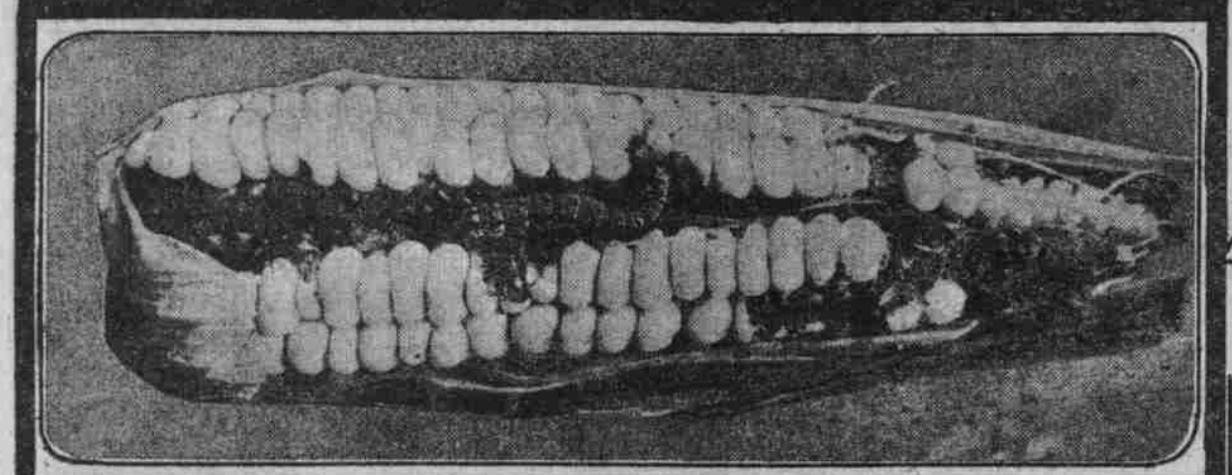


Uncle Sam's Deadly Insect Enemies

Enormous Damage Done to Cereals, Fruits and Other Crops by All Sorts of Bugs and Worms.



BOLL WORM AT WORK ON CORN

WHEN you visit Washington next time you may chance to wander through the shaded, park-like grounds in which the buildings occupied by the Department of Agriculture are located, and you may run across a curious, cage-like structure, ten or 12 feet square and eight or nine feet high.

Its frame is made of light wooden stuff and its walls of close meshed wire netting, through which the rain can beat, the wind can blow and the sunshine fall the same as anywhere else. Inside you will see divers jars and flower pots, some on shelves close to the outside of the wire net cage, some sunken in the ground and some otherwise disposed. In the jars and pots you will notice that plants and cuttings of various sorts are growing, and that on each growing thing there is some evidence that it is being attacked by a destructive insect.

If you hunt up some attaché of the department and ask a few questions you will learn that it is the Entomological Bureau's "breeding cage" for the study of the insects which damage and destroy deciduous fruits of all sorts.

This inexpensive structure, then, which cannot have cost more than \$50 in the building and which most visitors probably would pass by unnoticed, plays a highly important part in the really great work of the best organized and most efficient machine for fighting man's insect enemies in the whole world. It is in charge of A. L. Quaintance, one of the bureau experts.

Near by you will see a little peak-roofed house with solid wooden walls, painted white. Through little apertures in the walls close to the ground bees are entering and departing. You may enter the house if you like, and are afraid of bees, through an ordinary door, for the little white building is not full of bees, as you might imagine. They are kept in hives built inside the structure so that the outer wall of it forms one wall of each hive. The bureau gives attention to the insects which help mankind, as well as to those which damage crops. Bees, of course, stand at the head of beneficial insects; silkworms come next.

Green Bug's Work Dwarfed.

Only those who have looked up the figures have any notion how expensive to the Nation the insects of this country are. Mr. Marlatt says that such pests impose a heavier tax on the farmers of no other country. He places the average yearly loss at \$75,100,000, an almost unthinkable sum. Of this loss \$420,000,000 falls upon crops and farm forests, \$178,900,000 upon animal products, \$100,000,000 upon natural forests and forest products and \$100,000,000 upon products in storage.

