for the destruction of the Cottony Cushion Scale (*Icerya purchasi*), and the best means for preventing its spread; and that the said committee urge immediate and vigorous action on the part of the County Horticultural Commissioners in those districts.

Appointed: Ellwood Cooper, Dr. S. F. Chapin, and Matthew Cooke.

A communication was read from Felix Gillet, of Nevada City, calling attention to statements made relative to insects infesting the mulberry tree in California, in answer to which, the following resolution was adopted by the Board:

WHEREAS, It has been publicly reported that the mulberry in California, is a pestiferous tree, and unfit to be raised on account of being infested with scale insects; and, whereas, we consider such a report as doing a great injustice to a growing industry in this State—silk culture; be it therefore

Resolved, That the Chief Executive Horticultural Officer is hereby instructed to investigate the condition of the mulberry trees throughout the State, so far as insect pests are concerned, and report, at the next meeting of the Board, in what counties the scale or other insects are to be found on mulberry trees, and to what class of scale or insect they belong.

Mr. West, Committee on Red Spider, Mites, etc, read a report on experiments made on the same, which experiments extended through many years. With the most efficient means, he had never succeeded in destroying all vestige of the insects, and he was not yet able to report on a completely successful remedy. Whale oil soap and sulphur, together with tobacco decoction, had proved most successful and best.

Report placed on file.

After some discussion on the curculio of the plum, Dr. S. F. Chapin introduced a resolution for prohibiting the importation into this State of any trees, in view of thus keeping out this dreaded insect. The same was seconded and carried; but after further deliberation it was rescinded, and ordered struck off the minutes. In its place was substituted the following, offered by Dr. S. F. Chapin, seconded and carried:

Resolved, That the Board of State Horticultural Commissioners recommends to the Board of State Viticultural Commissioners the adoption of instructions to the Chief Executive Horticultural and Health Officer, as follows:

That in consideration of the great and constant danger of the introduction to this State of the curculio, or plum weevil, upon fruit trees from the Eastern States, he shall take the necessary measures to strictly enforce the quarantine rules relating to this subject, and shall establish such places as he shall deem necessary for the inspection of all trees imported into this State from without its limits, so that all such trees shall be held in his hand for examination and permit to go to their places of destination; and also that in order to enable this officer, or his properly appointed Inspectors, to perform this duty, the railroad and other transportation companies are hereby requested to aid in every way in their power the proper carrying out of this resolution.

The following was presented by A. Cadwell and adopted:

Resolved, That prominent fruit growers throughout the State be invited to contribute to a fund to bear the necessary expenses for legal counsel in sustaining horticultural quarantine. Contributions to be sent at once to the Secretary of the Board of State Horticultural Commissioners, John H. Wheeler, 111 Leidesdorff Street, San Francisco.

After general remarks on the action in Court pending, the following resolutions were offered and seconded:

Resolved, That the Board of State Horticultural Commissioners heartily approve of the present attempt of the Chief Executive Officer to enforce strict quarantine in accordance with the rules published by recommendation of this Board.

Resolved, That all persons having any interest in the preservation of our fruit industries are urged to give their earnest support to those laws which have been enacted with a view to their preservation.

Carried.

Moved, that at the next meeting of the Board officers be elected for the ensuing year.

Carried.

Following the above, Mr. Cooke reported on the satisfactory manner in which the quarantine work was progressing throughout the State, giving many interesting phases of the work by way of personal illustration, viz.: The successes of different fruit growers; their feeling of gratitude toward the Board for indicating the proper course for eradicating the pests, etc.

The President, Mr. Dwinelle, then addressed the Board. He spoke of the curculio and its attendant now threatening ravages; of the great exertion which should be put forth to prevent its introduction into California. He further noticed the readiness with which many personal enemies of the Horticultural Commission had now become the exponents of the valuable principles laid down by the Board, etc.

On the closing of Mr. Dwinelle's address the Board adjourned.

OFFICE OF BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 111 Leidesdorff Street, San Francisco, September 28, 1882. }

The regular quarterly meeting was called to order by President Dwinelle. Present—Commissioners Cooke, Smith, Shinn, Chapin, West, and the Secretary, John H. Wheeler.

Minutes of preceding meeting read, corrected, and approved.

In the election of officers announced at the preceding meeting which succeeded the above, the following candidates were elected without opposing nominations:

President: C. H. Dwinelle (reëlected).

Vice President: Dr. S. F. Chapin.

Secretary: John H. Wheeler (reëlected).

Treasurer: M. T. Brewer.

Charles H. Shinn announced his intention of resigning from the Commission before another meeting, as he intended to leave for an extended trip East; during which trip he expected to contribute to the Commission whatever experience he might meet with concerning horticulture.

A communication from the Viticultural Commission was read by the Secretary, recommending the Chief Executive Horticultural Officer to enforce the necessary rules for the protection of our trees from curculio and other noxious insects which may be introduced on nursery stock.

Mr. Cooke reported that he had decided to enforce the horticultural laws, and to have Inspectors appointed at Sacramento, Stockton, Los Angeles, Oakland, and San Francisco, to attend to and enforce the disinfection of all fruit trees imported during the ensuing year.

The Secretary read a report on the codlin moth, by Felix Gillet, of Nevada City, in which was detailed his successful conquest against this insect by the use of bands of cloth about the trees, to be removed and cleaned of insects lodging therein at stated periods, besides scraping and cleaning the trees well to destroy the larvæ and eggs. Mr. Gillet further reported on the successful use of sulpho-carbonate of potassium in fighting the apple tree root louse on young trees or nursery stock.

Some discussion arose as to how often bands or traps set for the larvæ or codlin moth should be cleaned. Gillet's experience was that the worm developed in fifteen days; Cooke's, eight days; Dr. Chapin's, nineteen days.

Mr. Cooke exhibited a parasite of the codlin moth of great interest to all. He further reported that, after extended conference with Commissioners, and silk growers throughout the State, and personal investigation, he could find no insect injurious to the mulberry tree.

A communication from Mr. Ellwood Cooper, of Santa Barbara, was read by the Secretary, urging the necessity of waging an immediate and vigilant war upon the cottony cushion scale of that county; the neglect of which would insure the early destruction of all their fruit interests.

Mr. Dwinelle reported that efficient work was being done by Colonel Hollister, of Santa Barbara, in fighting the *Icerya purchasi*, or cottony cushion scale, with hot water. Mr. Dwinelle further produced a communication from Albert White, of Riverside, which reported that the people of Los Angeles District had become fully alive to the

necessity of washing trees and fighting insect pests generally, and that much washing with soap solutions had been done for the citrus trees about Los Angeles.

The second annual convention of California Fruit Growers, to be held at San Jose, on the fourteenth of November, was next considered.

The following committee was appointed to interview transportation companies in view of securing reduced fares for horticulturists visiting the convention at San José in November—Commissioners Cooke and Dwinelle. Messrs. Cooke and Chapin were appointed to prepare a programme for the above named convention.

Committee appointed to indicate programme for convention, and secure papers to be read at said convention—Messrs. Cooke and Chapin.

Professor Dwinelle exhibited roots covered with woolly aphid, suggesting that horticulturists look to the same remedy for this insect as is relied upon by viticulturists in opposing the phylloxera, viz., in resistant stocks, one year's experiment at the University with them having proved successful.

Meeting adjourned.

JOHN H. WHEELER, Secretary.

MINUTES OF THE FIRST ANNUAL HORTICULTURAL CONVENTION.

HELD AT SACRAMENTO, IN THE ASSEMBLY CHAMBER OF THE STATE
CAPITOL, ON DECEMBER 6TH AND 7TH, 1881.

At the quarterly meeting of the Board of State Horticultural Commissioners, held September 29, 1881, the following resolution was presented and adopted:

Resolved, That the Chief Executive Horticultural Officer be authorized to call a general meeting of the horticulturists of California, to consider their interests in the matter of destroying insects injurious to fruit and fruit trees, the said meeting to be held at some convenient place in Sacramento, early in the month of December next. The above officer shall confer with representatives of the leading transportation lines, with a view of securing reduced rates of fare to those horticulturists attending the above meeting. At this Convention there will also be displayed apparatus for disinfecting, washes, insecticides, and free packages for fruits.

Pursuant to the above, the following call was made by Mr. Cooke, by publication and otherwise:

A State Convention of fruit growers, shippers, packers, nurserymen, and others interested in horticulture in California, will be held at the Senate Chamber, Sacramento, on Tuesday and Wednesday, the sixth and seventh of December, 1881, commencing at 10 o'clock A. M. of the sixth, for the purpose of consultation and discussion of the most practical means of exterminating the insect pests now infesting the orchards and gardens of the State, and such other subjects as may be introduced for the improvement of the fruit growing industries of California. The Central Pacific Railroad Company have kindly allowed a two-thirds rate of fare from all their stations in California to persons attending the convention, and have issued instructions to their agents at all points, as follows: To sell tickets at a two-thirds rate of fare to Sacramento and return, by trains arriving in Sacramento on the fifth, sixth, and seventh of December next, such tickets to be void after the twelfth of December (excepting the local rate between San Francisco and Sacramento, which will be the usual rate, five days' ticket, \$5.) Those who have succeeded in subduing any of the insect pests of the orchard, etc., are requested to be present and bring their weapons of attack, for the information of those beginning the fight. As this will be the first convention of fruit growers, etc., in California, we predict good results, and request a full attendance.

By order of the Board of State Horticultural Commissioners.

C. H. DWINELLE,
President.

MATTHEW COOKE,
Chief Executive Horticultural Officer.

JOHN H. WHEELER,
Secretary.

SACRAMENTO, November 7, 1881.

The Horticultural Convention began its session in the Assembly Chamber, Sacramento, California, December, 6, 1881. The meeting was called to order at 10 o'clock A. M. by Matthew Cooke, Chief Health Officer. Upon motion of Dr. Chapin, Prof. C. H. Dwinelle was named as temporary Chairman, and William Johnston as Vice-Chairman. J. H. Wheeler and Edwin F. Smith were named as temporary Secretaries.

Mr. Johnston moved that a committee of five upon organization be named by the Chair. So ordered. Whereupon the Chair named, as such committee, A. S. White, of Riverside; R. B. Blowers, of Yolo; M. T. Brewer, of Sacramento; N. R. Peck, of Placer; and John McMullen, of Solano.

Matthew Cooke was, upon motion, added to the committee.

Upon motion of Mr. Johnston, the convention took a recess until 11 o'clock.

The convention reassembled at the appointed hour.

The committee upon organization submitted their report, recommending:

FOR OFFICERS.

Professor C. H. Dwinelle, President; Hon. Wm. Johnston, President pro tem.; J. H. Wheeler and Edwin F. Smith, Secretaries.

FOR ORDER OF BUSINESS.

1. Address by the President; 2. Report of Chief Health Officer; 3. Appointment of committees on ways and means, fruit growers, fruit shippers to Eastern cities, fruit shippers west of Omaha, fruit packers, commission merchants, nurserymen; 4. Address of welcome by Mayor J. Q. Brown; 5. Essay on insect pests by Dr. Chapin; 6. General discussion.

Mr. J. H. Carroll moved the adoption of the report. So ordered.

Mr. Johnston moved to limit speeches, other than essays and set speeches, to five minutes' time. So ordered.

Upon motion, the first order of business was passed until after the noon recess, and Matthew Cooke, Chief Horticultural Officer, was requested to present his address and report, which he did, and ended by announcing that an exhibit of insect pests would be made at the store of M. T. Brewer & Co., Second Street, between J and K, in the evening at seven o'clock; also of such apparatus as had been found to be most convenient for the applying of liquid solutions on trees, etc.

Mr. Johnston moved that a committee of five be named by the Chair to report on the address after the noon recess. Carried.

And the Chair named as such committee, M. T. Brewer, F. Gillet, J. H. Carroll, Charles Gammon, and E. R. Thurber. M. T. Brewer declining, Hon. Wm. Johnston was named instead.

A recess was taken until one o'clock P. M.

Upon reconvening the following report was made upon Mr. Cooke's address:

REPORT OF COMMITTEE ON ADDRESS OF MATTHEW COOKE.

The committee to whom was referred the report of the Chief Horticultural Officer of the State, Matthew Cooke, Esq., beg leave to report as follows:

The convention has doubtless listened with great pleasure and still greater instruction to the many valuable and useful suggestions therein contained, not alone to the producers of the fruits on this coast, but likewise to all shippers, consumers, and all others having in hand the well being of that inestimable source of our coast's wealth at heart. The committee trust that the report may be so placed before the public of the State that it may not fall as a dead matter, but that its full merit and usefulness may be perpetuated by becoming a text to be studied and learned in the interest of the great good that has called us together. Your committee further recommend that the report be published as soon as practicable for general circulation, and, in conclusion, beg to offer the following:

Resolved, That in Matthew Cooke the State has a first-class Chief Officer, and one who, appreciating the duties of his office, is willing to devote his labors to their fulfillment.

Resolved, That the convention of horticulturists here assembled, hereby tender him heartfelt thanks for his able essay on our needs, and promise him an effort to second him by our industry and perseverance in the good work.

WM. JOHNSTON, Chairman.

President C. H. Dwinelle here read an address to the Convention. On the completion of which, it was moved by Mr. Brewer that the same be submitted to the press, with the request that it be published, and made a part of the records of the convention. Seconded and carried.

ADDRESS OF WELCOME.

Mayor J. Q. Brown, of Sacramento, was introduced, and, pursuant to programme, delivered an address of welcome, which, at the will of the convention, he was requested to furnish, in synopsis, to the Secretaries, to be incorporated in the proceedings of the convention. [The synopsis has not been received at the time of making this report.]

Following the above, Dr. Chapin, of San José, was introduced and read a paper on "the scale insects infesting fruit and fruit trees."

By unanimous consent, Dr. Chapin's address was added to the record of the convention, with the request that the same be disposed of in a manner similar to other reports already produced.

DISCUSSION.

A discussion on subjects reported on, now took place, taking up in regular order the borers, codlin moth, scale, etc.

COMMITTEES APPOINTED.

The appointment of committees by the President was as follows:

Fruit Growers—A. S. White, E. R. Thurber, John McMullen, R. B. Blowers, W. Robinson, G. M. Gray, Mr. Barker, P. D. Brown, H. Wilson.

Eastern Shippers—J. F. Farnsworth, E. T. Earle, P. H. Platt.

Shippers to Points West of Omaha—W. R. Strong, Samuel Gerson, Eugene Gregory, E. T. Adams, D. De Bernardi, W. J. Wilson.

Commission Merchants—J. M. Hixson, San Francisco; Robert Hall, San Francisco; Mr. Littlefield, San Francisco.

Nurserymen—Robert Williamson, Sacramento; S. McKinley, Los Angeles; Felix Gillet, Nevada; Mr. Silva, Placer.

Ways and Means—M. T. Brewer, A. T. Hatch, Rev. W. R. Peck, George McMullen, W. H. Jessup.

