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Crop Pest Commission

OF LOUISIANA

THE

INSECT ENEMIES OF THE BOLL WEEVIL

A Brief Account of Their Nature and How They
Destroy the Weevil.

BY

W. D. Hunter, Wilmon Newell and W. D. Pierce



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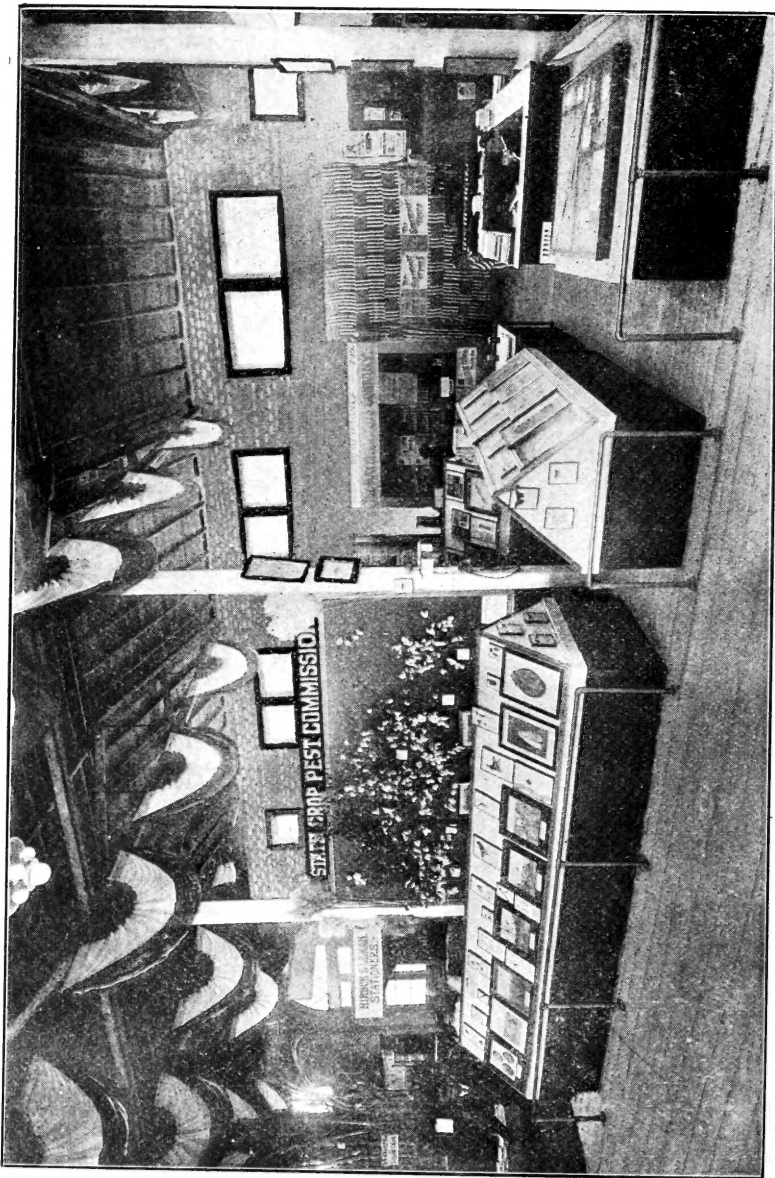


FIG. 1. Exhibit of the State Crop Pest Commission at the Louisiana State Fair, Shreveport, La., Oct. 5 to 13, 1907.
(Awarded a Diploma of Excellence by the State Fair Association.)

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State Crop Pest Commission

OF LOUISIANA.

CIRCULAR No. 20.

DECEMBER, 1907.

The Circulars of the State Crop Pest Commission are sent free of charge to all farmers and fruit growers of Louisiana who make application therefor.

The Insect Enemies of the Boll Weevil.

A BRIEF ACCOUNT OF THEIR NATURE AND HOW THEY DESTROY THE WEEVIL

By W. D. Hunter, Wilmon Newell and W. D. Pierce.

INTRODUCTORY.

There are many means of controlling injurious insects, such, for example, as the use of sprays or poisons and the destruction of the unused portions of the crop. These methods may be said to be direct ones inasmuch as they aim at the actual killing of the insects and are not devices for circumventing them. In the case of the cotton boll weevil the fall destruction of the plants and gathering of the infested squares are the only direct means which have been found at all effective. The other steps in the control of this insect, such as through preparation of the soil, early planting, intelligent fertilization, and extra good cultivation, are supplementary to the main step of destroying the stalks each fall. Although these direct methods are effective they involve more or less trouble and expense. A better method consists in the utilization of the agencies which are provided by nature. This circular deals with the work now under way in co-operation between the Crop Pest Commission and the Bureau of Entomology of the United States Department of Agriculture, in devising means for obtaining the best possible results in the utilization of such natural agencies affecting the boll weevil as can be controlled more or less easily by man. It is hoped that these methods will eventually assist greatly in the warfare against the boll weevil. At the present time, however, it must be understood that this circular deals with methods which have not yet been put into practice on a large scale, and its publication is intended to inform those interested of what work is under way. In the meantime, of course, no farmer should fail to make use of the expedients to be resorted to in raising cotton where the boll weevil is present that have been brought out in the publications of the United States Department of Agriculture and of the State Crop Pest Commission.

