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# Sugar cane borer and its parasite

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SECOND SERIES.

No. 9.

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BULLETIN  
OF THE  
STATE EXPERIMENT STATION.

—OF THE—  
LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE,

AT  
BATON ROUGE, LA.

WM. C. STUBBS, PH. D., Director and Official State Chemist.

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Sugar Cane Borer and Its Parasite,

BY H. A. MORGAN.

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ISSUED BY THE BUREAU OF AGRICULTURE.

T. S. ADAMS, COMMISSIONER.

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PRINTED AT THE TRUTH BOOK AND JOB OFFICE.  
BATON ROUGE, LA.  
1891.

## LA. STATE UNIVERSITY AND A. & M. COLLEGE.

### *BUREAU OF AGRICULTURE.*

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The bulletins and reports will be sent free of charge to all farmers, by applying to Capt. T. S. ADAMS, Commissioner of Agriculture, Baton Rouge, La.

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE, }  
BATON ROUGE, LA., 1891. }

Hon. T. S. Adams, Commissioner of Agriculture,  
Baton Rouge, La :

Dear Sir :

I hand you herewith a bulletin containing the result of a preliminary investigation of the Sugar-cane Borer, (*Chilo saccharalis*) as made by Prof. H. A. Morgan, Entomologist of the Station. As this is an insect long known in Louisiana, I most respectfully ask that you print this Bulletin No. 9, Second Series, and earnestly invite the attention of the sugar planters to it, that with their assistance a more extended investigation may in the near future be made.

Respectfully submitted,

WM. C. STUBBS,

Director. .

—:O:—

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE, }  
BATON ROUGE, LA., 1891. }

To Dr. W. C. Stubbs,  
Director La. Experiment Station, Baton Rouge, La.

Dear Sir :

In accordance with your request a somewhat preliminary investigation has been made in connection with the Tropical Sugar-cane Borer or Stalk Borer (*Chilo saccharalis*).

I herewith hand you a bulletin containing a result of this work and trust it may be a means of enlisting much assistance in a more extended investigation which we hope to make.

Yours obediently,

H. A. MORGAN.

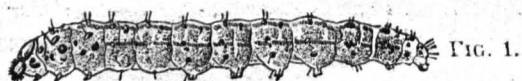


FIG. 1.

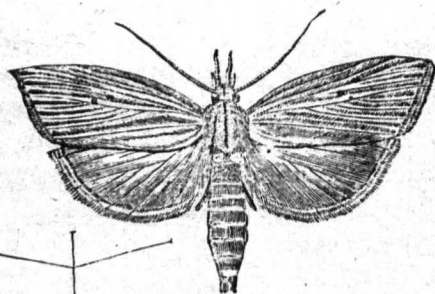


FIG. 3.



FIG. 5.



FIG. 2.



FIG. 4.

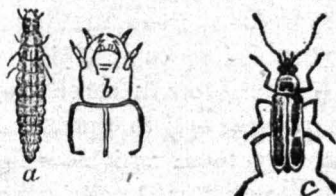
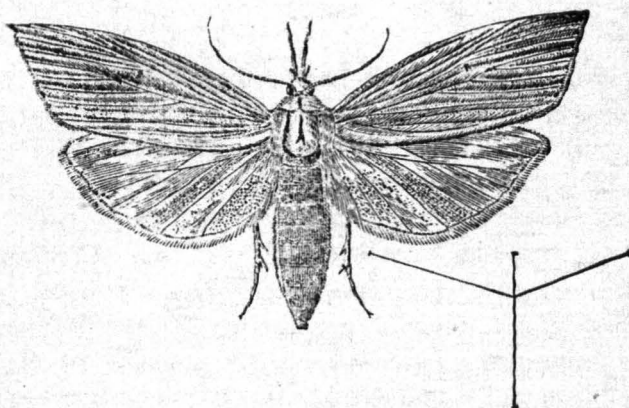


FIG. 6.

Fig. 1 represents the larva or caterpillar of the borer. Fig. 2, the pupa or chrysalis. Fig. 3, the moth (male). Fig. 4, moth (female). Fig. 5, a section of cane attacked. Fig. 6 (a,) the larva of soldier beetle or true parasite; (b) the mouth parts of the parasite, enlarged; (c,) the imago condition of the parasite.