All committees were instructed to submit reports on Wednesday forenoon.

The convention here adjourned to reassemble at 10 o'clock A. M. on the following day.

EVENING MEETING.

The members of the convention, by invitation, met at the business house of M. T. Brewer & Co., to witness an exhibition of insects injurious to fruit and fruit trees. Many citizens were also present. The exhibition was gotten up by Mr. Cooke, and consisted of specimens of all the most destructive insects to the horticultural interests that have made their appearance in the State. The specimens were shown under magnifying glasses, and in different stages of existence and positions, so as to exemplify, in a good degree, their habits and natural history. The occasion was also made one of social intercourse among the fruit growers and their friends, the conversation generally turning upon the fruit industries of the State.

SECOND DAY.

The Horticultural Convention met at 10 o'clock A. M. Minutes of the preceding session were read and approved. A. S. White, Chairman of the Fruit Growers' Committee, submitted the following

REPORT OF THE FRUIT GROWERS' COMMITTEE.

The committee appointed by the Fruit Growers' Convention would recommend the following report:

WHEREAS, The fruit growing interests of this State, which are of so vast importance, are threatened with destruction by insect pests of various kinds; and, whereas, any individual action is totally inadequate to meet the enemy successfully;

1. *Resolved*, That the fruit growers and farmers of the State be requested to give their earnest support to the horticultural laws, and give their united efforts to sustain the Chief Health Officer in the execution of the same.

2. *Resolved*, That the fruit growers in every county, where Commissioners have not already been appointed, shall demand of the Supervisors that they appoint Commissioners according to the requirements of the law.

3. *Resolved*, That we recommend that the orchardists of the State shall purchase only such trees, plants, or cuttings as are known to be free from infectious diseases, and are accompanied by a clean bill of health from the Commissioner or Inspector.

4. *Resolved*, That all nurserymen shall be required to disinfect all trees and plants to the satisfaction of the Commissioners or Inspectors before delivering them to their customers.

5. *Resolved*, That we recommend to each and every farmer and fruit grower, as good citizens of the State, to use all practical means to keep his trees free from all insect pests, that his orchards may not become breeding grounds to the damage of his neighbors.

6. *Resolved*, That we request the transportation companies not to return fruit boxes or baskets between the twenty-fifth of June and the thirty-first of December.

7. *Resolved*, That we recommend that the study of entomology be introduced into our public schools, so that the rising generation may be wiser than their fathers.

A. S. WHITE,
E. R. THURBER,
JOHN McMULLEN,
R. B. BLOWERS,
G. M. GRAY,
MR. BARKER,
P. D. BROWN,
H. WILSON,
Fruit Growers' Committee.

Some discussion followed the presentation of the above report, many objecting to the clause concerning the return of empty boxes by transportation companies.

The report was finally adopted without alteration.

REPORT OF SAN FRANCISCO COMMISSION MERCHANTS.

The committee of San Francisco commission merchants reported as follows:

Mr. President and Members: The undersigned commission merchants of the City of San Francisco, appointed by this convention to report such advice as we deem proper for the improvement in quality of orchard produce, respectfully submit the following: In order to meet the requirements of the trade, a choice fruit is an imperative requirement, and we are perfectly satisfied that any work done in an intelligent manner will well repay the producer and have a marked effect on the advance of sales and net proceeds, as it costs the same freight and drayage on inferior fruit shipped that it does on first quality. We earnestly recommend to the fruit growers to use every effort to improve the produce of the orchard; and in every respect we will use our endeavors to assist in your work. We wish it to be understood that we cannot in any way be held responsible for any cost that may be attached to the shipment of fruit to us in violation of the quarantine rules and regulations and other laws for the protection of horticulture.

J. M. HIXSON,
S. LITTLEFIELD,
ROBERT HALL,
Committee of San Francisco Commission Merchants.

The report was adopted.

REPORT OF COMMITTEE ON NURSERIES.

The following was submitted and adopted :

Your Committee on Nurseries begs leave to report, that whereas sundry kinds of insects injurious to fruits and fruit trees, vines, plants, etc., are infesting the orchards and gardens of this State; and whereas, these insects are spreading very rapidly, and if not checked, bid fair to ruin the great horticultural interests of our country; and whereas, the nurserymen and tree dealers who disseminate trees and plants all over the country, are necessarily in position to scatter these pests far and wide; or, on the other hand, to aid materially in checking the spreading of them; therefore, we, your committee, recommend and urge all nurserymen and others disseminating trees and plants, to thoroughly disinfect all trees and plants of every description before sending them out or offering them for sale.

ROBERT WILLIAMSON,
FELIX GILLET,
S. MCKINLAY,
C. M. SILVA,

Committee on Nurseries.

The report was adopted.

REPORT ON FRUIT PACKAGES.

To the Board of State Horticultural Commissioners:

Your committee appointed at a convention of fruit growers, held at Sacramento, December fifth to eighth, on the subject of "disinfecting of fruit packages" and "a cheap free package," report jointly as follows:

To make a perfect system, one of two plans must be adopted; either that of providing at each station or landing whence fruit is shipped, an apparatus for the purpose of fumigating or disinfecting, or a general location in the principal cities where the packages can be treated in large quantities before reshipping to the grower.

Under the first plan, the cost of apparatus in so many places would result in such a tax on the shipper as to be altogether too expensive to be generally adopted, except under compulsion, while at the same time, it does not prevent the spreading of the pest during the journey to the proposed point of treatment. Under the second plan, the obtaining of sufficient room in cities to handle the immense number of packages accumulating daily, together with the extra cartage and the elaborate system of accounts necessary to be kept between the commission merchant and the manager of the disinfecting establishment, would make it, while perhaps more efficient, quite as expensive. It is estimated that, under either plan, an average charge of one and one half cents per package will be necessary to cover the cost every time it is disinfected.

So far as the process of disinfection is to be observed, your committee, after investigating the various plans proposed and submitted, submit the following as the most economical, while equally sure: That each package be placed in a close tank and exposed to the action of live steam, at a minimum temperature of two hundred degrees Fahrenheit, for a minimum period of five minutes.

Your committee is clearly and unanimously of opinion that a free package system is preferable to any system of disinfecting that can be adopted, numbering among its advantages:

First—The saving on freight to market, on account of the lesser weight of the free package, of one half cent each on an average.

Second—The saving of cartage on return package, for which the commission merchant is willing to make an allowance of one cent each.

Third—The greater price that can be realized for fruit by the commission merchant from the actual consumer, on account of its being in clean, new packages, and the fact that canneries are willing to pay an additional price if they do not have to nail up and reship empties, both of whom have agreed that an increased price can be realized of two and one-half cents on a twenty-five pound, and five cents on a fifty pound package.

Fourth—The saving of the cost of free disinfecting, which we before stated to be one and one third cents each.

Fifth—We have figured closely, that with the advantages already claimed, and the low prices at which free packages can be procured, say, on the standard fruits that are marketed in boxes, about fifty per cent of the cost of the present return package, and for chests about twenty-five per cent, the fruit grower will find, after a full trial of the free package system for a term of years, that he has been at no actual additional expense, and that he has by its adoption reached the only successful method, outside of the orchard, of ridding it of pests.

We find an ordinary free package of twenty-five to thirty pounds weight of peaches, plums, or apricots can be furnished for about six cents; one holding forty pounds, for Eastern shipping, nine cents; one holding sixty pounds, regular apple size, eleven cents; berry crates, with trays or baskets, holding forty pounds strawberries, or forty pounds raspberries, or fifty pounds blackberries, or sixty pounds currants, or sixty pounds cherries, for twenty-five cents.

As an illustration of the actual saving, by using the free package in place of a return package, we submit the following estimate of saving on a twenty-five pound box:

Allowance by commission merchant for drayage-----	1 cent.
Cost of disinfecting-----	1½ cents.
Freight to market-----	½ cent.
Increased value from consumer or canner-----	2½ cents.
Loss in transit and wear and tear-----	2½ cents.
Total-----	8 cents.

R. B. BLOWERS,
WM. H. JESSUP,
A. T. HATCH,
A. D. CUTLER,
Committee on Fruit Packages.

An extended discussion followed this report on all subjects involved in the same, more especially regarding the use of free packages, which ended by the adoption of the report as amended by Mr. Hatch, to the effect that disinfection be recommended instead of the free package system.

Before closing the morning session, President Dwinelle made some remarks on the good already accomplished by the convention.

At the reassembling, an informal discussion was had on mildew, pruning, etc.

The following communication was read by the Secretary, J. H. Wheeler:

COMMUNICATION FROM CANNERS.

To the Convention of Fruit Growers at Sacramento, Cal.:

The undersigned, manufacturers of hermetically sealed goods, recommend to the fruit growers who ship their peaches to the San Francisco market the abolition of baskets and the substitution of closed boxes of uniform size, holding twenty-five pounds each, thereby preventing much of the stealing and mashing of fruit which now causes a large percentage of loss to both shipper and purchaser.

[Signed]

CUTTING PACKING COMPANY, by A. D. CUTLER,
SOL. WANGENHEIM & CO.,
J. M. SPAFFORD & CO.,
CODE, ELFELT & CO.,
A. LUSK & CO.,
KING, MORSE & CO.,
J. LUSK CANNING COMPANY,
SCHAMMEL, REYNOLDS & CO.,
M. BANNER & CO.

SAN FRANCISCO, December 5, 1881.

REPORT ON FRUIT SHIPPING TO EASTERN STATES.

To the State Convention of Horticulturists:

Your committee appointed on fruit shipments to the Eastern States would beg to report as follows:

We have given the subject as careful examination as time would permit, and we find that the amount of green fruit shipped to the Eastern States is of great importance to the fruit growers of our State. Over four hundred carloads of green fruit has been shipped east of the Missouri River during this year. We find that several important matters stand in the way of Eastern shipments of fruit, one being the high rate of freight charged per car, and another the codlin moth pest. Both of these ought to be overcome. The first demands, and should receive, careful consideration at the hands of the railroad companies, and the other can be remedied by a vigorous and persistent effort on the part of the fruit growers. Fruit that is at all infected by codlin moth becomes almost worthless before it reaches the Eastern States. We would say that we deem it of the utmost importance to growers to do all in their power to make it of profit to the fruit shippers to still further extend their already large field of outlet for California's fruit productions.

Some have said, in words, that nothing can be done to exterminate the pests; others have spoken still louder by their acts and their failure to fight the destroyer, thus injuring themselves and their neighbors. However, enough has been done to prove, beyond a peradventure,

that systematic work will save the orchards and vineyards of our State, and cause them to continue to be the fruitful source of income to their owners that they have been in the past. We will not here individualize, but we will say that many fruit growers have, by their persistent efforts, saved their crops in a marketable condition, when, if they had not used precautionary measures, their fruit crops would have been failures. But freight rates and the codlin moth are not the only obstacles that meet the Eastern fruit shipper—the state of the weather while on the way, and the condition of the market when his fruit reaches its destination, gives him, if possible, even more concern.

The contents of a car is often spoiled by the heat in transit, and both fruit and freight money become a total loss. Again, it has often occurred that fruit that cost one dollar and fifty cents per box on the track in Sacramento, is sold at twenty-five cents or fifty cents per box in Chicago, owing to a glutted market or the heated condition of the fruit on arrival.

These last obstacles are unavoidable, but the others can and should be remedied.

In conclusion, we here express our earnest hope that all growers will cooperate, and, by united and systematic effort, completely eradicate our fair land of the pests that are gnawing at and sapping the foundations of all hopes of prosperity to fruit raisers.

[Signed]

J. F. FARNSWORTH,
EDWIN T. EARL,
P. E. PLATT,

Committee on Eastern Shipping.

The report was adopted.

REPORT ON FRUIT SHIPPING WEST OF OMAHA.

The field belonging to this committee covers a great but sparsely populated territory, embracing eastern California, Nevada, Idaho, Montana, Utah, Wyoming, Colorado, and Nebraska. This territory has a great variety of climates and soil, and is generally of high altitude, with frosts during a large portion of the year, and generally deprived of rains and moisture for long periods; and with no facilities for propagating fruit or fruit trees, the supplies in the future, as heretofore, will be required from this State.

As the resources of this growing outlet for California fruits are constantly increasing, it is but fair to presume that the population will increase in proportion, and the demand for fruit will be greater in consequence. To meet the requirements of this trade, it will necessitate the production of the best quality of every description of orchard products, the cultivation of the best varieties, and the careful picking, packing, and handling of the same. We would, therefore, suggest:

First—The varieties to be cultivated: The choicest and most desirable for flavor, size, color, beauty of form. Our instructions from consumers are to “ship nothing but choice fruit,” with the invariable advice that the cost of transportation is fully as much on the poor fruit as on the good.

Second—Fruit required for this trade should be carefully picked just before reaching maturity—that is, when it is hard and firm in every part. Even a day's delay in picking will so hasten the softening of fruit as to render it unfit for shippers' use. Fruit gathered before being fully developed is of no value to the dealer or consumer—never ripening, but becoming shriveled, tough, and tasteless; yet, if gathered and packed when ripe, it will soften and decay before it can be marketed. Great care should be exercised, and more attention given to these points than heretofore.

Third—In packing, the greatest care should be used. Fruit of uniform state of ripeness should only be put in the same box, and should be as uniformly sized as possible, placed carefully in layers, packed solid and full. Inferior, or bruised, or overripe fruit, placed with hard and choice, ruins and renders the whole unfit for trade, and very often ruins the reputation of the dealer, while it at once points out the carelessness of the grower.

Fourth—Honest, intelligent, and careful fruit growers cannot fail to be well paid for their labors, while on the other hand, the slovenly and dishonest must certainly suffer the reverse. “Be sure your sins will find you out,” may be well applied in this, as in all other careless or dishonest dealings.

Fifth—We recommend uniformity in style and dimensions of boxes for use by fruit packers and growers. For apples, fifty-pound boxes, Sacramento style and dimensions; pears, forty-pound boxes, as used for Eastern trade; plums, twenty pounds; peaches and apricots, twenty to thirty pounds; depth from four and one half to seven inches, according to size of the fruit. For cherries and small fruits, the San Francisco boxes that are used in chests—ten pounds each.

Sixth—We recommend the adoption of the “free box” system, as they can be made lighter than return boxes, and furnished at little more than half their cost. The fruit is then sold by the box, and will command a higher price, as the free package presents a new, smooth, and bright appearance, which goes far towards the sale of the contents. The return box has been the cause of much of the dissemination of the codlin moth and worm, and of other insect life which has brought ruin to our orchards throughout all parts of the State.

Seventh—Every grower should place his initials on all the boxes leaving his premises, and should be scrupulous to mark the name of the variety of fruit, and its size and quality, the state of ripeness—hard, medium, or soft—on the end thereof. The adoption of this system will be at once a great benefit to dealers, a convenience to growers, and a certain help towards

repressing much unnecessary profanity among dealers that are obliged to burst open boxes in order to ascertain their contents.