INSECTS ATTACK ONE ANOTHER.

In a state of nature most insects are held in control by other insects which prey upon them. When an insect succeeds in getting away from its native enemies or is artificially introduced into a country where there are no insects to attack it, damage must be expected if a cultivated crop is attacked. When the cotton boll weevil became established in the United States it was free from all its tropical enemies and rapidly

moved northward and eastward, almost without check. This condition could not last. There are everywhere multitudes of little insects which can not live on vegetable matter and which must have insect food. From time to time some crisis has happened in the existence of one or another of these little creatures and it has had to try strange food. It is but natural that many of them have been attracted to such a common insect as the boll weevil.

PREYING INSECTS.

These minute insect friends do their work in several ways. At present the most important of them are the little fire ants (so-called on account of their sting, which gives a burning sensation), which abound in the cotton fields, exploring every inch of ground and plant in search of insect prey. They are very active little creatures and seem to have learned to recognize the presence of boll weevils in the fallen squares. When one is located the discoverer summons a squad of her fellows and they gnaw their way into the square and remove the weevil entire or in pieces to their nest, where it is quickly consumed. On account of this habit these little ants are called **PREDACEOUS** or **PREYING** insects. One of these fire ants is shown, greatly enlarged, in Figure 2. This little ant, which occurs all over Texas and Louisiana, should not be confused with the Argentine or so-called "New Orleans" ant, which has become such a household pest in Southern Louisiana.

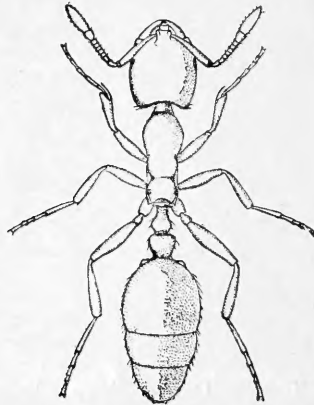


FIGURE 2. A fire ant (*Solenopsis geminata*), which is an important enemy of the boll weevil (After Hunter & Hinds, Bur. of Entomology, U. S. Dept. of Agr.

PARASITIC ENEMIES OF THE WEEVIL.

The most interesting enemies of the boll weevil are about fifteen species of very small wasp-like insects, which fly around the cotton fields until they find a cotton square with a live weevil larva in it. Then they lay an egg in the square on the weevil, and fly to another square to lay another egg. They have a sharp apparatus called an "ovipositor," for depositing their eggs, with which they can easily pierce the square. These eggs hatch in three or four days and the little grubs commence to feed on the boll weevil larva. The weevils die and their enemies grow and finally develop into full grown insects like the one which laid the eggs. One of the most important of these wasp-like parasites is shown, greatly enlarged, in Figure 3.

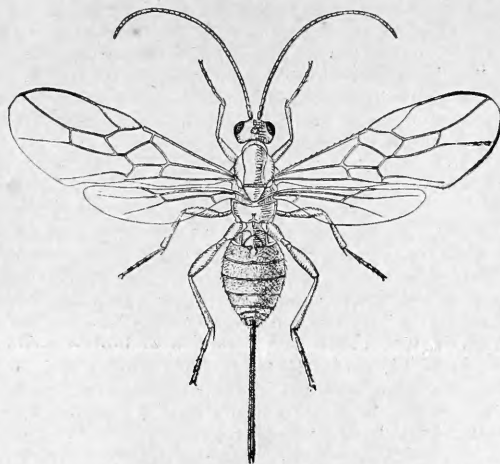


FIG. 3. One of the important wasp-like parasites (*Bracon mellitor*) of the boll weevil. Notice the long ovipositor with which the weevil-infested square is punctured and through which the parasite's egg is forced into contact with the weevil larva. (After Hunter & Hinds, Bul. 51, Bur. of Entomology, U. S. Dept. of Agriculture.)

When an insect lives like this, at the expense of another insect, it is called a PARASITE, and the insect which suffers is called the HOST. Not all parasites kill their host immediately, but their attack is finally fatal. All insects with the parasitic habit are permanently so and need never be feared as enemies of any field crop. They are always the friends of the farmer.

It has already been intimated that the BOLL WEEVIL PARASITES ARE NATIVE INSECTS. Ordinarily they attack other species of weevils which breed around the cotton fields in different weeds. Most of these other weevils are harmless for two reasons: First, they are held down by their enemies, and, second, they attack and hold down more or less the weeds which are such nuisances.

