

# OKLAHOMA

## AGRICULTURAL EXPERIMENT STATION.

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# The San Jose Scale

 In Oklahoma.

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AGRICULTURAL EXPERIMENT STATION.

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# THE SAN JOSE SCALE IN OKLAHOMA.

(*Aspidiotus perniciosus* Comstock.)

Order, *Hemiptera*.

Family, *Coccidae*.

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The chief object of this bulletin is to inform all in Oklahoma who own or have charge of fruit trees that the San Jose Scale is in the Territory, and to urge them to keep careful watch of all fruit trees and if anything suspicious is found on the trees to send it to the station at once for identification. If the San Jose Scale or any other injurious insect is found to be present, the station will give the best advice at command and lend every reasonable help in stamping it out.

It is assumed that everyone knows something of the ravages of this insect. Within comparatively few years (since 1887) the San Jose Scale has spread from California to many states, and its rapid work in the destruction of fruit trees has been felt wherever it has been found.

The general symptoms are that the trees look stunted, fail to grow, the smaller limbs die, and the limbs and trunk of the tree are found, on examination, to be more or less thickly covered with scales.

There was every reason to expect that this insect would reach Oklahoma. The appearance is fairly prompt, considering the settlement of the Territory which began April 22d, 1889. Its presence in the Territory had not been known until June, 1897, when Mr. W. T. Harness of Lexington, sent infested twigs and leaves to the station for information in regard to the insect. On June 18th, 1897, Mr. Harness' orchard was visited and about fifty plum and peach trees near the house were found to be badly infested, particularly a few plum trees standing close to the house and on the south side of the orchard. Mr. Harness planted his trees in 1891, but he did not discover the scale until the winter of 1896-7. At this time Mr. Harness supposed the scale was introduced into his orchard on house plants or ornamental shrubs. No San Jose Scale is reported to have ever been found in the nursery or in stock sent out from the nursery from which the trees were obtained.

The infested trees were, in June 1897, bearing an abundant crop of early plums. It was decided to spray liberally with kerosene emulsion as soon as the fruit had matured. This was done,

using the emulsion solution one part to seven of water. This was found to kill the foliage and, before waiting to see whether the scales were all destroyed, Mr. Harness cut out one hundred of the worst infested trees.

The writer next saw the orchard on February 10th, 1898. A few badly infested trees were found and several on which the scales were scattering. On this date seven peach and five plum trees were sprayed with what is known as the sulfur, salt and lime solution, made in the following manner: Five pounds of sulfur, five pounds of fresh lime and eight and one-fourth gallons of water were placed in a large iron kettle, out of doors, and boiled for about an hour. Meanwhile five more pounds of fresh lime were slacked; water was added to the slacked lime until it was thin enough to be strained through a piece of coarse gunny sacking. This was strained into the hot sulfur solution and four pounds of salt added. After this was measured into the spraying barrel enough water was added to make a total of fifteen gallons. In spraying with this solution it was found necessary to spray from at least two directions so as to cover all parts of the tree, because the mixture does not spread like an oily mixture. At least two sprayings, one in the fall and one in the spring when there are no leaves on the trees, are usually recommended. Mr. Harness gave these same trees a second spraying and all other infested trees in his orchards one spraying before the leaves appeared. Scale bearing specimens of twigs and bark from one of the worst infested trees sent me about one month after the spraying showed the scales cleaving from the bark and the insects beneath dead and shriveled. It is too early, however, to say that this treatment will be entirely successful.

The source of introduction is not at present easy to determine. There seems to be but little doubt that it came from Texas. As above stated, Mr. Harness supposed he had introduced the scale himself. An investigation of some old plum trees on the premises a few rods to the south of Mr. Harness, on February 10th, 1898, revealed the probable source of infestation. These trees were badly infested and on a few peach trees on the same grounds were also found scattering specimens. Five orchards in the neighborhood were examined. In one of them—adjoining Mr. Harness on the north—were a few scales and in one about one-half mile east a single specimen was found and in the other no evidence of scale was found.

Many orchards in the Territory have been examined, as well as native plum trees, but no more specimens have been found.

## LIFE HISTORY.

This has been carefully studied and often published. It may be briefly stated. During the winter, the nearly or fully developed females have their beak inserted into the bark and are alive under the scale. When the weather becomes warmer and the leaves are developing the females begin producing live young. These young crawl about more or less for from twenty-four to forty-eight hours when, having found a suitable place, they thrust their tiny beak or sucking tube into the bark, leaf or fruit and begin sucking out the sap, at the same time secreting a scale over the body. If the individual be a female she never moves from the spot. She grows rapidly and casts her skin from time to time to five times, the cast skins uniting with the secretion to form the scale. Up to the time of the second molt the male and female are much alike, but from this period the female loses eyes, legs and antennæ, the sucking organs for sustaining life and the organ of reproduction being the only essential ones remaining. The male, on the other hand, after the second molt, transforms to a perfect insect and develops large, strongly faceted eyes; long, stout legs; long, flexible antennæ; delicate though very serviceable wings, and the mouth parts disappear. The only function of the male is to fertilize the female and this having been accomplished he dies.