We believe that the fruit production of California is but yet in its infancy. Twenty-five years ago scarcely anything in the way of fruit was raised in this State. At that time one of your committee purchased the first peaches produced in Smith's gardens (near this city) for \$1 50 each, selling them readily for \$2 apiece. Apples were first imported from South America in 1851, and sold from fifty to seventy-five cents per pound. After this, Oregon fruit orchards came into being, and partially supplied the wants of California. From 1855, attention was turned to the capabilities of the soil and climate of this State, and the river bottoms and desirable lands near the coast, and afterwards the foothill regions, and even higher altitudes, were set out to a considerable extent with fruit trees. The almost universal success in production has demonstrated that California can yet be made one of the greatest fruit countries in the world—equaling in quality, size, and beauty, that of any other portion of the earth.

We believe that the terrible pests of the moth, worm, scale, and other insect life that has developed itself, can be entirely eradicated from our State if the efforts now being made under the laws passed by our last Legislature are heartily sustained by all, and the combined intelligence and experience acquired on this subject be put into force.

The territory assigned to this committee embraces but a small portion of the population which has to be supplied from the produce of the California orchards; San Francisco, with its three hundred thousand population, and other portions of the State with equal or greater population, has to be supplied through dealers; the large and constantly increasing outlet for carload shipments to the great cities and dense populations east of the Mississippi River, and the immense and rapidly growing demand for California canned, desiccated, and dried fruits in Europe and elsewhere, putting to test the capabilities of the immense canning establishments already in successful operation, and leading to the establishment of others, point unerringly to the great future extended to the cultivators of fruit in this State, and affords much encouragement to dealers.

In conclusion, we urge upon all engaged in the growth, packing, and sale of fruit, that the most studious care and good judgment should be exercised, and strict and unswerving justice and honesty of purpose in every transaction should be observed. No business has suffered more by a neglect of these self-evident facts. The grower has often shown himself more anxious to palm off his products with reckless disregard of the interests of the dealer and consumer, and without a thought of his future reputation. Such men only ruin business, and certainly do not deserve success. They should be discarded as unworthy of countenance.

All of which is respectfully submitted.

W. R. STRONG,
EUGENE GREGORY,
SAMUEL GERSON,
C. T. ADAMS,
D. DE BERNARDI,
W. J. WILSON,

Committee.

SACRAMENTO, December 7, 1881.

The report was adopted.

By unanimous consent of those present the business of the convention was continued to an evening session, which was opened by the President, and business continued as before.

REPORT OF COMMITTEE ON WAYS AND MEANS.

Your Committee on Ways and Means beg to report as follows: We find it necessary to raise \$100 to reimburse the Chief Horticultural Officer for moneys he has expended in calling this convention, to wit:

Large posters and printing postal cards.....	\$18 00
Postal cards.....	20 00
Postal stamps.....	16 00
Clerical help in issuing postals, posters, etc.....	26 00
Arranging Assembly Chamber and incidental expenses.....	20 00

\$100 00

We would also recommend a fair compensation to our two efficient Secretaries and to the two Pages for their services.

To provide for all of which we would recommend an assessment of \$1 50 on each member of this convention, to be collected immediately; and furthermore, should there be any surplus, then such surplus to be donated to the Agassiz Society to use in the purchase of books and instruments for use in said society.

Your committee, realizing the great value of the book recently issued by our Chief Horticultural Officer, and fully appreciating its value as a disseminator of useful knowledge, we respect-

fully recommend to your honorable body that Matthew Cooke, Esq., be requested to prepare and issue a larger and more complete work, covering such ground as he deems best, and to have such work illustrated with ten full pages of colored plates, and that this convention make such subscription for books as will warrant Mr. Cooke in preparing such a work.

Your committee has ascertained that two thousand copies of a book of from three hundred to three hundred and fifty pages, with ten pages of colored plates, can be printed, bound, and lithographed for \$5,500.

We suggest that a subscription list of 1,500 at \$5 each will make \$7,500, leaving \$2,000 to enable Mr. Cooke to collate throughout this State such information as he may require, and make such further investigation and experiments as he may find necessary. In view of these facts, and knowing the value and need of such a work, we recommend that a subscription list be opened immediately, and that the members of this convention be requested to subscribe for as many copies as they can. Your committee believe that such a course will do more to lead fruit growers to labor for the eradication of the insect pests than any other course that can be pursued.

M. T. BREWER,
A. T. HATCH,
GEO. C. McMULLIN,
WM. H. JESSUP,
N. R. PECK.

The report was adopted.

REPORT OF COMMITTEE ON DRIED FRUITS.

Your Committee on Dried Fruits beg leave to report as follows: One of our committee having made a canvass of three months in the Eastern States, visiting the principal cities, makes the following statement: That what he saw there convinced him that the dried fruit interest of this State is destined to be one of much more importance than has been generally accorded to it; while our canned fruits have attracted much more attention than our dried products, the latter is gaining favor since the introduction of evaporated fruits.

Our sun-dried or evaporated apples will find ready market on this coast, on account of the limited amount which will be produced because of the ravages of the codlin moth and other pests; while, on the other hand, pears, if properly prepared by evaporation, being pared and cut into eighths, will command a good price. Any variety of pear suitable for drying will meet the requirements.

Peaches, in consequence of the demand for canning purposes, command too high a price to make drying profitable, except in localities too far removed from canning establishments. They should be placed on the market either peeled, or otherwise, in an attractive form, so as to insure the most remunerative price.

Apricots, nectarines, and pitted plums, on account of their not being produced in the Eastern States, will always command good prices.

The prune d'Agen can be made profitable, but growers must meet the competition of European products, more particularly those of France. They should be most carefully cured and packed. We have still much to learn in assorting and curing.

We believe that the fig is destined to become an important product among our dried fruits.

Our observation leads us to believe that most of our dried fruits, to become profitable for shipping to the East, should be prepared by artificial evaporation. People purchasing evaporating machines should be careful that they be not deceived by misrepresentations of interested parties regarding the drying capacity of their machines, as much loss is sometimes made thereby.

With regard to the proper packages for dried fruits, the following are recommended by the State Horticultural Society:

For peaches, inside measure—

9 × 9½ × 15 inches, holding 40 lbs.
5 × 9½ × 15 inches, holding 20 lbs.
2½ × 9½ × 15 inches, holding 10 lbs.

The same size for apricots, pitted plums, and prunes, will hold respectively, 50 lbs., 25 lbs., and 12½ lbs.

Apples—

9 × 9½ × 15 inches, to hold 30 lbs.

Small packages of light material to pack in crates of five pounds, 4½ × 5 × 9½ inches.

W. B. WEST, Chairman.
S. T. CHAPIN,
A. T. HATCH,
J. M. HIXSON,
M. T. BREWER.

Committee.

The report was accepted.

REPORT OF COMMITTEE ON FRUIT PACKING.

To the Fruit Growers' Convention :

GENTLEMEN: Your committee represents a fruit interest second to none in the State, using fully one half of the green fruit produced as a whole, and three quarters of certain varieties, such as apricots, Bartlett pears, peaches, plums, and quinces. As representing such an interest we desire to bring before your body these facts:

First—To compare favorably with foreign productions of the same character, we require a superior quality of size, ripeness, and flavor.

Second—The territory we are now endeavoring to supply in competition with Eastern producers, is one that, through the drouth of the past season and other favorable circumstances, has been opened in a larger measure than ever before, and can only be retained by concessions in prices of material and rates of freight that would bear a favorable comparison with those at the East, and call for a mutual understanding and agreement as to prices between the fruit grower and the canner that will fairly remunerate the grower, and allow the canner the opportunity to canvass that market with a fair hope of successful competition in seasons less favorable than the last, bearing in mind that the superior manner in which the California canner is accustomed to prepare his goods, as compared with the Eastern manufacturer, will insure a preference at reasonable prices.

Third—In order to increase the foreign demand of Europe, the East Indies, Australia, and China, it must be borne in mind that the greater proportion of their inhabitants are people of moderate means, who are accustomed to closer economy than the average Californian, and that a small difference in price here, when increased by the natural additions of freight, long credits, insurance, etc., is increased many times before the goods reach the consumer, and if not kept down to a minimum, reduces the consumption largely.

As an example of this we would cite the apricot crop of Portugal for 1880, which although only an average one, was put upon the English market at such prices as to almost totally exclude the California apricot.

As a further evidence of the beneficial effects of moderate prices, we will call your attention to the enormous consumption of canned salmon by the working classes of England, when placed at a price within their means, it being noted that every reduction in price has been followed by a corresponding increase in consumption, till at this time the enormous catch of 250,000 cases (2,100,000 dozens of cans) on the Columbia River is exported to and sold in England, at a price to the eater of twenty cents per can, against a consumption in 1876 of 50,000 cases, at forty cents per can.

Fourth—In order to produce the fair average remuneration of the grower, as many intervening profits as possible, such as freight packages, small and worthless fruits, etc., must be abrogated; and there must also be a certainty as to quantity and quality of the crop as a whole, and individual shipments in particular, regarding which points the canner is usually in the dark up to the moment of use.

Fifth—Your committee earnestly advocate the adoption of the free package, whenever practicable to the grower, and feel sure the canners will advocate it, to the extent of bearing a fair proportion of the cost—say one half.

Sixth—The unanimous recommendation of the canners of San Francisco and vicinity that Sacramento River peaches be shipped in close boxes, rather than baskets, has our approval, from the fact that fully five per cent of the best part of each basket is ruined, by stealing and mashing during shipment and distribution.

In this particular, we would call attention to the fact that there is no uniform weight of peaches in baskets, it varying from twenty pounds to twenty-five pounds. That cannot but result in constant misunderstandings between shipper and consumer.

Seventh—We recommend for canners' use the following standard varieties:

Apples—Fall and Newtown Pippins.

Apricots—Royal.

Cherries—Large white and meaty varieties.

Plums—Yellow Egg, Greengage, Coe's Golden Drop, Columbia, Washington, Jefferson, Ickworth.

Peaches—Yellow Crawford, White Heath, Yellow Cling.

Pears—Bartlett.

Eighth—While we are not familiar with the causes and remedies of the various fruit pests, we perhaps are in a position better than the majority of consumers to appreciate their baneful effects, and shall at all times aid in their extermination in any manner your society may decide best.

Ninth—We recommend a closer and more intimate relation between the canner and producer, in order that canned fruits may become like many articles familiar to us, a necessity rather than a luxury, and to this end we invite at all times a free, frank, and open discussion of the points suggested in this report.

A. D. CUTLER,
J. H. MORRIS,
Committee on Fruit Packers.

REPORT OF COMMITTEE ON RAILROAD FREIGHTS.

To the State Board of Horticultural Commissioners :

A committee of five was appointed by the Horticultural Convention, which was in session in Sacramento, December sixth and seventh last, to wit: E. T. Earl, W. R. Strong, J. M. Hixson, M. T. Brewer, and A. T. Hatch, for the purpose of conferring with the railroad companies on the subject of reduction of rates of freights on fruits. Said committee to report to your honorable body.

Therefore, said committee beg to report as follows:

On the twenty-second day of December, 1881, the committee (with the exceptions of Mr. E. T. Earl and J. M. Hixson, who were at the time in the southern part of the State) called upon General Superintendent A. N. Towne and General Freight Agent J. C. Stubbs, at Mr. Towne's office in San Francisco, where an hour and a half was spent in a discussion of the subject in its various phases. While the officers of the railroad seemed to be willing to accede to any reasonable request, your committee failed to show how the railroad company would be benefited by making concessions (at least to their satisfaction). A guarantee of an increase of the amount of freight to any considerable extent, might be met by them with a reduction equal to seventy per cent of the net profits arising from such increase in quantity, providing said increase resulted from or on account of said reduction in rate. Furthermore your committee saith not.

Respectfully submitted.

A. T. HATCH, Chairman.

The Committee on Ways and Means, after canvassing the convention in accordance with the adopted report to the Board made before, submitted the following as their final report:

RECEIPTS AND EXPENSES OF THE CONVENTION.

Cash received from convention by M. T. Brewer.....	\$127 75
Cash by M. T. Brewer and M. Cooke.....	19 10
Total	\$146 85
<i>Cash Cr.</i>	
By printing fifteen hundred posters	\$18 00
By printing two thousand postal cards	4 00
By printing one half letter circular.....	2 00
By two thousand postal cards.....	20 00
By twelve hundred one cent wrappers.....	13 45
By postage stamps	3 30
By labor mailing, posting, etc.....	12 00
By labor hired for setting up, attending to, and tending doors, exhibit	26 50
By cash paid expressage.....	2 10
By cash paid janitor Assembly Chamber	39 50
By cash paid two pages at convention	6 00
Total	\$146 85

IN MEMORIAM.

WHEREAS, John B. Saul, of Oak Shade, Yolo County, has been removed by death; therefore, be it

Resolved, That in him a typical horticulturist has been lost, whom Californians truly miss. Born in Ireland, early removing to America, studying and practicing horticulture under the instruction of Downing and his associates upon the Hudson, he soon became known as exceptionally well versed in the literature and skilled in the practice of his honorable calling. In California he distinguished himself and won deserved success. His example in close attention to every detail of his calling, and perseverance in striving for the highest excellence, in the face of great difficulties, is worthy of praise and imitation by others. His loss will be sincerely felt by all who knew him.

ROBERT WILLIAMSON,
MRS. JOHN BIDWELL,
R. B. BLOWERS,
C. H. DWINELLE,
A. T. HATCH.

Adopted.

The convention then adjourned to meet in San José on the second Tuesday (fourteenth) of November, 1882.

JOHN H. WHEELER,
Recording Secretary.

ADDENDA.

The following Reports were received too late to be placed with the Reports of the other Commissioners.

REPORT BY S. F. CHAPIN, M. D.,

COMMISSIONER FOR THE SAN FRANCISCO DISTRICT.

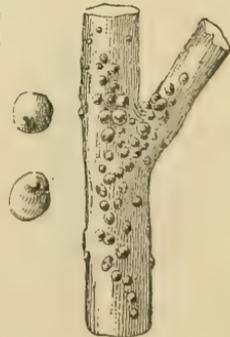
SCALE INSECTS.

The prevalence of scale insects in the orchards of Santa Clara Valley during the past few years has afforded ample scope for their study, to which I have for the past three seasons devoted what time I could command. Assigned to this work by you, I shall report as concisely as possible the information gained, and the results obtained by numerous experiments carried on and observed for two seasons. I shall here use in this paper, as a part of it, a report presented to the Santa Clara County Horticultural Society, August 6, 1881, by Mr. D. C. Vestal and myself, with such revision and correction as another year has shown to be needed, and with added memoranda to the experiments detailed, in order to present their full effects after a lapse of more than a year. I shall also detail other experiments, and shall refer to work done on an extensive scale for the destruction of the scale pests, and which has shown most gratifying results.