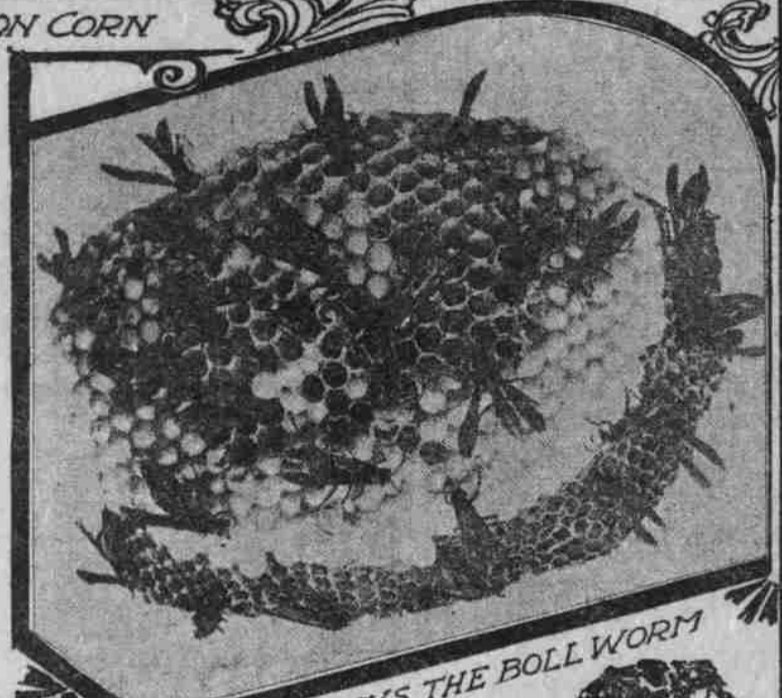
The loss to the cereals, wheat, oats, barley, rye and other grains, is about \$200,000,000 annually, year in and year out, whether there is any special visitation like that of the green bug, which made such a sensation in the Southwest this year or not. It is estimated that it did about \$3,000,000 damage last Spring. This is bad enough, but it is a million dollars less than 5 per cent of the total average shrinkage of the grain crops yearly.

The corn rot worm, the boll worm (or ear worm), the chinch bug and the Hessian fly average \$20,000,000 damage each year right along to the corn crop alone, more than double the damage done to the wheat by the green bug this year. Besides, there are a lot of minor pests which damage corn that the public rarely hears of and of which many farmers are ignorant, such as bill bugs, wire worms, cut worms, army worms, stalk borers, grasshoppers, corn plant lice—50 kinds, in all, Mr. Marlatt says, that do a total yearly damage of more than \$50,000,000 in all, or nearly nine times as much as that done this year by the green bug.

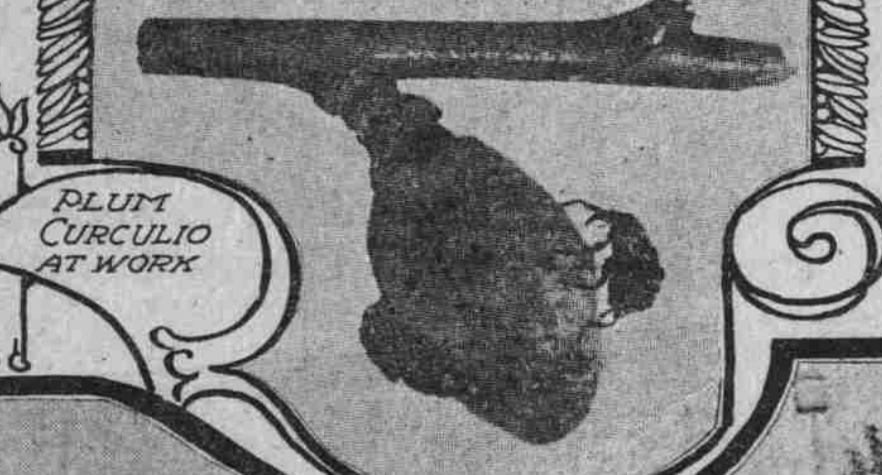
Wheat suffers more from bugs and worms of various kinds, both actually and relatively, than any other crop. Corn is the biggest crop of the country, its value sometimes reaching and even exceeding a billion dollars, with an average 8 per cent insect loss. The average loss from insects in wheat is about 20 per cent. On a crop worth \$500,000,000 this would be \$100,000,000, more than 11 times the damage done this year by the green bug. The Hessian fly and the chinch bug are more partial to a wheat than a corn diet even. Sometimes the Hessian fly fairly exterminates a large part of the growing wheat.