It frequently happens that the parasites become so numerous on one of these native weevils that finally the supply of food for their young gives out. Under such circumstances they find the closely related boll weevil and deposit their eggs on it. EACH YEAR SEVERAL NEW SPECIES ARE ADDED TO THE BOLL WEEVIL ENEMIES by this process, in different parts of the infested region.

Of the fifteen or sixteen parasites referred to, all do not occur throughout the entire weevil-infested area. In some localities three or four kinds of them are found, in others perhaps five or six kinds, etc. One of the lines of work being conducted by the entomologists is that of distributing these parasites over the entire weevil-infested section so that every locality will have, if possible, twelve or fifteen kinds of parasites attacking the weevil instead of three or four. Some of the co-operative experiments in introducing parasites that have been made in the past season near Shreveport have proved very encouraging and have demonstrated the practicability of this plan.

If there were no checks in the development of our great pest there would not be a single lock of cotton produced in the infested region. Fortunately there are many checks. In the first place the planter can so manage as to destroy myriads of weevils in the fall, and also so as to kill many hibernating weevils in their winter quarters. He can plant early and produce some crop before the weevils

catch up with his cotton. He can plant so that the sun will get in its full effect. It is now known that the intense heat from direct exposure to the sun is responsible for the death of 32 per cent of all weevil stages. This control in some places under favorable conditions reaches almost 90 per cent. At the same time the little fire ants (see Figure 1) destroy 20 per cent of all the weevil stages, and the parasites kill 10 per cent. This means that **THROUGHOUT THE SUMMER 62 PER CENT OF ALL THE WEEVIL STAGES ARE BEING KILLED**. There are many favorable conditions which increase the work of one or another of these agencies. The figures just given are for 1907, and show a decided increase over 1906.

One of the purposes of the boll weevil investigation is to bring about a knowledge of the weak points in the life history of the insect so that every planter will know when and where to strike in order to accomplish the best results. **IT IS WITHIN THE POWER OF EACH FARMER TO LESSEN THE DAMAGE BY THE WEEVIL**, but much more is accomplished by the natural agencies referred to.

The object of this circular is to explain the nature and possible value of the parasites, which are more difficult to understand than are the artificial methods of controlling the weevil. Very little can be done at present in assisting the ants. They will take care of themselves. There are no reasons why the **PARASITES**, however, can not **BE INCREASED** and raised above the third rank as boll weevil destroying agencies.

ASSISTING THE PARASITES.

The planter who desires to offer every possible inducement to the parasites will plant his cotton early so that the first spring brood of parasites can start on the boll weevil instead of some other neighboring species of weevil. He will **PLANT** his cotton **IN WIDE ROWS** and use every device to insure plenty of sunlight in the entire field. These little creatures need heat and light and work best in the sunny fields, thus adding to the direct effect of the sun itself.

When it can be done without taking labor from the necessary field operations it is a good plan to pick up infested cotton squares and place them in large cages in the field, a plan which was first brought prominently to the attention of the Louisiana planters in Circular No. 15 of the Crop Pest Commission, published early last June. These cages may be of common wire screen, 14, 16 or 18 meshes to the inch. Some weevils will escape through the coarser meshed wire, and **all** of the parasites will. Even if only half of the weevils were held in and all of the parasites escaped it can readily be seen that the proportion of parasites to weevils in the field would be greatly increased. The squares should be dried a little before placing in the cages or at any rate scattered lightly. They should not be packed, for then the moulding and heating would destroy the parasites. Cages placed in various parts of the field will bring up the parasitic control of the weevil uniformly.* Immediate results must not be expected. Owing to their small size the parasites will rarely be seen by the farmer even when they are abundant and doing great work. The benefits are actual but hard to demonstrate without very careful examinations.

As has been shown, the common weeds around the fields contain many parasites of other weevils. It is possible **BY CUTTING** these **WEEDS TO FORCE** the **PARASITES TO ATTACK THE BOLL WEEVIL**. An attempt of this kind in July on the experimental farm of the Bureau of Entomology at Dallas, Texas, resulted in increasing

*Such cages need not be complicated or expensive. Any *tight* box or barrel, with top or side tightly covered with the wire cloth, makes a good cage.

the work of one parasite species from 2 per cent to over 30 per cent on weevils in dry hanging squares. The cutting only took two or three hours and the result was worth while to say the least. Our recommendation is, therefore, that whenever possible the weeds along the edges of the cotton fields or on useless ground adjoining the fields, be cut early in July and again early in August. There might or might not be parasites in these weeds, but there are many other cultural reasons why the weeds should be cut, and if by so doing the parasites are increased, so much the better.

All of the foregoing shows what may be done by each planter. The results will not be uniform, but in no case can they be entirely negative.

The work of the entomologists will necessarily be devoted to attempts at introducing new parasites and causing a more general distribution of each parasite species, in devising the best means of so doing, and in obtaining a complete knowledge of these creatures which must be the basis for their practical utilization. At the same time the farmer must be counted on to assist nature in controlling the weevil by applying such measures as the scientific investigations show to be effective.

Baton Rouge, La., December 19, 1907.

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