The plates were not made from original specimens, but Figs. 1 to 5 were made from cuts as given by Wm. Kruger, of Java experiment station; and Fig. a, b and c were made from cuts as furnished by Prof. Saunders in his work on "Insects Injurious to Fruits;" however a specimen of this insect (a) was also placed in the hands of the engraver.

# SUGAR CANE BORER.

(*CHILO SACCHARALIS*.)

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Very little investigation has been carried on in this State in connection with this insect since March, 1881, when Mr. L. O. Howard, of the Agricultural Department at Washington, visited Louisiana to investigate the sugar cane borer (*Chilo saccharalis*), the sugar cane beetle (*Ligyris rugiceps*) and other insects which had been causing trouble throughout the State.

Late during the sugar cane season of last year, too late, in fact, to accomplish much, it was my privilege to study to some extent the sugar cane borer,\* and it is with the object of furthering this investigation and with the view of enlisting the assistance of the sugar planter and others who may be interested, that this preliminary bulletin is published. As the time afforded last season was entirely too short to carefully complete the life history of different broods I am compelled to resort to the statements as made by investigators in other countries in order to complete the circle from the egg to the moth. The statements may differ somewhat from those which our future investigation will show, on account of different localities, yet they will aid in forming a basis upon which we can work more intelligently than if these facts were entirely unknown to us.

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## The Amount of Damage Done.

No careful estimate of the loss occasioned by the ravages of this insect has yet been made, but as nearly every well informed sugar house man will tell you that it is very much harder to

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\* In countries where more than one borer is present in the sugar cane this one is called the "stalk-borer."

make sugar from cane which has been attacked by the borer, than when not, it is my opinion that the average planter is not aware of the loss he is sustaining, or the inconvenience he is put to by the presence of this insect. On many plantations the crop has been severely attacked, especially after warm and open winters. Sorghum has been known to be more seriously injured than sugar cane, a decided decrease in the per cent. of sugar being apparent in the injured stalks.

On plantations where the borer is present it is usually the case that a much larger percentage of cane is bored than the owners are really aware of.

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### Life, History, with a General Description of the Different Stages.

*Egg.*—The following is the description as given by Prof. Comstock in his report on "Insects Injurious to Sugar Cane." "The eggs, which, however, we have only seen upon the corn are flat and circular, 1mm. (one twenty-fifth of an inch) in diameter, and are white when first deposited, turning yellow as they approach the hatching point." Many have expressed themselves as to the difficulty in finding the eggs. I have discovered the shells of eggs which answer to the above description upon the axil of the leaf or just where the leaf ceases to encircle the stalk. Eggs from which true borers have been hatched in other countries have been found in the same position. In our future study we hope to clear up many undecided points in connection with the deposition of the eggs upon the plant.

*Larva or Caterpillar*—The amount of time required for the eggs to hatch has not, as far as I can learn, been yet ascertained in America. The time given by Miss Ormerod is nine days, but the difference of climate is likely to influence slightly the length of time.

The young larva on emerging from the egg begins at once to bore into the cane upon which it feeds for some thirty-one days, as given by Miss Ormerod; however, Prof. Comstock raised it up to pupa stage upon a corn plant in thirty days, and with him, I



am of the opinion that in Louisiana and in warm districts the period taken for growth of caterpillar will be even less than thirty days; when full grown is about 1½ inches long and contains four violet stripes on its body (running from head to caudal end), divided by the intervening portions of the body, which are white. Over the body are distributed a few hairs, arising from each dark spot (except spiracles), which appear scattered over the body in regular form.

*Pupa.*—As stated the larva assumes the pupa condition in from 30 to 31 days, and perhaps less, after hatching. The chrysalis is of a light brown, about 3-4 of an inch in length and 1-6 of an inch in diameter; however the size of the pupa will vary according to the amount of food the caterpillar has had, which has entered into it. If poorly fed or if it has received some check so as to cause it to enter pupa condition sooner, the chrysalis will be smaller than if well fed and allowed to fully mature. The time spent in this stage is some 14 or 15 days.

*Moth.*—The general color of the moth is grey, but when the wings of the female are spread it will be noticed that the hind wings are very much lighter than the fore, or than either pair of those of the male. In Prof. Comstock's report, before referred to, it is there stated that the male is the one possessing the light hind wings, but from my own study as well as that of others, this proves to be the female. The body of the female is usually a little larger than that of the male. The size of the moth varies, ranging from head to caudal extremity, from one-half to a little over three-quarters of an inch, and one from tip of wing to the other when expanded from one and one-sixth to about one and one-half inches.