All scale insects impair, to a greater or less degree, the vitality and productiveness of the tree or plant upon which they live. Of the seven species which have here been observed as infesting our deciduous orchard trees and fruits, five are of frequency and of such importance as to attract the attention of orchardists. These are the *Lecanium oleæ*, *Aspidiotus rapax*, *Aspidiotus conchiformis*, *Aspidiotus perniciosus*, and the *Icerya purchasi*, the two last named being the most dangerous of all scale pests which the orchardist has to encounter.

LECANIUM OLEÆ.—This scale is beginning to attack other trees than the orange and its kindred. A year since I examined an orchard where it existed in overwhelming numbers upon the German prune, Briggs' Red May, and the Early Crawford peaches, upon the Moorpark apricot trees, and most of all upon the *Petite prune d'Agen* trees. This is believed to be the direct result of planting a few orange trees close by. Mr. Ellwood Cooper has written fully upon this scale, to whose reports I refer you.

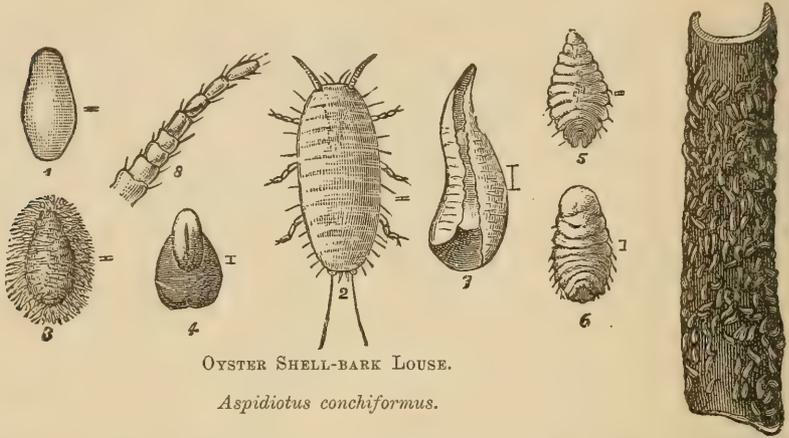
ASPIDIOTUS RAPAX.—So named by Prof. J. H. Comstock. This scale is rapidly spreading, and is now found in many places where unknown a year or two ago. It seems to be most prominent in Santa Cruz County, where it can be abundantly found. I have, during the past two seasons, observed it in many places in Santa Clara County, and have had specimens sent me from San Lorenzo, Alameda County, where it was abundant upon pear trees, a branch sent being well covered with the old scale, and also newly hatched young crawling about.



GREEDY SCALE.
Aspidiotus rapax.

This scale seems to be native to the willow and alder, and other indigenous trees. It, however, is found in great numbers upon acacia trees, upon the black locust and poplar, and upon some of our orchard trees, as the pear and apple. This scale somewhat resembles the *Aspidiotus perniciosus*, and by many is confounded with it, but it is not to be compared to the latter for destructiveness.

ASPIDIOTUS CONCHIFORMIS.—The one longest known, and which was discovered and described in Maine in 1794, has ever since that time infested the apple tree particularly, although found upon other fruit trees and upon the currant. This is now found in great num-



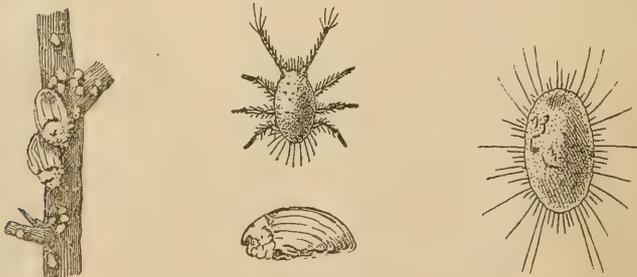
OYSTER SHELL-BARK LOUSE.

Aspidiotus conchiformis.

bers upon almost all old apple trees on this coast, and is commonly known as the bark louse or the oyster shell scale. It may be found described in works on entomology. This species has not caused so much injury as to alarm fruit growers to any great extent, although it is described by Dr. Packard as doing more injury to the apple tree than any other insect known.

COTTONY CUSHION SCALE.

Next will be described a comparatively new scale heretofore, but one which has within the last two or three years been ravaging many localities in widely different parts of the State. This is the so-called



COTTONY CUSHION SCALE.

Icerya purchasi.

dorthesia, or, as named by Maskell, *Icerya purchasi*, and called by Mr. Matthew Cooke the cottony cushion scale.

This scale has been, it is asserted, known to be on the acacia for seven years in San José, but it is only during the past and present seasons that it has attracted attention. Its great prolificness, and its destructive abilities, have called widespread attention to it. This pest attacks everything in the way of tree, vine, or shrub; all the evergreens, as well as deciduous trees that fall in its way are attacked, and every ornamental shrub on the lawns of some portion of our cities will show its presence. The ivy, even, is not proof against it. In San Rafael, San Mateo, Santa Barbara, and Los Angeles, it is well established. While in San José it has not this season caused so great damage as last, yet in the citrus-growing regions it is becoming one of the most serious pests they have to encounter, and it is even stated that, should its ravages not be checked, orange and lemon culture will have to be abandoned.

From the rapid destruction which follows the presence of this scale, it is well that it should be widely recognized, and its first invasion noticed and checked. In San José, in 1881, it was first noticed in May as the fully developed female, from which the first brood of young then appeared.

The present season of 1882, the first young appeared May 25; the mother insect having gradually matured her eggs from the opening of Spring until the young were hatched. The egg of the *Icerya* is small, pale or orange red, elongated and ovoid. The young just hatched out are very active, and are very minute, perhaps the twenty-fifth of an inch in length. The body is pale red; the six legs and two antennæ are black. The antennæ are long and club-shaped, and have from six to nine joints, as they are further matured. The antennæ are covered with long hairs, which bristle forth prominently. The eyes are small and black. Between the pair of forelegs on the under side of the body is to be seen the beak or sucker, by which the insect secures its nourishment.

The females partly grown are of a variety of colors, orange red mostly, and spotted over with white and green; some are nearly entirely a dirty white, and many are a pea green. It seems that the coloring matter of the plant they are upon colors them to some extent. Their body is ovoid and elongated and flattened, the back being ridged up with several segments quite prominent. Around the rim of the body are a multitude of hairs, standing out prominently. Around the rear half of the body, on its rim, is a row of tubercles or spinarets, from which a white secretion issues, forming a cottony cord, and these placed side by side and the interspace filled up by the same material running lengthwise the body and projecting from it, gives the whole a ribbed, satin-like appearance, whitish in color. Gradually, as the insect matures, these projecting ridges approach each other at the ends, and are joined together and curved under slightly at the point, while the sides are at the same time curved under the whole length, and the edges joined together with a flat ribbon-like band, the whole forming, when complete, a soft elastic white sack, the size and somewhat the shape of a medium-sized white bean. The length, when mature, is about three eighths of an inch; the width, one fifth of an inch.

Inside the sack are deposited the eggs of the female, among the interstices of a mass of cotton-like fiber, which under a high magnifying power is shown to be round and not more than one sixth part the thickness of pure cotton fiber, with which it was compared in

the same field. This mass of cottony fiber is filled with a great amount of granular matter, for the purpose, it may be, of affording sustenance to the young insects within the sack. The young hatch out in this sack, and make their way out into the world through a



BLACK SCALE.
Lecanium oleæ.

rent in the soft and tender underside of the sack. The female, after finding her home and during maturity, does not move, although she does not lose her legs, but clings tenaciously with her feet to her support, leaving the body tipped up in the rear and the cottony mass movable in any direction. The male insect was only found during a period of about two weeks from September twenty-fifth. This was the observation of 1881, when I found them in great numbers. I have failed to find the male insect this season. It has a long red body, six legs, and one pair of very long, dark, and transparent wings, prominent eyes, and antennæ very long, and covered with hairs arranged very much as the feathers of a peacock. The antennæ are 16 or 17 jointed. The winged male is easily seen and easily caught, as it moves slowly about, and is not readily disturbed so as to fly away. The female insect lives upon the trunk of the tree and large limbs, and down to the smallest twigs, around which it may be seen clinging in clusters sufficiently great to completely hide the branch; also upon the leaf, along the stem and ribs of which it is fixed, both above and below, although more abundant on the under side of the leaf.

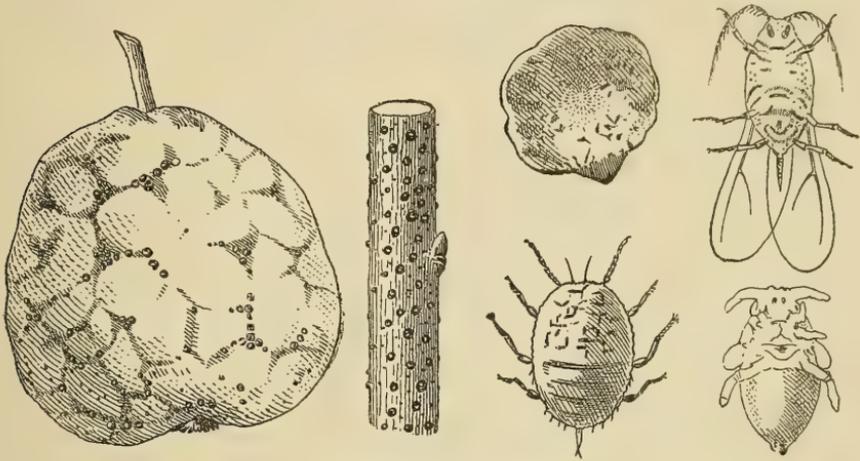
There are three broods of this insect in the season, the first appearing in May, the second in August, and the third in October, or about three months apart. I have just observed (October fifteenth) the mature female with eggs fully grown, and with the young hatched out and crawling in the same sack. In 1881 they rapidly increased from about the first of August, and were continually appearing and still hatching out in December.

Every female, it is estimated, produces from 200 to 500 young. The young will mature and produce a new brood in about three months. Where this scale infests deciduous trees it may be readily destroyed by the application now found to be successful in treating the *Aspidiotus perniciosus* and detailed further on in this report.

Where, however, evergreens are involved, it is a far more serious problem. The best treatment for the *Icerya*, so far found, is that used by Mr. Cooper, of a strong and hot infusion of tobacco, applied by spray as near as may be at 130°.

ASPIDIOTUS PERNICIOSUS.

By far the most injurious scale pest infesting our orchard trees and fruit is the new species of *Aspidiotus*, which, so far as known, originated in San José, and for some years was confined to this locality. It has been known as the San José small, round, black scale, and



SAN JOSÉ SCALE INSECT.
Aspidiotus perniciosus.

named by Prof. Comstock *Aspidiotus perniciosus*. The spread of this scale over the State has been gradually taking place, until now it can be found in a number of the fruit-growing counties, notably San Joaquin, El Dorado, Nevada, Placer, Sacramento, Yolo, Solano, Sonoma, Alameda, Santa Cruz, San Benito, and others, and I am told even in Humboldt in the north and in the southern counties. This scale produces terrible results in an orchard when once established. Its ravages have caused widespread alarm, and unless checked soon causes entire destruction of the trees infested. The trees become entirely covered with the scale, so that no portion of the bark can be seen. The fruit also becomes covered in the same manner and is rendered unfit for use. The losses caused by the ravages of this insect cannot be easily computed. Whole orchards are literally destroyed by it. In many cases those who have recognized its presence and destructive power in time have made most strenuous efforts to stay its spread and save their trees, but it has hitherto been, to a great degree, discouraging, owing to the difficulties encountered in fighting an unknown foe. Within the past two years, however, great progress has been made in destroying this insect, and it is now considered certain that we have an efficient means of ridding ourselves of one of the most dangerous pests known to fruit growers.

The trees attacked embrace every kind of deciduous fruit trees except the Black Tartarian cherry, and it is supposed two or three other black cherries. Some varieties are less liable than others to its attacks, but we have found it upon all other trees than those excepted above.

Poplar and other ornamental and shade trees give it a support. It infests hedges of osage orange and the wild cherry, many of which

have been destroyed in the past two years and have been dug out. It is found on the currant, and quickly destroys the bush. It has been found upon rhubarb, and tomato plants growing in orchards among infested trees. This scale evidently prefers some varieties of trees, but yet when placed upon others not so well liked, will stay and colonize to some extent.

The effect of this scale insect upon the tree is peculiar. After a short residence there, the green layer of the bark becomes stained a very dark red color, which continues until the death of the limb or tree, unless the insect be killed. The bark may then be restored to its normal color and health.

The damage in Santa Clara County has already become so great as to cause the most serious losses, not alone to the fruit growers, but also to the public at large; and from the orchards affected has greatly lessened the revenue which has been derived from the production and sale of fruit. One instance, stated definitely, will suffice to show these losses.

This orchardist states (1881) that he has 2,000 trees badly infested with scale; 1,000 of these trees are totally destroyed, and will be dug out this season; the balance are badly injured, but can probably be saved. This portion of his orchard, in health, returned at least \$5,000 per year. His loss on crop from these trees in 1880 was over \$2,000. For 1881 there was a total loss of crop on 1,500 trees. This orchard has regularly paid an interest of 10 per cent on \$1,000 per acre. The scale pest alone has caused a loss of \$20,000 to the owner.

Further on reference will again be made to this orchard. The Assessor's roll for 1881 reports in this county 335,537 bearing trees of the apple, pear, plum, and peach. This does not include the large number of trees which have been destroyed and are unfruitful; neither the immense number of young trees that have been planted, but not yet paying; and, as observed, it leaves out the large number of other varieties, cherries, almonds, apricots, etc., in bearing, which, it is estimated, would make a grand total of 1,000,000 trees. Should the losses experienced by the orchardists now suffering be carried out to all, you can readily estimate the astounding result. The value of the Santa Clara County fruit crop for 1880 was returned at \$976,475, notwithstanding the immense losses incurred. The sworn statement of the Assessor, now before me, says: "That all fruit trees in Santa Clara County are assessed as improvements at the following prices: trees in full bearing, free from scale, \$1 50 per tree; trees bearing, affected with scale, from .00 to 50 cents per tree, and that there is a large number of orchards situated east and northeast from the City of San José, badly infested with scale (and after naming some, says), and in consequence are assessed at .00 to 50 cents per tree." From this it will be seen that the revenue derived from taxation is seriously affected by the presence of this pest upon our orchard trees.

The Assessor's roll for 1882 gives of the four varieties of trees named above—apples, peaches, pears, and plums—bearing trees subject to taxation, 280,347, a deduction from the previous year's assessment of 55,190 trees. This loss is, in fact, upon apple, plum, and peach trees, as the young pear trees coming into bearing, and being assessed for the first time, more than equal the loss on that variety. So it is seen that the loss in assessed value on these three kinds of trees totally destroyed has amounted in the one year to \$82,785. This is actually but a small part of the loss, as other varieties of trees

destroyed, and the losses of previous years from the scale, as well as the reduced value of trees affected but still bearing, cannot well be enumerated. These trees were destroyed before the application of proper remedies; now, however, from the knowledge of correct treatment, these losses will soon cease, and the taxable property of the county be immensely increased. I feel assured that the next assessment will show a decided improvement. Thus the magnitude of this evil becomes apparent, and the problem to be solved is of vast importance.