Seven years ago it destroyed 40 per cent of the wheat in Ohio and 50 per cent in Indiana, the destruction being so complete that these percentages of the area planted to these grains were plowed under in the two states. Twenty per cent of the Michigan wheat area was abandoned also that year, and the decrease in the wheat crop of the whole country for 1890 from the Hessian fly alone amounted to not less than a hundred million of dollars.

It is rare that this fly does any such great damage, however. It is a little thing, although twice as large as the green bug, being about an eighth of an



WASP WHICH DESTROYS THE BOLL WORM



PLUM CURCULIO AT WORK



WASP WHICH DESTROYS THE BOLL WORM

KNOCKING THE PLUM CURCULIO FROM THE FRUIT



BOLL WORM AT WORK ON COTTON

inch long. It looks somewhat like an under-sized mosquito. As its name indicates, it is of European origin and it landed on American soil in 1776, coming here in the straw brought over by the Hessians troops. It first did serious damage to American wheat three years later. It has been on the wing ever since, and it reached New Zealand in 1883. It is attacked by several parasites, but about the only thing to do when the fly once gets well at work in wheat is to plow the crop under, after a had been burning the stubble in the Fall is recommended. In order to destroy the eggs, and so prevent the fly from getting a good start the next year, it is a good thing also, says Mr. Marlatt, to sow winter wheat very late when the season appears to be favorable to the fly.

Still another and a most ingenious scheme is to plant a "decoy" crop of wheat, early, in a narrow strip. The flies are attracted to this early wheat and gather upon its spikes from the remainder of the field. At the proper time the strip, young wheat, Hessian fly and all, is plowed under as deep as possible, after which the ground is thoroughly rolled, on the theory that a compact surface will prevent the maturing flies from escaping.