The female begins producing young at from thirty to forty days old, and continues to do this for a period of about six weeks after which she dies. During this period she produces on an average nine or ten every twenty-four hours. It has been estimated from careful observation that the total progeny of a single female would, in the course of one season, be 3,216,080,400. Some of this number would perish, but most of them would mature. Since the female produces young over so long a period the generations are not marked, but young may be found any time during the summer on an infested tree. The young shield themselves with a scale so early that a remedy in order to be effective must kill the old as well as the young. A remedy that will destroy the secreted scales will be very likely to injure the foliage if it is present. Mr. Harness tried a solution of concentrated lye and says that after the application the limbs looked gray with the dead and bleached scales but most of the foliage was also killed.

METHOD OF DISTRIBUTION.—This may be accomplished in any one of several ways. In nursery stock, on the feet of birds by the wind, on the clothing of any kind of animal, and by almost anything that is moving from where the scale is abundant.

FOOD PLANTS.—The insect may be found on many species and varieties of cultivated and native species of trees and shrubs so that it is scarcely safe to say that any of those in common cultivation are exempt from it.

NATURAL ENEMIES.—There are some parasitic insects that may help to hold this in check and the insect is also subject to an attack of fungus disease, but for the citizens of Oklahoma no reliance should at present be placed on either of these.

### LEGISLATION AGAINST.

Restrictive laws have been enacted in nearly every state where this insect is abundant, but for Oklahoma it would be more expedient at present for every man to be a law unto himself and keep the keenest watch for this pest and to destroy it thoroughly as soon as discovered. Already there has been an appearance of some sort of suspicious scale in another locality in the Territory but it was stamped out before the writer secured specimens by which to determine what it was. This is better than any law that could be enacted.

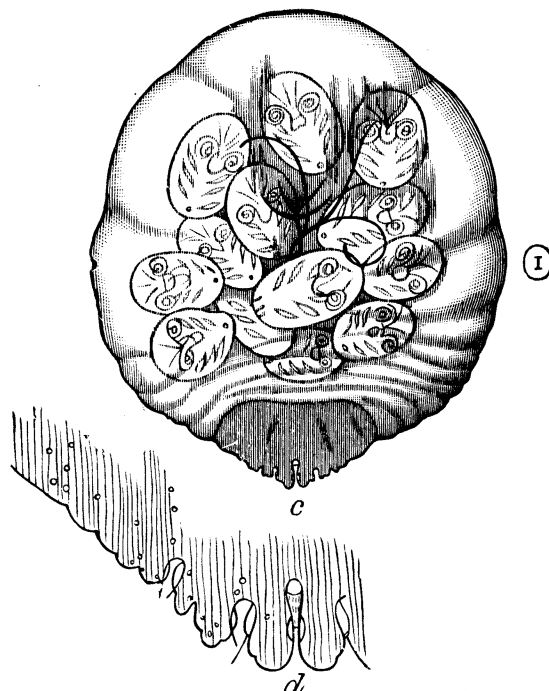


FIG. 1. Represents at *c* a female removed from the scale and magnified, showing the coiled mouthparts and the unborn young; *d* the posterior portion of a female more highly magnified. After Howard.