DESCRIPTION OF THIS PEST.

From the study we have given to this scale during the past three years, it may be briefly described as follows: The scale insect is massed upon the bark of the tree and fruit as well, the scale of a dark gray or blackish and tough material which covers the insect being very small and round in shape over the female, while that covering the male is much smaller and elongated on one side. In both, the higher and central portion of the scale has a yellowish color, and directly under which may be found the insect itself, which is soft and delicate in structure and of a pale straw color. There is no connection between the cover and the insect, which is merely protected by it from harm. The shell-like scale is formed by either the cast-off skins of the larva or by a waxy secretion of the body of the insect. The microscope shows the young female insect oval in shape and flattened.

At first it is very small and hardly perceptible to the naked eye, but careful observation will detect it as a minute yellow dot on the bark of the tree, crawling about with the six legs with which it is provided, and seeking a favorable locality upon which to fix itself for life. It will crawl about for only a day or two, and then fastens itself to the bark by a beak-like protuberance which it inserts, and procures nourishment from juices of the tree. Immediately after fixing itself it begins to be covered with a silvery material, which, as it grows older, is gradually changed in color to a very dark hue, and enlarges to the size of about one sixteenth of an inch in diameter. The insect, soon after fixing itself, loses its legs and antennæ, and thus remains through life, keeping its flattened shape, but growing wrinkled and almost round, gradually increasing in size to perhaps one sixty-fourth of an inch in width, and one fiftieth of an inch in length when full of young. After the young emerge it is dried up and disappears. We have counted from the female, when full of young, between fifty and sixty of the minute sacks which contain the young perfectly formed insects ready to crawl about. The young male insect is produced in the same manner and at the same time, though not in such numbers—perhaps half a dozen males to a hundred females. In size, the male is about one third that of the female, and in shape very different, being elongated and more angular; provided with six legs, placed differently upon the body, with two antennæ and two eyes, and with a teat-like protuberance at the rear end of the body, ending with a point.

At this stage of its existence the male has no wings, and it cannot be discerned without the aid of a magnifying glass. The color of the young male is not a yellow, but of a steel-like or whitish hue. It crawls about and fixes itself upon the bark, as does the young female, and becomes covered with a scale in the same manner, but which is

elongated upon one side, and not more than one half the size of the scale of the female. The male, after remaining its allotted time in the pupa state, emerges as a fully developed insect, having eyes, antennæ, six legs, and one pair of very long wings of a reddish and transparent appearance, and the protuberance at the rear end of the body is developed into a very long tapering point, nearly as long as the body itself. The perfect winged male is so minute it can with great difficulty be discerned by the naked eye, crawling and flying about in search of the female, which it impregnates under the scale, and then, having fulfilled its mission, dies.

In the season of 1880 we saw the winged males first appear on March twenty-third, and in great numbers for a few days. The first brood of young scales appeared the latter part of April. On June twenty-seventh we found the males from the first brood under the scales and nearly developed with appendages and wing pads, and on July second large numbers of them flying about; also, as late as July twenty-fifth, and still later, on August second, a few were seen. On July twenty-third, the trees were covered with the young of the second brood. August second the young males of the second brood were found crawling about. Bark scraped clean on the twenty-third of July was found on the twenty-fifth alive with young insects, and some of them already commencing to be covered with scale. As it was expected at the time these observations were made, a third brood would appear about October, so we found it. On October seventeenth we found the male scale insect in the first pupa stage of development in the winged form, and also, on the same day, found the perfect winged insect of the third brood moving about on the tree.

These facts prove conclusively that there are three distinct broods of these insects in the season, the earliest portion of the first brood about March twenty-third, of the second brood about July second, and of the third brood about October seventeenth, there being apparently an interval of fourteen to fifteen weeks between the different broods of the season. The young female insects were found crawling about through the season, and as late as the last of November. The last brood remains through the Winter under the scale until the approach of warm weather in the Spring, when they again appear.

While the *Aspidiotus conchiformis* will develop but one, or at most two broods per season, this new species of *Aspidiotus* will produce three broods, and each female probably fifty young. This present season of 1882 has been, in the development of fruit and insects, about three weeks or more later than usual, consequently the appearance of the scale was not expected as early as last year. The first winged male scale insects of this species were discovered this year on April twenty-fifth, crawling about on an English hawthorn tree. At that time no young female scale insects were to be found, but the old females under the scales were approaching maturity, and in due time the young appeared.

FOES OF SCALE INSECTS.

The natural enemies of the scale insects are the larvæ of some varieties of the *Coccinellidæ*, or lady-birds.

The season of 1881 developed in great numbers an important enemy of the scale, viz.: the *Chrysopa* or lace-winged fly, the larvæ

of which prey upon it. This is a beautiful, slender, and delicate fly, bright green in color, with large golden eyes, and very long wings like lace. The eggs are very minute, white, and oval in shape, and



LACE-WINGED FLY.
Chrysopa.

are attached by a long and slender pedicle to the underside of leaves or the fruit. The larvæ is about one quarter of an inch long, slender, and tapering from the middle toward both ends. It is provided with jaws, each perforated, through which it sucks the juice of its victim.

REMEDIES FOR SCALE INSECTS.

In 1881 Mr. J. H. M. Townsend, of the Santa Clara County Horticultural Society, kindly placed at our disposal a large number of trees infested with scale *Aspidiotus perniciosus*, for the use of the committee in making such experiments as were desired. A series of careful experiments for the destruction of the scale pest were made and the results carefully noted. Other experiments had been under way in our own orchards for many months.

These experiments demonstrated on one hand the inefficiency of many applications, and on the other hand showed a certain means for the destruction of the scale insect. The remedies which have proven successful will destroy all the varieties of scale, as the one under treatment is the most difficult of all to overcome. A portion of these experiments are numbered, and the results obtained, stated as observed, at different dates up to this time, October, 1882.

No. 1. Concentrated lye of the American Lye Company, one pound; water, two gallons. February 22, 1881—Applied by spray upon two peach trees infested by scale; washed in the afternoon when the trees were dry; effect, scale killed; the tenderest wood was killed also. July 5, 1881—New wood grown over the trees four and five feet long.

No. 2. Concentrated lye, one pound; water, two gallons. March 10, 1881—Applied by spray upon two peach trees infested by scale, washed in the morning when the trees were damp with dew. July 5, 1881—Scale killed; buds and twigs not injured; fruit abundant and trees most healthy.

No. 3. Concentrated lye, one and one half pounds; water, one gallon, June 23, 1881—Applied by pouring from a dipper upon two pear trees infested with scale and with numerous limbs dead. Lye so strong as to burn bark and foliage. August 2, 1881—Scale entirely destroyed; bark being restored and new foliage appearing.

No. 4. Concentrated lye, one pound; water, one gallon. July 5, 1881—Applied by spray upon a large apple tree badly infested by scale; bark and leaves burned. August 2, 1881—Scale killed; green layer of bark being rapidly restored, and new leaves and blossoms appearing all over the tree. The foregoing trees have since been mostly killed by the application of a low grade of coal oil.

No. 5. Concentrated lye, one pound; water, one gallon. February, 1881—One almond tree, one Easter Beurre pear tree, and two apple trees, grafted, were washed by brush with this strength of lye, in order

to destroy the red spider and its eggs, which could not be destroyed by previous applications of lye, one pound to five gallons, and also one pound to three gallons; another and the main reason being to ascertain the effects of very strong lye upon the trees. No scale upon these trees. This application destroyed the red spider and its eggs on these trees so that it did not appear for months; but, however, later on the trees became again infested. While the strong lye will destroy a large number of the eggs of the red spider, it is found that all cannot be reached. The effect upon the bark and health of these trees was wonderfully good, the bark being very smooth and having a bright green velvety appearance, and totally free from all moss or other parasite.

No. 6. Concentrated lye, one pound; water, one gallon. The experiments in this number were made upon a section of orchard in a square block, comprising three hundred and fifty-seven Ickworth plum trees, cut down and grafted into Petite prune; some yearling prune trees having been put in in places and washed as were the plums. Of these, one hundred and twenty-six trees were washed in February, 1881, with the above strong lye, applied with a brush. Among the three hundred and fifty-seven trees were eight trees badly infested with scale. No others had any scale upon them. The infested trees were scattered about as follows, and washed as indicated:

No. 10 in first row, and 4 in eleventh row were washed with lye, one pound to three gallons of water. The effect was not quite sufficient to completely destroy the scale, though so injured that they did not breed. Afterward these two trees were washed with one pound to one gallon, and this effectually ended the scale. No. 7 in sixth row, 10 in seventh row; 11 in twelfth row, 8 in fourteenth row, 3 in seventeenth row, and 11 in seventeenth row, were washed with lye, one pound to one gallon of water, with the effect of completely destroying every scale upon them, and not one has appeared upon any of these trees since that time. These trees have been in the finest possible condition from the time of this application.

Among the trees not washed with the strong lye, two were found in June, 1882, to have scale upon them; one of these, the top having become badly broken by wind, was dug out and burned; the other was washed soon as discovered with the whale oil soap and sulphur mixture; owing to the foliage upon the tree, not every part of it could be touched. Yet, however, the scale was destroyed, so far as could be found.

No. 7. Concentrated lye, one pound to one and one half gallons water. Five Bartlett pear trees obtained from the nursery and planted in 1881 and scattered among a considerable number, although carefully examined at the time for scale, were found in June, 1881, to have a few scales upon them. These were at once washed with the above strength of lye, which destroyed the scale completely upon three of these trees, so that none subsequently appeared. On two of them, however, a live scale or two must have remained on the trunk of the tree, at the surface of the ground, untouched by the lye, as in September following a few young scales were discovered, located close to the ground. These were again washed in the same manner. Since that washing no scale has been found upon either of these trees until this month (October 16, 1882). On one of them has been found a few young scale. The tree was immediately washed with the whale oil soap and sulphur mixture. On another Bartlett pear tree, not, how-

ever, numbered with the above, was found some scales, November 7, 1881. This tree, being entirely dormant, was washed with lye, one pound to one gallon water, completely destroying the scale, as none can be found on it this year. Among the Yellow Egg plum trees, one was found January, 1882, with scale upon it, and washed at once with lye, one pound to one gallon water, and repeated in February. No scale were left, as none can be found at this date. Another Egg plum tree was found infested in June of this year. To this was applied, by a brush, the whale oil soap and sulphur mixture, with some lye added. No scale can now be found upon it.

The trees in experiments five, six, and seven, are in an orchard of fifty acres. I have constantly and carefully watched all these trees, and at this date no scale can be discovered in the entire orchard. Should any hereafter appear, the treatment will be by lye, one pound to one gallon of water. With this success in my two years' individual practice, I feel justified in repeating the statement I made at the first State Fruit Growers' Convention, that young orchards can be kept free from the *Aspidiotus perniciosus* by the right use of concentrated lye as a Winter wash, and the whale oil soap and sulphur mixture for Summer.

In the following experiments, the trees were all badly infested with scale :

8. Concentrated lye, one and one half pounds; water, one gallon. June 24, 1881—Applied to two Clairgeau pear trees; brush used in order to save foliage; many limbs dead from effects of scale. June 27—Trees burned considerably; scale killed where reached. July 2—Much of the bark showing a healthier appearance. July 23—Trees still better. August 2—No sign of scale; green layer of bark being restored very rapidly; the fruit quite clean, because no scales of second brood were upon it. April 25, 1882—Examined the trees, and found a very healthy top, and with new bark where burned with the lye when washed in the Summer. All the surface was not touched by the lye, and where not washed, the scales still existed. Wherever the bark was washed, owing to the time that it was done, it was cracked across. Yet underneath this cracked surface was found new and healthy bark. October 14, 1882—There has been a good growth of new wood this season, and the under bark has maintained its fresh and healthy appearance over entire tree.

9. Concentrated lye, one and a half pounds; water, one gallon. June 24, 1881—Applied on a portion of tree to ascertain the effect upon the stain of bark. July 23—The bark where washed shows much less stain; lighter in color, and the green layer being restored. August 2—Stain rapidly disappearing.

10. Concentrated lye, one pound; water, one gallon. July 5, 1881—Mixed accurately, and applied same day upon pear tree. July 23—Scale, where reached, entirely destroyed; bark burned by the lye, but otherwise healthy and good where it was previously sound. April 25, 1882, and October 14, 1882—Observations nearly the same as in the preceding number, the bark under the cracked outer layer being all renewed, and with a bright, healthy, green layer free from stain; free growth of new wood during the season.

11. Concentrated lye, one pound; water, one and one half gallons. Tree washed same time as above and with about the same results, although an unthrifty tree. October 14, 1882—The tree had been

pretty well destroyed by the scale last year, and shows but a little growth of new wood.

12. Concentrated lye, one pound; water, two gallons. Same as above, except that the tree was still more thoroughly ruined by scale, and at this date has not recovered; but little new wood; what there is, however, being healthy.

No. 13. Concentrated lye, one pound; water, three gallons. This tree had been washed by spraying, April 1, 1881, with this strength of lye, which proved too weak to destroy the scale. July 23, 1881—Young scale insects covered the tree; the tree was left to itself with that washing. April 25, 1882—Observed that the scale was abundant and fast accomplishing the destruction of the tree. October 14, 1882—The tree is dead to within one foot of the ground, but from the collar many new sprouts have grown.

No. 14. Concentrated lye, one pound; water, five gallons. June 23, 1881—Applied to two trees, one slightly and the other badly infested with scale. This wash was used by pouring it upon the trunk of the trees, and allowing it to run down and soak into the ground; the tops of the trees were not touched. This experiment was made, as it had been publicly stated that this weak lye used in this manner was an effectual remedy. July 2, 1881—No effect produced upon the scale where not reached by the lye. August 2, 1881—No effect other than noticed above; scale only injured where touched by the lye, and second brood of young scale insects crawling all over the tops of the trees. April 25, 1882—Trunk quite clean and healthy, but the top full of scale insects of the last season alive and approaching maturity. October 14, 1882—Tree covered with scale, old and young; the trunk, however, where washed, appearing far more free than the upper portion; the bark where washed is healthy.

Use of Kerosene.—In the following experiments with kerosene, the action of that agent was reported as it *then* appeared at the date of report, but the subsequent effects, which will now be stated, show how important it is to allow ample time to elapse before coming to a conclusion upon the merits or demerits of a particular proposed remedy. The use of coal oil when the tree is full of sap is plainly shown to be unallowable. These will be detailed as they appeared at the time, and also as seen this season:

No. 15. Kerosene, low grade and heavy, 110 test. June 1, 1881—Applied to two pear trees, spraying, with coarse spray used and oil thrown over the entire trees. June 27, 1881—Observed that the foliage had been killed and the trees considerably affected; scale killed. July 2, 1881—New leaf buds coming out. July 23, 1881—New foliage all over the trees, and seemingly new vigor throughout; new shoots six inches long; no scale to be found, and the green layer of the bark healthy to all appearance. August 2—Foliage increasing rapidly all over the trees, and, apparently, the trees were gaining in health. Thus they appeared up to August, 1881. The observation of these trees on April 25, 1882, showed a very different state; the trees were dead.