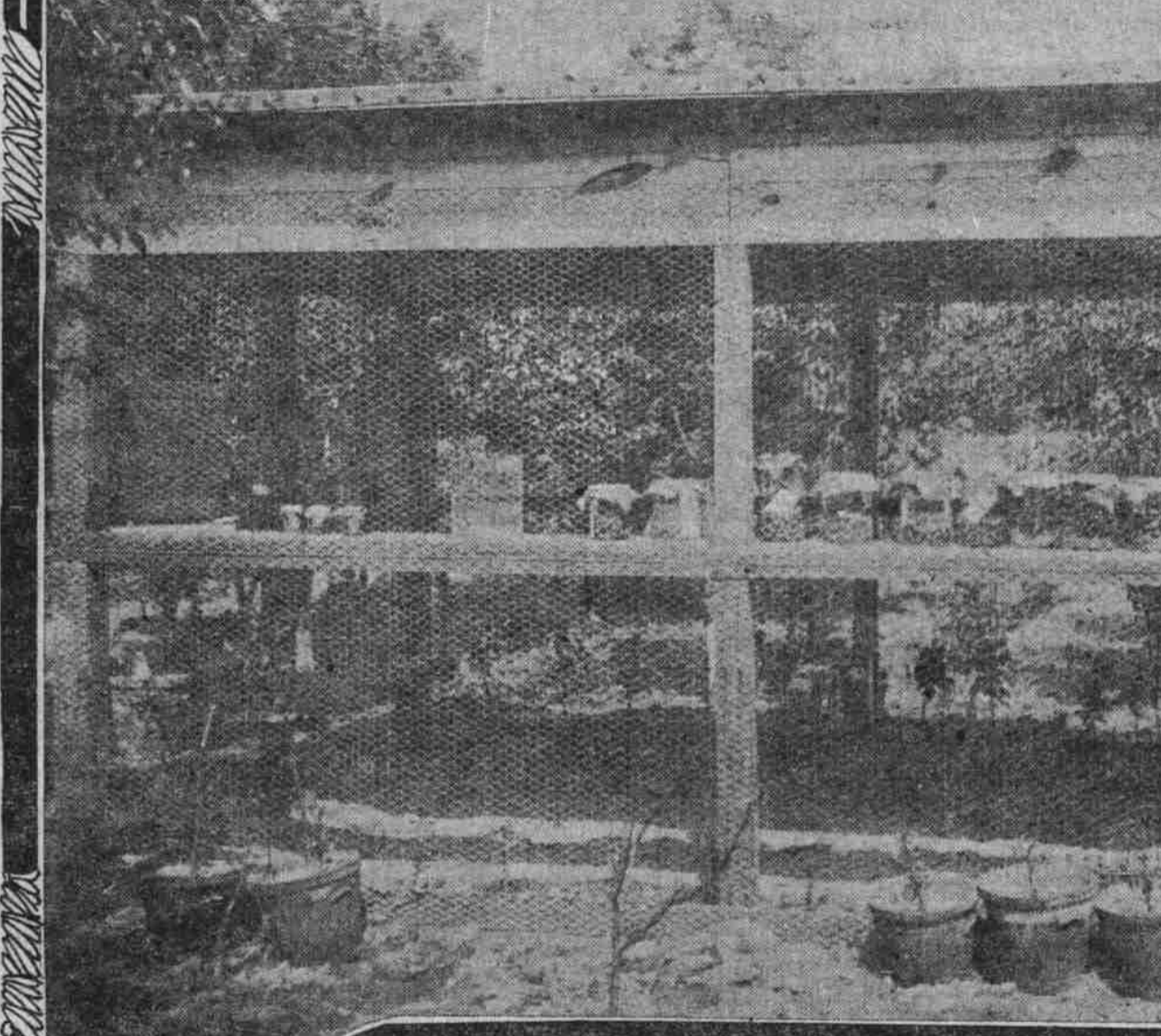
The chinch bug is a native of this country. It works on wheat until after that grain is harvested, when it migrates to the corn fields, for which reason the bureau recommends that the two crops should not be planted near together. In addition to this fly and this bug, wheat is attacked by midges, plant lice, straw worm, joint worms, bulb worms, army worms and saw flies. The army worm is a native America, and when it really gets a start travels in great masses, whence its name, destroying everything before it. Like the grasshopper and the potato bug, the army worm seems to have been got under pretty fair control, and it is years since any of these pests has done any great damage.

The Terrible Green Bug.

I asked for some details about the green bug. Mr. Marlatt reached to the back of his roll-top desk and brought forth a pasteboard box, from which he took a handful of dried wheat spikes, cut when they were green, each of which bore hundreds of tiny, black, more like little brown wartlike lumps at first than anything else. "There are a few thousands of them, from Kansas," said Mr. Marlatt, "and they are the parasites that kill him," referring to what seemed like tiny, sootlike dots on the bottom of the box.

On close examination the little brown warts showed the insect character clearly. Each was about a sixteenth of an inch in length, and a small round hole was found in the back of nearly every specimen in the collection.

"In every case," said Mr. Marlatt, "the hole means that a parasite has laid its egg in the body of the bug and that the parasite got to work to perpetuate their kind, although long before that they had destroyed great areas of growing wheat.



BREEDING CAGE IN CHARGE OF A. L. QUAINANCE.

by the time the warm weather really set in, but not early enough to save the crop after an open winter and a late Spring.

"This is because the bug, which the bureau knows as the Spring grain aphid—is able to work all through an open winter while the parasites are not. Thus when the weather conditions are favorable the bug gets a big start on its enemies, when the winter and spring are normal the parasites go to work on the bug as early, practically, as it goes to work on the crop, and there is no trouble.