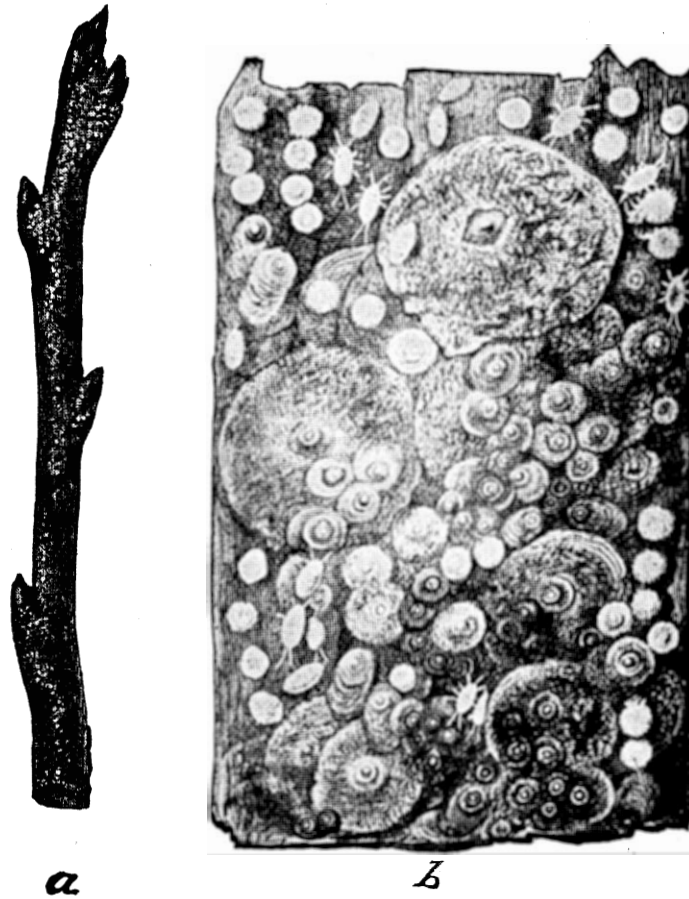


FIG. 2. Represents at *a* an infested twig, natural size; *b* bark as it appears under a hand lens, showing scales in various stages of development and young larvæ capable of locomotion. After Howard and Marlatt.

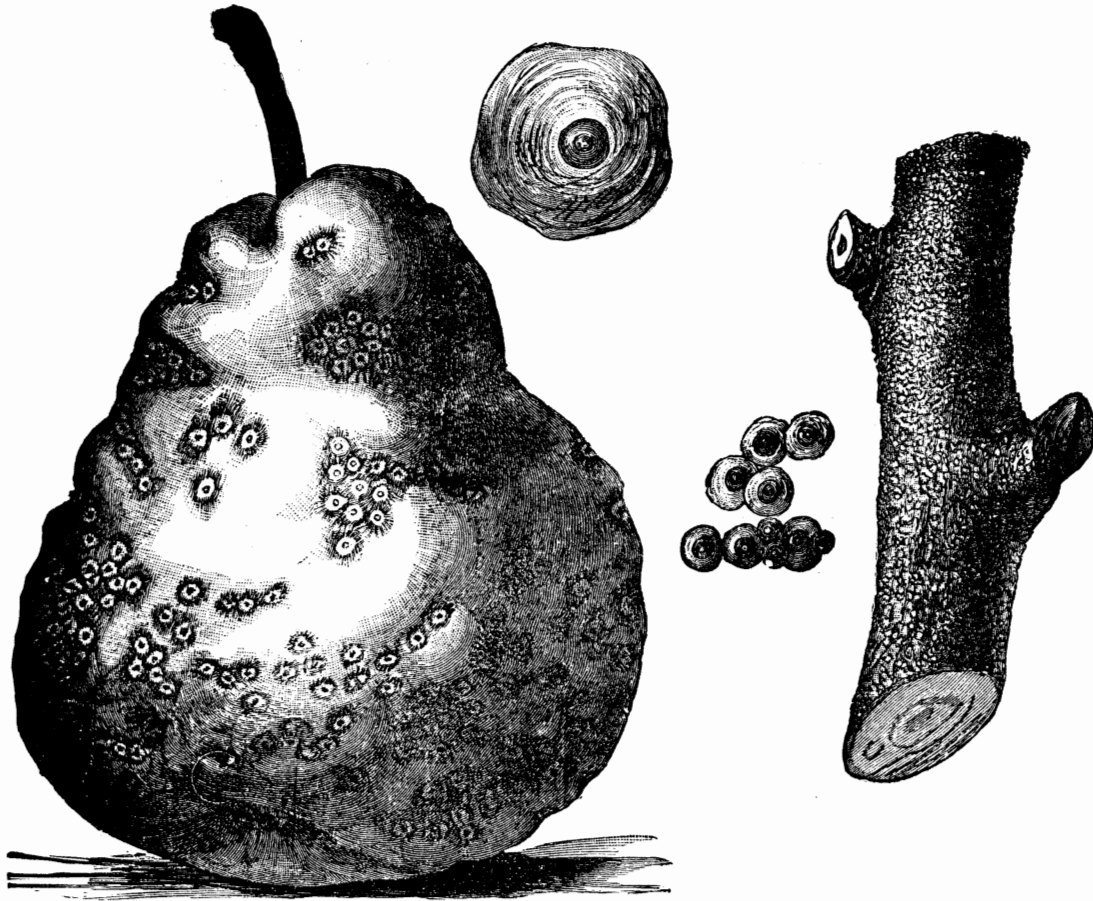


FIG. 3. Represents San Jose Scale on pear fruit and twig, with enlarged female, (the upper); the male, (the lower) scale. After Howard.