No. 16. Kerosene, high grade, 150 test. June 1, 1881—Applied by spray upon two pear trees. June 27, 1881—Observed that the foliage had not been killed, but that the scale had all been destroyed; the trees apparently uninjured. July 2—New leaf buds coming forth. August 2, 1881—Trees appeared healthy; foliage uninjured; scale showing no signs of its presence, and the fruit showing less effects

from scale on account of the wash it had received. April 25, 1882—Trees were dead.

No. 17. Kerosene, high grade Diamond brand, 150 test. July 27, 1881—Applied upon two pear trees with a coarse heavy spray over entire trees; trees very badly infested. August 2—Effectually destroyed the scale; the trees and foliage apparently entirely healthy. No perceptible effect upon the trees, but completely drying up the scales, so that they are blown away by the wind. The fruit is not affected by the kerosene, but the scale upon it is killed, and the fruit is very clean. It is observed that kerosene of 150 test evaporates rapidly, and leaves but little signs of having been applied. April 25, 1882—One tree dead; the other not dead, but nearly so. October 14, 1882—Examination showed trees to be dead.

No. 18. Kerosene, same brand, July 27, 1881—Applied upon a pear tree by spray atomizer, which produced a very fine mist only. August 2, 1881—The same effects produced as in No. 17; scale appeared to be entirely destroyed; no apparent effect upon tree or foliage. April 25, 1882—Tree not dead, but with many scales upon it. October 14, 1882—Old wood dead, but new wood from near the ground.

No. 19. Gasoline. July 27, 1881—Applied upon pear tree by heavy syringe spray thoroughly over the tree and foliage. August 2, 1881—Not effectual in destroying the scale; too volatile; many of the insects killed but a large proportion unaffected; no apparent effect upon the tree or foliage at that time; on this tree, the young male scales, just hatched out, were found crawling about. April 25, 1882—The tree has been almost killed by the scale infesting it. October 14, 1882—Tree still alive, with some scale upon it.

No. 20. Gasoline. July 27, 1881—Applied upon pear tree by the spray atomizer. August 2—Results same as the preceding. October 14, 1882—This tree did not suffer from the effects of the application, but this season has made a vigorous growth of new wood quite clean from scale. The foregoing applications of kerosene and gasoline were made in full strength.

No. 21. Whale oil soap and sulphur mixture, one pound; water, one gallon. June 23, 1881—Applied by spray over pear tree, covering foliage and fruit thoroughly. July 23—Scale killed; tree gaining in health, green layer of bark being restored; fruit greatly improved in appearance. August 2, 1881—Tree still improving, also fruit. April 28, 1882—Tree very healthy and appears clean from scale; green layer of bark being fully restored, and parts of the tree that were nearly killed by the scale are forming new bark rapidly; the tree has a very fine top of new growth. October 14, 1882—The tree has grown very thriftily through the season, and the wood is all very healthy; some scale are found upon the tree, however. These trees are in an orchard badly infested, and it is to be expected that the insects will return. This wash is an effectual Summer wash, and where there is any scale present should be used in the strength here given, as a wash of one half the strength has proven ineffectual.

No. 22. Soft soap, one pound; sulphur, one pound; tobacco, one pound; water, three gallons. July 5, 1881—Applied upon two trees by spray, covering trees, foliage, and fruit, thoroughly. July 23, 1881—Seemed quite effectual at the time; many scale destroyed, but not all; trees not affected by the wash; fruit improved in appearance. Subsequent observations, however, showed that but little was

accomplished in destroying the scale. October 14, 1882—This tree shows an abundance of live scale in all stages of growth. This wash was used with good effect in another orchard, June 1, 1881, on a Fellenberg prune tree, clearing it from scale, which, up to this time, have not returned.

No. 23. Soft soap, one pound; sulphur, one pound; water, three gallons.

No. 24. Soft soap, one pound; water, three gallons. The two washes named above were applied June 23, 1881, and with no effect, neither has it shown any result this season.

No. 25. Whale oil, one pint; kerosene, one pint; borax, one ounce; water, one gallon. June 23, 1881—Applied by spray to a pear tree. At the different dates in 1881, when the effect has been observed, it has been apparent that the oil is decidedly injurious to the tree, applied in this manner or at this time; it is therefore not recommended. Applied to another tree in one fifth the strength above given, it has no effect upon either scale or tree. April 25, 1882—The tree first treated is nearly dead, but, however, having the top cut off, new wood is coming along; scale appears to be destroyed. October 14, 1882—The old wood is dead; the sickly growth of new wood springing out from the lower portion of the tree shows some scale.

No. 26. Carbolic acid, three ounces; water, two gallons. June 23, 1881—Applied by spray upon a pear tree badly infested with scale. June 27, 1881—Failed entirely. This tree afforded a constant succession of insects in all stages of development, both male and female. From it some of our most interesting studies were made; we report it as it appeared at each visit. On that date (June 27, 1881) we found the male insect under its scale partially developed, with wing pads, but wings not yet out. July 2—Found plenty of winged males of the second brood flying and crawling about. July 23—Tree was covered with young female scale insects of the second brood crawling, and with a few of them just located and commencing to be covered with their scale. July 25—A few of the winged male still found; bark scraped clean on this date was in two days covered with young scale insects, and with a slight formation of scale over them. August 2—Tree entirely covered with young scale on this date; two or three winged males were found. April 25, 1882—Tree almost dead from effects of scale; top dead and removed, and a few feeble shoots coming forth. October 14, 1882—Shoots have grown from the trunk of the tree to some extent, but the whole having been so seriously affected, the tree is considered worthless.

The entire orchard in which these trees are situated, other than the ones experimented on—from eight to twenty-six—were washed this past Winter with a very low grade of coal oil called "tree wash;" the result is not satisfactory; the owner tells me (October 14, 1882) that he is satisfied that the oil has seriously injured his trees.

EXPERIMENTS WITH STEAM.

It was at one time thought that steam might be effectually applied for the extermination of insect pest upon trees. In the Summer of 1881 a test of this agent was made in an orchard near San José. A large tent was made to hang upon a frame, which could be run on either side of and overhanging the tree; the tent then being dropped,

the tree was entirely inclosed in an air-tight bag, into which the steam and other ingredients were forced, and left to act upon the tree and insects as long as was thought necessary.

Horticultural Commissioner D. C. Vestal and myself carefully noted the experiments made, and placed the results upon record. These experiments are also numbered for convenience in describing.

No. 1. September 8, 1881—An apple tree infested with scale insect, woolly aphid, and other pests, was covered by the tent, under which was hung upon the tree cloths saturated with bisulphide carbon, one half pound. It was thus left for three fourths of an hour, and then the tent was removed. Result, apparently of no effect. The woolly aphid was not injured, but found crawling about. The red spider was found crawling about; also a small caterpillar was observed unharmed. The scale insects were not affected in any way, so far as could be observed. September 12, 1881—Examination made on this date showed that no effect had been made by the application upon any of the insects mentioned as infesting this tree. Mr. J. H. Wheeler, the maker of the bisulphide carbon, thought that the agent had not been properly brought into contact with the insects, and for that reason failed to destroy them.

No. 2. A pear tree was treated with steam forced under the tent covering the tree. The temperature was raised to 165°, and maintained for ten minutes. Observations immediately afterwards showed that the foliage of the tree, and the young wood of the tree, were destroyed. Everything was cooked thoroughly. September twelfth, the tree and the scale were both killed.

No. 3. An apple tree was treated in the same manner, with steam at 140°, for three minutes, and afterwards with sulphur fumes (caused by putting two handfuls of sulphur upon live coals) for five minutes. The result showed that the tree did not appear quite so much injured at this time as the preceding tree at first showed, but as seen on September twelfth the effect was the same. The scale was killed, and also the entire tree, except the oldest part of the trunk.

No. 4. Apple tree steamed for five minutes at 140°; dried for five minutes, and then fumed with sulphur for five minutes. Result the same as the preceding.

No. 5. Apple tree moderately covered with scale and woolly aphid. Steam applied with which had previously been mixed three gallons of kerosene, pumped into the boiler of a thrashing engine. This application was made at 110° and maintained for four minutes. September 12—No effect was perceptible upon the tree, except that the foliage was somewhat injured. The scale insect was not killed or even injured. The woolly aphid was found alive and uninjured.

No. 6. Steam and coal oil applied four minutes at 140°. September 12—Tree pretty nearly killed. Only the oldest wood alive—all new wood and buds killed.

No. 7. Steam and coal oil for six minutes at 130°; No. 8, same for six minutes at 150°; No. 9, same for twelve minutes at 120° to 130°. This tree was steamed four minutes, and then, after an interval of six minutes, was steamed two minutes more. September 12—The result upon these trees was the same. The trees were all destroyed excepting the trunk and oldest wood.

From these experiments it will be seen that steam cannot be applied in such manner and at a temperature sufficiently high to destroy the insects without, at the same time, destroying the tree.

During the season of 1881 strong efforts were made to introduce the use of various patent mixtures, which were claimed to have great merit in destroying the scale insect. One of these was to be used by simply spreading it on the trunk of the tree, which application it was stated would, through the poisoning of the sap, kill the insects. This, as well as others of a like nature, were given careful consideration and tested, and resulted in entire failure.

Another method, which was persistently forced upon the public, was that of boring into the trunk of the tree to the center, and filling the auger hole with the so called cure. A careful investigation of many trees so treated was made by Mr. Matthew Cooke, Mr. D. C. Vestal, and myself, for the purpose of determining the actual effects, if any, of this treatment. October 17, 1881, we visited the orchard of one person who had allowed his name to be used in recommending this exterminator, and first examined two pear trees bored and the holes filled with the preparation. These trees were found to be covered with live scale insects in all stages of development, and showing no signs of injury. The young female insects were found crawling about the trees in great numbers. The wood, the season's growth, was covered with scale. An apple tree, the trunk and large limbs of which had been washed the previous Winter with strong lye, showed that the scale, which completely covered it when the lye was applied, were entirely destroyed where the wash had reached, but on the smaller wood, which had not been washed with the lye, the scale was found alive. This tree had also been bored and treated with the application referred to, and which had no effect whatever. On the trunk of this tree, where the lye had been applied, the green layer of bark was found replacing the old, which had nearly been destroyed by the scale.

At another place we examined a pear tree which had been bored and treated with this preparation. This tree was in no manner whatever affected by this so called remedy, but was completely covered with scale insects in every stage. We found the young females crawling about, and on this tree was found the male scale in the first pupa stage of development for the third winged brood, and also on this tree was discovered the perfect winged male of the third brood. In no case has the slightest good resulted from these secret and patented preparations. We have treated this subject thus fully, because, to our knowledge, prominent and careful horticulturists have been induced to purchase these things at an exorbitant charge. The treatment of trees by crude petroleum and its different products has been thoroughly tried in this vicinity, and, it must be confessed, with conflicting results. Some still claim that coal oil is efficacious, and if properly used, safe; but the advocates of this practice are very few now, although at one time, orchardists were pretty evenly divided in the use of coal oil on the one hand, and that of concentrated lye on the other. The treatment of orchards by crude petroleum was commenced in 1879-80, but was not extensively tried until 1880-81. Many orchards were then drenched with crude petroleum, greatly to the regret of the users. The following season the advocates of coal oil abandoned the use of the crude, and applied a partially refined product which is little better. This is called "tree wash," and was used this past season very extensively.

This whole subject may be treated as with one agent. Many orchards have been visited where this treatment has been adopted,

and where the result has been disastrous. One prominent orchardist used the "tree wash" upon about twenty acres of all varieties of trees, and has lost almost the entire number. A great part of the dead trees have this season been dug out. Another used this wash upon sixty fine cherry trees, ten years old, killing them all. Another, adjoining the last named, washed with the same, and killed one hundred and twenty-five choice cherry trees. Another had used crude petroleum, with the result of killing all his trees except apples and pears, which partially rallied and put forth a sickly new growth. These results can be substantiated by many other orchardists who have met with a greater or less degree of loss from the use of oil, and almost every person who has been in favor of using coal oil has abandoned its advocacy. Indeed, I now know of but one orchard where it is the intention to apply it again. This one, from some cause, appears not to have suffered from its use, and a visit to this orchard on the fourteenth of October showed a very large and fine crop of apples being gathered which were almost free from scale. This orchard, belonging to father and son—the Messrs. L.—has been washed in the following manner: In 1879–80 some trees were treated with kerosene of 150 test. In 1880–81 crude petroleum was applied to the trees of the entire orchard. These were principally apple trees, numbering about six hundred, although there were trees of every other variety. In 1881–82 the tree wash was applied to the same trees and in the same manner. As stated, this orchard is almost free from scale, and the trees appear healthy. The Messrs. L. attribute their success with coal oil to the following means of procedure. It is applied in the middle of the Winter, or before the sap begins to flow. It is applied in the finest possible spray, and is not allowed to touch any part but once. The work is done when there is no wind, and when there is no moisture upon the tree. All this evidence leads to the conclusion that the products of petroleum are most hazardous to the life of the tree, and while one or two may not experience the loss of their orchards, the hundreds of others would destroy their trees. Therefore, with all this added experience before me, I most emphatically condemn the use of petroleum or refined coal oil of any grade for the purpose of an insecticide.

The effect of coal oil upon trees of all varieties of stone fruits is particularly disastrous, being less upon apples and pears. I now again refer to the use of concentrated lye, which, as before seen in this report, has been of such signal service, and which I consider to be the specific, or at least so far as we now know, the best means of destroying the scale insects of deciduous trees. In the case under consideration where the *Aspidiotus perniciosus* is involved, no other application will do the work as well, as a Winter remedy which can be used when the tree is denuded of foliage and when the tree is dormant. The lye, while causing little if any harm, but on the other hand in most cases positive benefit to the tree, is, where used with care and in the proper strength, an effectual remedy. The only other remedy which can be recommended is the whale oil soap and sulphur mixture (codlin moth wash), which is applicable as a Summer wash particularly.

A few prominent examples of the employment of lye on a large scale will be given to show its usefulness and success. Great results had been obtained by the application of concentrated lye, but the

definite strength in which it should be used was only determined in the season of 1881, consequently the past Winter preparations were made for applying it on a large scale to entire orchards. In the early part of this paper reference was made to the losses of one orchardist, Mr. T., as an instance to illustrate the condition of many orchards in this vicinity. The orchard was visited a few days since (October 14, 1882), and a vast improvement noted in the health and appearance of the trees, which had by careful treatment been made to survive the devastating effects of the scale.