"It is lucky that while nature has given the bug great powers of survival and reproduction, she has provided an unusual number of ways of checking it. By May and June a certain species of ladybug and their larvae begin to devour green bugs in great numbers. The ladybugs were not needed in Kansas this year, however; the parasites did the work effectively before it was time for the ladybugs to get to work.

until there is another open winter followed by a backward Spring. The bug will survive, of course, and will begin work on the wheat in the Southwest next year and every normal year, but its enemies will be ready to begin on it quite as promptly. The green bug was first described by an Italian scientist in 1832. In June of that year it was so numerous in the city of Bologna as to cause great annoyance. A grain field infested with green bugs speedily turns brown. In health the bugs are bright green, but their popular name shows, but when attacked by the parasites they change color speedily.

Protecting Fruits From Moths.

The importance of Mr. Marlatt's special work is apparent from the wide distribution of the grain crops of the country and the equally widespread work of destruction done by the insect enemies of grain. Mr. Howard's special work in fighting the gypsy and the brown tail moths is not less important, although as yet these pests have not got west of New England, where they were first known in America. It is Mr. Howard's business to see that they never leave New England, as it is that of the bureau to confine the cotton boll weevil to the Southwest, and he is prosecuting his task with intelligence, vigor and enthusiasm.

The estimated damage done to fruit by insects in this country is \$27,000,000 annually, the total fruit crop being figured as worth \$125,000,000. Thus the percentage of damage is much less than the damage to wheat. Should the destructive moths ever get a foothold in the great fruit regions of the Middle West, in the orange groves of Florida, the vineyards and groves of California and the apple orchards in the West the damage would be incalculable. This is no exaggeration. These moths feed on practically all trees and shrubs as well as on fruit trees; the gypsy moth attacks pine, hemlock, spruce, cedar and all other coniferous trees and deciduous forest trees. Fifty-acre patches of forest,

every tree on which has been killed by moths, are found in some places.

Both these moths came to Massachusetts first; the gypsy moth in 1859, brought by a Harvard professor, who wished to study it. The insect got away from him before he had been studying it long, and he notified everybody at once. Yet it was not noticed in large numbers until 1880. The brown-tail moth probably was brought here in 1840 on rose plants, but it did not become a nuisance until 1852. Now both are found in many parts of New England; the brown-tail has gone as far as New Brunswick. The State of Massachusetts appropriated money to fight the gypsy moth soon after its dangerous character was realized, but in 1892 all work was stopped, not to be resumed until five years later, in 1904.

Mr. Howard is enabled to give the help of the bureau and himself because of appropriations for that purpose, first made by Congress in 1905. The bureau is employing a large number of laborers to destroy moth nests in New England this Summer. Both these moths are the prey of birds and parasites, but the native American insect-eating birds are not so numerous in New England as formerly, having been killed off by pot hunters, and driven away by the rapidly multiplying English sparrow, another importation. Several importations aggregating hundreds of thousands of parasites, were made in 1905 and 1906, but as yet it is too early to know how effective they will prove in this country. Many thousands of dollars have been spent in spraying trees and otherwise poisoning the moths and in burning their nests. These methods of fighting them

must be used if the moths are ever to be checked, but they are so expensive that individual use of them can never check the pests effectually. For several years General S. C. Lawrence of Massachusetts spent more money each year fighting the gypsy moth on his own and adjoining lands than the lands were worth. The brown tail spreads more rapidly than the gypsy moth, making long flights, which the latter does not.

The Deadly Boll Worm.

Until the cotton boll worm came to the United States from Mexico, the boll worm was the most serious insect enemy of the cotton crop. It is quite as bad today as ever, but it has been overshadowed of late by the weevil.

It works quite differently in corn and cotton, and it attacks tomatoes, tobacco, peaches, peas, beans and okra. It is found in almost every land in the world, as far south as New Zealand and as far north as Denmark. It works at the sea level, and is met in Africa 5,000 feet above sea level and in the Mexican mountains at an altitude of 2,900 feet. It is supposed to be native American, but it has spread to China and South America. It has not been reported in Japan. It was not reported as an enemy of cotton until 1820. It did not attack corn, so far as known, until 1842.

It is not nearly so destructive elsewhere as in this country; it does more damage to sweet corn than to field corn, and it does more damage to field corn, South and North. Sometimes when the plant grows rapidly the worms is squeezed to death between the rows of kernels as it is feeding on the ears. It has many enemies, including certain ants, beetles, wasps, spiders and flies which eat it. Woodpeckers and other birds also devour it. Half a dozen or more varieties of parasites help destroy it, too, both in the egg and in the larvae.

cotton, strips of corn are often planted cotton fields for the protection of the latter, generally with success. Peas are planted in cotton fields for the same reason, and as successfully. The worms sticks to the corn and peas and leaves the cotton alone. Mr. Quaintance has done much good this immunity to the boll worm, and has also fought the plum curculio most effectively.

The work of the Agricultural Department's Entomological Bureau is carried on in conjunction with the entomologists of the various state experimental stations. Not a little is being done by their inspectors in fruit tree nurseries. All fruit stock growers, those which is infected with any injurious insect is destroyed invariably. Every year new ways of fighting noxious insects are discovered, and, undoubtedly, the damage done by insects is much less than it would be yearly were it not for the intelligent, never-ending fight against them that the National and state governments are leading up.

Only the barest idea of the complete scope of this fight can be given here, however; it would require a thick volume to cover the ground in coming years, it includes the fighting of mosquitoes, houseflies and cattle ticks; a warfare against many insects injurious to forest trees, in co-operation with Gifford Pinchot, chief of the Forestry Bureau, and many other things, all of which were briefly alluded to by Mr. Marlatt in his talk with the writer the other day. The work of the bureau with bees and silkworms is as interesting as its insect war.

Incidentally, at the end of the talk Mr. Marlatt said that certain varieties of trees, plants and vines are immune to certain insect pests. Thus the Le Conte pear, a rather coarse variety, is immune to the San Jose scale, which attacks practically every other sort of fruit tree. The reason for this immunity no one has been able to find as yet.

Incidentally, too, Mr. Marlatt drew attention to the fact that while many of our worst insect pests are imported, many equally destructive ones have been sent from this country to attack the crops and plague the farmers of the world. The phylloxera, which has so bedeviled French and other European grape-growers, is one of these. Although native to this country and found in nearly all American grapes, it does not damage them materially, but it destroys every European grape vine or cutting it fastens on, even when planted in America. The salvation of the European vineyards was brought about by planting them with roots and cuttings from the native American grape vines, made to bear the European varieties of grapes, and today the European vineyards are almost as free from the phylloxera pest as they were before it was introduced in Europe.—Copyright, 1907, by Dexter Marshall.

The Wrong Paper.

Kansas City Star.

"I have been engaged in the practice of law a good many years," said S. S. Urmy, police judge of Topeka, Kan., "and about the most humorous thing I ever saw in a courtroom was in Topeka.

"One day an old negro man was being tried in the Justice Court—that was before the office of police judge was created—and he demanded a trial by a jury of his peers. He could neither read nor write, and the lawyer insisted that the jury, to be his peers, as required by law, must be unable to read or write, too. To avoid dispute I agreed to it, but we had a time finding 12 men in Topeka who could neither read nor write. But we did find them and the case went to trial.

"Before the jury retired I took two pieces of paper and wrote 'guilty' on one piece and 'not guilty' on the other, and instructed the foreman of the jury to destroy the one he did not wish used and to return the other to me when the jury reached a verdict. The jury was out only a few minutes when it came back. The foreman handed me a piece of paper with the word 'guilty' written on it.

"Well, gentlemen, you find him guilty, do you?" I asked to read or write, too.

"No, sah, judge, no sah, we done found him not guilty," spoke up one of the Jurymen. Then he added with distinct pride that fool nigger he was tearin' up the wrong piece of paper."

His Use for a Fork.

Denver Post.

A Denver man had a friend from a Kansas ranch in the city Saturday on a business deal, and at noon they went to a downtown restaurant and had lunch together. The Kansas ranchman ate his entire meal with his knife. When he was nearing the end he discovered something. He discovered that he had no fork.

"Say," he said to the Denver man, "that waiter didn't give me a fork."

"Well, you didn't need one," replied the Denver man seriously.

"The deuce I don't," came from the Kansas. "What am I going to stir my coffee with?"