As was before stated, many of the trees destroyed had been dug out. These were particularly apple trees. Some, however, had survived, though badly injured. These being heavily cut back had put forth a new growth, which is this year most satisfactory. The pear and plum trees, especially, have shown the good effects of treatment, and are now vigorous and on the way to great fruitfulness. Owing to the fruit spurs and all small wood of the pears being killed by the scale two years ago, there could be but little fruit this year, but from the fine thrifty growth on these trees a large crop of fine fruit is promised for the coming season. The plum trees, of which there is a large number, have made a fine recovery from the effects of the scale, and yielded this year a valuable crop of fruit, obtaining of French prunes at the rate of eight tons to the acre of fresh fruit. The total yield of fruit this season exceeded in value that of the last by a large percentage. The fruit has been of fine quality and very clean. At least 90 per cent of the total yield has been entirely free from scale, and of the 10 per cent remaining none of that was as bad as the fruit of the entire crop of last season. The coming season he expects to have a very large crop of fine and perfectly clean fruit. Mr. T. has used both oil and concentrated lye on his trees, not, however, together, but separately. He says he shall not use oil again, as he is satisfied that it injures his trees. Lye has given him his fine results. It has been used in the strength of about one pound to two and a half gallons water, but in this strength it has required a longer time and a larger number of applications to destroy the scale. Although some scale is still to be found there, the orchard is nearly cleaned of the pest. It is intended to use lye and the caustic soda the coming Winter.

Another extensive orchard near to the above, belonging to Mr. R., has been thoroughly treated by concentrated lye. This orchard of thirty acres, in which are 5,000 trees, has been one of the worst infested by scale. Last Winter the entire orchard was drenched by lye, applied by fine spray in the strength of one pound to one gallon water, and one pound three ounces to one gallon water—some few trees with even a stronger solution. This application was made from December, 1881, to February, 1882. A visit made on April twenty-fifth last, showed the scale to be pretty thoroughly destroyed. The trees, at this date, were in a most vigorous and healthy condition, with beautiful green foliage, and hanging full of fruit, well set in all varieties, far enough advanced at the time. Other trees were in full blossom at that time. On October sixteenth I again visited this orchard, to ascertain the season's results, and found it had borne out the estimate made of it in April last. The growth of wood has been very fine and healthy. The crop of fruit has been good this season, and has been almost entirely clean. The cherries were entirely so. The plums and prunes, of which there was an immense

crop on about 1,200 trees, were also wholly free from scale. Also, the pears and apples were, most of them, clear of scale, though a few were slightly infested. Some scale remains in this orchard, but so little compared to last season that, although the quantity of fruit was about the same, the quality was far superior, and therefore in value far greater. A portion of the pear trees, which still showed some few scattering scale, were washed in September with a solution of lye, showing four degrees by the lyeometer, in which was mixed sulphur, as much as could be forced through a coarse nozzle, and whale oil soap in small quantity. This has apparently cleared away the few scale that were present. It is intended to wash with lye the coming Winter, in the same manner as last, wherever it may be required.

Another prominent example of the use of lye is that upon the orchard of Mr. G., in the celebrated fruit growing locality known as the Willows, San José. This orchard is chiefly devoted to the culture of the cherry, and is one of the best known in the State for that product. There are also a few hundred French prune trees. All of these trees, both cherry and prune, range in age up to fifteen years. Two years ago the *Aspidiotus perniciosus* appeared on the white cherries, nearly destroying a number of trees. In the Winter of 1880-81 the trees were washed with concentrated lye, one pound to five gallons of water. It resulted in some good, but did not kill many insects. In January, 1882, with the exception of one tree mentioned further along, the entire orchard was washed with concentrated lye, one pound to one gallon of water. All varieties of trees subject to scale were washed twice—the applications being made two weeks apart. The method employed was by heavy spray continued upon the tree from five to twenty minutes for each tree. The fluid dripped from the tree upon a table arranged under it, and thus saving the material from waste. October fourteenth I examined this orchard. On the cherry trees all of the scale has been destroyed upon almost the whole of the trees washed. On a few trees, however, there are at this time a few scale to be found, bred from some not reached by the wash. The effect upon the cherry trees was not injurious, except that a few fruit spurs were killed. The trees this year bore a very fine crop of fruit, wholly free from scale. Not a single specimen of scale could be found upon any of the fruit, as a careful inspection was made of it for that purpose. The effect upon the prune trees was a little greater, killing a larger number of fruit spurs. This is partly attributed to the state of the atmosphere, as it was warm and dry when these were washed. Not a scale insect can now be found upon any of these trees, although very large trees and very badly infested with scale. Mr. G. intends to wash his trees the coming Winter with lye in the strength of one pound to two gallons of water, using also the table as before. The saving caused by this was at least two thirds of the material.

THE DRAIN TABLE.

The table is made of sheet and zinc, fixed upon a frame in halves, which are placed against the trunk of the tree on either side, thus forming a circular basin fourteen feet in diameter, and requiring but one minute for transfer from one tree to another.

AN INSULATED TREE ATTACKED.

The tree mentioned as not being washed was a Cleveland Bigarreau cherry, standing in the orchard one hundred yards from any tree infested, being surrounded by the Black Tartarian trees, which are never infested. This tree last Winter, at the time of washing the orchard, had no scale upon it. Now, however (October fourteenth), I find this tree covered with scale already matured, as well as many young crawling about upon it. This is an interesting observation, as it shows the rapidity with which a tree may become covered with this pest, and also that the scale will single out and colonize itself upon trees to its taste. In this orchard no cherry of the black varieties has been infested. The Black Tartarian, the Black Bigarreau, Knight's Early Black, the Black Eagle, and the Early Purple Guigne, are none of them troubled; and neither has the Belle d'Orleans shown any insects. The white varieties of cherries are among the worst infested trees we have.

CAUSTIC SODA.

Some orchards have also been washed with the English caustic soda. One stated to me that he had used it upon his entire orchard of all varieties of trees, mostly, however, Newtown Pippin apples, in the strength of ten degrees by the lyeometer. It was not used in this case for the purpose of destroying scale, for the orchard was free from it, excepting some of the *Aspidiotus conchiformis*, which it destroyed. The object was to clean the trees of moss, and also to kill the red spider. The trees were cleaned, and a large porportion of the red spider eggs killed, but not all by any means. This caustic soda is obtained in large drums of six hundred pounds, and is somewhat cheaper than the concentrated lye, which fact may cause its more frequent use hereafter. Many other instances might be cited to show the efficacy of lye as an insecticide, but sufficient facts are stated.

HOW THE INSECTS ARE SPREAD.

Attention must be called to the means of spreading this serious pest, the *Aspidiotus perniciosus*. The system of "return boxes," and packages of any character, is known to be pernicious and a fruitful source of the spread of all kinds of noxious insects, which, either as insects, eggs, or larvæ, are fastened to them and taken into the orchard, to be developed in due time, and then to spread devastation to everything attacked. Indeed, to me, so obnoxious is the return box, that I will not permit one to be brought into the orchard or on the premises. I prefer to pay the cost of new boxes, and give them with the fruit sold. As the female insect has no wings, she can, of course, only be spread about by becoming attached to something by which she is carried to different localities, and by crawling about during the short period after hatching, before becoming fixed for life.

Birds will carry them most frequently about an orchard, and it is thought that one source of danger is little regarded, viz.: carrying them about on one's clothing by brushing against infested trees.

If boxes or packages are returned, they should be disinfected as soon as received, by dipping in boiling water, to which is added not less than one pound of potash to twenty-five gallons of the water used.

The nursery trees sent over the State have been the means of spreading the scale extensively, and while nurserymen are anxious to make sale of their trees, they must take every precaution to see that their patrons do not suffer, by neglect to first destroy the scale, which may be done by dipping the trees in a solution of concentrated lye of one pound to two gallons of water. I am glad to say that most nurserymen are desirous to do all in their power to destroy the scale.

Among other means of preventing the spread of scale, thorough and constant cultivation of an orchard should be kept up. One prominent difficulty in the way of eradicating the scale I believe to be the practice so prevalent of growing other small crops in the orchard between the trees.

It cannot be too strongly impressed upon the mind of every owner of an orchard that he must personally watch his orchard and exercise such constant supervision that no infested tree shall escape observation, and, when found, the proper remedy at once be applied. In the orchard referred to where chance trees have been found infested, no other course would have saved me from the overwhelming spread of the scale.

The experiments of 1881 and the subsequent use of lye in instances mentioned, indicate the remedy. This should always be used when the tree is dormant, and when the foliage has disappeared from the trees. In our climate that time is the Winter, and at any time before the trees put forth their buds.

APPLYING THE LYE.

The strength of lye should be one pound to one gallon of water, where trees are infested with scale. Where it is only desired to cleanse the tree from moss, one pound to three or four gallons of water is sufficient. The best method of applying the concentrated lye is by dissolving in boiling water, and throwing it upon the trees with a force pump through forty or fifty feet of one half-inch rubber hose, to which is attached a nozzle, having for its opening a simple straight slit, very narrow in width, and one sixteenth to one eighth of an inch long. The best spray tip yet devised is that made at San José, called the Merigot Spray Nozzle. The pumps most used for this purpose are the Gould pump and the Merigot pump. The latter is made at San José, and is cheaper than the Gould pump. Great care should be taken to cover the tree entirely with the solution of lye, as upon its thorough application depends its success.

One of the greatest difficulties in the use of strong materials is from the spray falling upon the person of the operator, and burning and injuring the skin. In order to overcome this obstacle, I have devised a simple "extension nozzle" of slight cost, which is very light, and which may be made of any length desired, say from four to fifteen feet, or even longer. By the use of this extension, it is perfectly easy to reach and spray any orchard tree without danger and discomfort. The cost of materials and apparatus may be given as follows: The Gould pump costs about sixteen dollars, without accessories; the Merigot pump, twelve dollars. The suction hose and the long hose will cost, according to quality used, from fifteen to twenty-five cents per foot.

The Merigot spray tip, if purchased alone, \$1 50. If bought with pump, the pump and spray, \$13. The bamboo extension with globe

valve seven feet long, \$2 75. All excess in length over seven feet, twenty-five cents per foot. The concentrated lye, of the American Lye Company, in one pound cans by the case of forty-eight pounds, \$3 50 per case. English caustic soda in 600 pound drums, \$33 to \$35 per drum. The whale oil soap and sulphur mixture called the "Codlin Moth Wash," is manufactured in San Francisco, and the price can be ascertained by inquiring of Messrs. Allyne & White, 112 Front Street.

In conclusion, I will give the analysis made by Prof. Hilgard, of the State University, of a sample can of American Lye Company concentrated lye. The can sent I took from a lot I had been using, and is supposed to be a fair sample of the manufacture. The analysis is as follows:

Caustic potash -----	8.3
Caustic soda and some carbonate of soda -----	91.7
	100.0

With this I submit my report, expressing my firm conviction that ere long we shall be freed from the ravages of one of the most dreaded pests known to horticulturists.

APPENDIX TO DR. CHAPIN'S REPORT.

[The following is an Appendix to the report of Dr. Chapin on the Scale Insects, which was published in the Rural of Oct. 28, and Nov. 4, 1882.]

I take the opportunity to add in this Appendix several important matters which have been ascertained since the first printing of this report. In regard to the *Lecanium oleæ*, mentioned as so seriously infesting an orchard of deciduous fruit trees, I have just visited that orchard, and now cannot find even a specimen of the scale of the present season. The trees were all washed the past Winter with concentrated lye—one pound to one gallon of water—and with the result of completely destroying this scale. The strength of the lye, however, destroyed part of the fruit buds on the French prune trees, lessening the crop for this season, but that obtained being of the first quality. The *Aspidiotus perniciosus* has lately been found infesting the blackberry bushes, in company with the white scale, *Diaspis Rosæ*, which has long troubled the blackberry and raspberry. I have also just discovered its presence upon rose bushes, which it has killed, as it does everything it attacks. At the same place it was also found infesting the Japan quince, fruit and branch. Thus it is seen that our ornamental shrubs are almost all liable to its attacks.

The *Icerya* scale has within the past few months been spreading to localities which were last year free from its presence. One of the most serious matters concerning it has just come to my knowledge. The following communication from Mr. A. Kamp, sexton of Oak Hill Cemetery, was read at the last meeting (November tenth) of the San José Common Council:

WHEREAS, A certain scale insect, known as the "cottony cushion scale" (*Dorthisia* or *Icerya purchasi*), having attacked certain trees and plants in Oak Hill Cemetery, and are threatening, with certainty, the destruction of every tree and plant therein; now, therefore, being in doubt as to my authority in entering the lot of any one and removing infected trees without their permission; and whereas, each deed bears upon its face a condition subjecting it to such rules and regulations as may be adopted from time to time by the Mayor and Common Council for the better government of said cemetery, I now, therefore, do petition and ask your honorable body to pass an ordinance authorizing the sexton, on the approval of the Cemetery Committee, to remove all infected trees in Oak Hill Cemetery.

To ascertain the condition of this beautiful city of the dead, I visited it, and by the kindness of Mr. Kamp, was shown the work which has been done by this pest. It is fast taking possession of almost every variety of ornamental tree and shrub there, as well as invading the domain of the floriculturist. The scale is so abundant in places that it covers almost entire many trees and bushes, and can be seen continuously dropping down to the ground, and the young and partially grown ones literally covering the fences like patches of red paint, and also lying upon the ground in masses of thousands upon thousands, so thick and so deep in places of several inches square that the ground cannot be seen. In a short walk around the cemetery Mr. Kamp collected for me to bring to the Fruit Growers' Convention the following infested specimens, all of which are in the exhibition hall for the inspection of horticulturists and the public. These comprise some deciduous fruit trees, many evergreen trees, shrubs and vines, flowers, etc. Pear trees, apple trees, the forest trees, the white oak, *Quercus alba*, and the California laurel; the English laurel, *Laurus cerasus*; the beautiful shade trees, the black locust, and the cork elm; the different varieties of acaciæ; magnolia, grandiflora, dwarf flowering almond, wild greasewood, bridal wreath, rose bushes of various kinds (though it is here to be noted that the Bank-sia rose, which was among the infested varieties was not at all troubled), the dwarf box, pittisporum, tobria, English ivy, clematis, verbena, veronica, variegated sage, and strawberry plants. Also, specimens of the oleander, which were completely covered with the black scale, *Lecanium oleæ*. Many more varieties might have been secured, but these will indicate that almost everything is subject to the attack of the *Icerya*. There is, however, one of our most beautiful trees that is free from all scale pests, viz.: the pepper tree. The danger of visitors to our cemetery carrying away this scale to their homes is of the gravest character.

DAMAGE FROM COAL OIL.

The application of coal oil shows such peculiar results upon trees that the danger attending its use is daily becoming more and more apparent. I have just visited an orchard belonging to Mr. P., who, in the latter part of December, 1881, washed one hundred and sixty Newtown Pippin apple trees, ten years old, with the coal oil branded "tree wash." These trees were not harmed, although the scale was killed. On the same day the pippins were finished, he washed thirty-four White Winter Pearmain trees, standing beside the others, from the same barrel and in precisely the same manner; the same person also doing the work. The result was, that all the pearmain trees were killed. On an adjoining place men were washing with the same "tree wash" at that time. In this case many pippin trees were badly injured and some killed, while the pearmains were not apparently harmed. Here were shown exactly opposite results on adjoining properties. With these uncertainties attending the application of a particular agent, it is best to abandon it altogether.

DISINFECTING PEACH ROOTS.

With the use of lye there is not such danger existing. I have been many times asked the question, "Can concentrated lye be used on

the roots of trees without injury?" I think this can now be safely answered with regard to peach roots, at least, and anything on that stock. In February, 1882, Mr. H. C. Morrell, of Wright's, Santa Cruz Mountains, purchased two hundred and thirteen Solway peach trees from a lot brought from the East. They being poor trees, he feared some disease attended them, and he decided to wash them entire. Before planting he dipped the trees entire, root and top, in concentrated lye, one pound to one gallon water. He tells me, on November 9, that the trees have all lived, except two, which perished from other causes. The trees are healthy, and have made the same growth that his other trees have done. At my request he will dig up one of those trees and bring it to the Convention for the inspection of the members.

An excellent method of dissolving concentrated lye in cold water is by placing the finely broken up lye in a wire basket, and suspending it in cold water near the surface. The lye will readily dissolve, and, by its greater specific gravity, saturate the bottom first, gradually reaching the top. In this way 300 pounds may be dissolved in 100 gallons of cold water in from twelve to fifteen hours. The great object here gained is the saving of fuel and labor.

Further inquiries relating to caustic soda have enabled me to state that it will be used to a considerable extent this coming Winter. It can be supplied in drums of 600 pounds, Runcorn Alkali Company brand, for four cents per pound. Caustic potash can be obtained in like drums of 300 pounds for six and one half cents per pound. The analysis showing the relative quantities of each of these articles in concentrated lye enables orchardists to mix to suit themselves. At the cost of each given alone, 90 per cent of soda and 10 per cent of potash would give, at the strength of one pound to one gallon water, four and one half cents per pound or gallon. Probably no effectual wash could be made any cheaper than this. To save weighing or measuring, the lyeometer, or lye tester, is used. This may be purchased for seventy-five cents. By dissolving one pound of the lye in one gallon of water the degree marked on the lyeometer will show the density of the fluid, and in future preparations it may be made to suit. An illustration of relative strengths and combinations of these salts is shown in the exhibition hall. The degrees shown by the lyeometer are as follows, each in the strength one pound to one gallon water:

	Settled.	Agitated.
1. Concentrated lye, American Lye Company-----	13°	16°
2. Caustic soda-----	15°	16°
3. Caustic potash-----	11°	12°
4. Caustic soda, 90 per cent-----	22½°	26°
5. Caustic potash, 10 per cent-----	22½°	26°
6. Pure water-----	0	

It is very important that a proper selection of caustic soda be made, as many cheap brands do not possess caustic properties, but are worthless salts with acids. The brand of A. G. Kurtz is good, and can be furnished for four and one quarter cents per pound. A more costly article, and the purest, being also of greater strength, is that made by Greenbanks. This is the best, and costs six cents per pound. I apprehend that the main difficulty with the cheap brands of concentrated lye is that they are made of worthless soda. We should be careful in our efforts always to secure a valuable article if we would succeed.

LATER NOTES ON THE WOOLLY APHIS.

The year has given some valuable hints in regard to this pest. Some experimenters report failure in the use of alkaline applications about the roots of infested trees. In one case it is said that the aphides were found crawling up through a mixture of lime and ashes. On the other hand, from several parts of the State statements come in that lime has destroyed the pest. In one case, at least, quicklime was applied close to the tree, and upon the roots, without injury to the tree. A basin should be dug about the tree, a liberal supply of lime thrown in, and covered over with earth. If there are no facilities for irrigation, it is important that the application should be made in the Autumn, or early Winter, to insure a thorough soaking of the infested roots by the alkaline solution.

There is also an accumulation of evidence to the effect that gas lime may be used with safety, in moderate quantities, on well drained soils. Professor Husmann used gas lime in the Simonton Vineyard, at the rate of one gallon on a surface eight feet square. It was intended as a partial insecticide against the phylloxera, as a manure, and to improve the tilth or mechanical condition of the soil. Professor Husmann reports a great increase in the vigor of the vines and in their crop of grapes.

At the Rancho Chico gas lime was also used about apple trees. In all experiments due care should be had that the water containing the soluble parts of the gas lime may not stand long upon the roots of the tree or vine. Great service may be done to the public by those who will experiment carefully and report results to the Horticultural Commissioners, using lime, ashes, gas lime, niter, tobacco, carbon bisulphide, etc.

C. H. DWINELLE.

REPORT OF A. S. WHITE

COMMISSIONER FOR THE LOS ANGELES DISTRICT.

RIVERSIDE, September 25, 1882.

C. H. Dwinelle, Esq.:

DEAR SIR: Your postal at hand. Mr. Cooke has so recently visited every portion of this district that he is much better qualified to give the information that you desire than I am. Of this, however, you can rest assured, that everything is progressing as favorably as we can expect. The trees in most of the infested districts are being rapidly cleaned, and nursery stock is not being shipped into districts not infested. I think public opinion has been educated up to the proper standard, and will sustain any just laws for the protection of our horticultural interests. The entire Press is with us. Am sorry I cannot attend at this meeting, but find it impossible to do so.

Yours truly,

ALBERT S. WHITE.

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THE "SMUT" FUNGUS.

[*Fumago salicina*.]

Compiled by E. J. Wickson, Horticultural Commissioner for the State at Large.

The prevalence of the Black Deposit on orange, lemon, olive, walnut, and other trees, in this State, makes timely a brief statement concerning the fungus which causes it, and the conditions under which it appears. Fortunately, the fungus has been carefully studied from California specimens, by Professor W. G. Farlow, of the Bussey Institution of Harvard University, who is one of the leading mycologists of the United States. His writings are published in the Bulletin of the Bussey Institution for 1876 (Part V), but are not available for California readers; hence this attempt at a compilation therefrom, which shall contribute to a popular understanding of the subject. I shall also introduce a few observations concerning the occurrence of the fungus, from other sources.

After a thorough study, Prof. Farlow determined that the fungus sent him from this State is identical with that which has been known in Europe since 1829, and which, occurring in different forms, had been given different names. These forms were, however, found to be various stages of growth of the same fungus, which is now known as *Fumago salicina*. It is reported as occurring in Europe on willows, oaks, birches, hawthorn, quince, and pear trees, and on oranges. In California it was first recorded as affecting the olive, and here also it may be seen on almond, walnut, California laurel, and other trees. Its presence on the orange and lemon trees in this State is, however, most obtrusive, because it gives the dense foliage of these trees a most sorry appearance, and because it covers the fruit, making it exceedingly ill-looking, and reduces its market value considerably. Retailers of these fruits resort to brushing, washing, and other means to remove the black coating, and growers in "smutty" localities are sometimes forced to cleanse the fruit to make it marketable.

The fungus, *Fumago salicina*, does not enter into the substance of the leaf or young bark upon which it grows. For this reason it does not destroy the vegetation upon which it is parasitic, and it is therefore unlike the "rust" on grain or the mildew on the rose or the grapevine, which do penetrate and destroy the tissues of the plant upon which they grow. Scraping or brushing the "smut" from the leaves or fruit of infested trees show the surface of the leaf or the skin of the fruit uninjured. Thus the smut may exist without destroying the vitality of the tree, although it is quite sure that such a close covering as sometimes occurs must, to a greater or less extent, interfere with the functions of the leaves, and thus reduce the vigor of the tree.

When it is seen that the fungus does not draw its nourishment directly from the tree, it becomes an interesting matter to discover its means of livelihood. On this point, Professor Farlow says:

The disease, although first attracting the eye by the presence of a black fungus, is not caused by it, but rather by the attack of some insect, which itself deposits some gummy substance on the leaves and bark, or so wounds the tree as to cause a sticky exudation, on which the fungus especially thrives; * * * and in seeking a remedy, we are to look further back than the fungus itself—to the insect, or whatever it may be, which has made the luxuriant growth of the fungus possible.

With these remarks, Professor Farlow commends the subject to the entomologists.

The recommendation was accepted by Professor J. Henry Comstock, and the subject was made a study by him while in California in 1880. In his address before the California State Horticultural Society, September 24, 1880, he said:

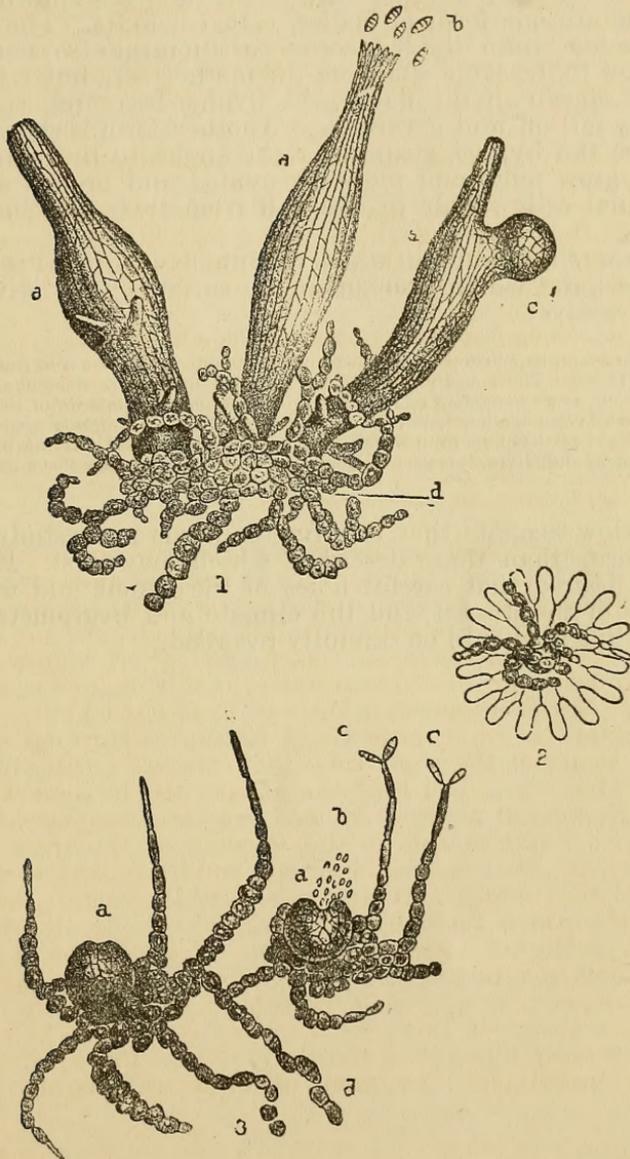
My own observations confirm the conclusions of Professor Farlow. In fact, before I read his paper, I had learned to consider the presence of fungus on the leaves as a sure indication of the presence of scale insects. And as I had never been able to find the fungus organically connected with the plants, but simply growing over the surface of them near the coccids, and easily removed by rubbing, I supposed that it grew upon the honeydew which the insects excreted, and which so frequently attracts the visits of the ants. Professor Farlow suggests, as a means of destroying the fungus, the use of alkaline soaps as strong as the trees will bear. If our conclusions respecting the fungus be true, this remedy will be found a very effectual one, for it will destroy the scale insects, which render its presence possible.

It may be remarked farther, that experience during the last two years has proved, on a large scale, the truth of this observation, for the free use of whale oil soap and of concentrated lye, which has been made in the southern counties, has not only cleaned the trees of the scale insects, but has changed them from their vile smutted condition to the handsome green of clean foliage. The use of the same agents to kill the scales adhering to the fruit before marketing, as ordered by the quarantine rules of the Chief Executive Horticultural Officer, has also removed the smut from the fruit and greatly increased its market value. In this connection it may also be remarked that the freedom from smut which is enjoyed in certain regions back from the coast, may be attributable to the freedom of the trees from scale insects, rather than to some climatic condition unfavorable to the growth of the fungus. At any rate, it is thoroughly demonstrated that means which have been found effectual in destroying scale insects cause the smut also to disappear. I shall attempt now to present the facts ascertained by Professor Farlow concerning the growth of this fungus. In order that the subject may be more intelligible, I introduce a copy of Professor Farlow's engraving, for which I am indebted to the publishers of the Pacific Rural Press. Professor Farlow says, speaking of specimens of smut he obtained from olive leaves:

The black substance, when seen with a magnifying power of four hundred diameters, is found to be composed of the stellate hairs of the olive, over which grows the fungus, to the dark color of whose mycelium the spots owe their color. The mycelium is very variable in appearance. As a rule it is composed of moniliform hyphæ, whose cells are .006 mm. by .008 mm., and in some places almost spherical.

These bodies called hyphæ are seen at Fig. 1*d*, where they grow so closely as to form a sort of membrane, which extends parallel to the surface of the leaf and forms the chief part of the black substance

which may be scraped or washed from the leaves. Besides these multitudinous oval or spherical bodies seen with the microscope, there are larger forms, as shown in Fig. 1 at *a a a*. They are termed



stylospores. They are flask-shaped bodies, extending above the mass of the mycelium by which they are surrounded. They may be easily seen with a good magnifying glass, as the black projecting necks are tolerably conspicuous. They vary much in shape, and have forks, branches, and swellings, as shown in the engraving, Fig. 1 *c*, and from them are liberated spores, as shown at Fig. 1 *b*. Other forms of the

fungus are shown in Fig. 3; *a a*, are bodies termed picnidia, which are quite numerous. They consist of a membraneous sac, of a black color, which contain the small bodies, which are represented as being discharged at *a*. Still another form of the fungus is shown in Fig. 3 *d d*. These are one form of bodies, called conidia. The ordinary cells of the mycelium divide by cross partition into two parts, which do not grow to the same shape as the mother cell, but remain two by two, as shown in the figure, the hyphæ becoming zigzag, and finally they fall off and germinate. Another form is shown at Fig. 3 *c c*, where the hyphæ, rising at right angles to the plane of the mycelium, grow more and more attenuated and branch at the tip. The terminal cells divide in two, fall from their attachment and germinate.

Fig. 2 shows the manner in which the fungus entwines itself around the stellate hairs which grow upon the surface of the olive leaves. Prof. Farlow says:

A microscopic examination shows why the deposit is more easily removed from the orange than the olive leaves. The smooth surface of the former gives no permanent attachment to the fungus, which, as we heretofore said, does not penetrate into the interior of the cells of the mother plant, while on the other hand, the hyphæ wind themselves tightly around the stalks of the stellate hairs of the olive, from which they cannot be removed. If the fungus should attack both oranges and olives, it is very evident why the latter would suffer much more than the former.

Prof. Farlow suggests that this fungus needs more study. There are other forms than those described which may exist. Especially is it to be desired that careful notes of the extent and manner of appearance of the disease, and the climate and hygrometric conditions attending it, should be carefully recorded.

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