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### Habits of this Insect in Different Stages.

*Larva or True Borer Stage.*—On coming from the egg it bores through any leaves that encircle the stalk at the point where it is hatched until it reaches the cane proper, when it penetrates it, very often eating through to the pith before attempting to go up or down the cane. It invariably commences its work of destruc-

tion near an eye, and when it reaches the pith continues its burrow either up or down the stalk. It has been stated that it invariably goes up, but from the fact that so many canes are bored down through the center to even below the surface of the ground, and a great many of them to near the surface, either of these places being beyond where it might enter, it seems quite conclusive that when once it reaches the pith it has no particular choice of direction. The eggs being generally deposited upon the leaves which come from the upper or soft part of the cane, the holes upon the lower portions of the stalk made from the outside, however, indicate that the cane has been attacked when quite young.

Small caterpillars are sometimes found in the passages made by larger ones, but as the walls surrounding the older made passages become very hard, the functions of the cells being destroyed by the way, the young larva prefer as a rule to make their own passages.

During the growth of the caterpillar it sheds its skin five times; however this is modified to some extent by the growth. Its habit of leaving its haunt and coming to the outside of the cane, renders it more liable to the attack of enemies, as well as accounts for the difference in the size of the numerous holes made in the one stalk. On being disturbed when outside of its burrow, it suspends itself by a web, and thus may be blown from one place to another. From the protection it receives from its habit of living inside of the cane, the body of the borer, is naturally very soft, and hence the adequacy of being suspended by a web, as by falling to the cultivated soil below it would not be able to regain its position upon the plant, and would thus perish. When attacked by an enemy, its violent movement often repels the intruder, but seldom does the parasite give up after the first attack.

The borer is very destructive to corn (see "Insect Life" Vol. III, No. 2, page 64) as well as sugar cane and sorghum. Some of the corn crops near Fredricksburg, Va., have been almost completely destroyed by this insect.

When the larva becomes full grown it prepares itself a place for its escape (when metamorphosed to a moth) by enlarging its burrow near the outside of the cane, and it is in this enlarged portion of its haunt that it assumes the pupa condition, where it remains, if not disturbed, until the imago or moth condition is reached.

*Pupa or Chrysalis Condition.*—In this condition it is capable of considerable movement, and when irritated may wiggle itself out of its passage; hence the reason why we often find the pupa cases upon the ground. In Mauritius, it is said that this insect often assumes its pupa condition among the leaves of the cane, and thus we may conclude that the climate changes in a measure the habits, showing that it accommodates itself to circumstances. It is usually considered that this insect hibernates in the larval condition; but this has yet to be fully confirmed regarding this pest in Louisiana, from the fact of its being a tropical insect seems to indicate that whenever full grown it will go into pupa condition. This point will be referred to under the head of "Preventives and Remedies."

*The Moth.*—In this stage it has the peculiar habit of remaining in the same position for a considerable length of time. This we have instanced several times this fall; however, the specimens were in captivity, but the cages were sufficiently large as to allow of considerable movement. Darkening the cage did not seem to have any influence in arousing motion. The moth is said not to be attracted by light, but several were captured by having a regular insect lamp situated on the turn-roads between certain tracts of cane. This point will be more fully demonstrated next season. Moths were kept in captivity in order to ascertain some idea as to the length of their existence. Some lived four days, others five and others six.

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### Preventatives and Remedies.

Considering the fact that this insect has made its appearance in Mississippi, Georgia, South Carolina and Virginia, and to do

considerable damage to the corn crop, we have greater reason to anticipate more serious effects from its presence in Louisiana, and especially in the northern portions of the State.

It is true that when cane containing the borer has been introduced into the northern portion of the State, that this insect did not reproduce there, but since it has been introduced into Virginia, and has there gotten a foothold, whether it be that the manner of curing and housing the corn has protected it, or that its habits have been somewhat changed, more serious results may be expected. If it has assumed the pupa condition to hibernate in, and thus be better fitted to withstand the cold, the name of "tropical borer" may be recognized as a misnomer to those at least which are produced in Virginia and further North. If this supposition be true an invasion of this insect into the cane fields of North Louisiana may be expected from the North instead of the South.

Commercial fertilizers have been recommended by some, particularly "acid phosphate," but no difference in the frequency of the attack could be noticed in the cane which was fertilized with a fertilizer containing acid phosphate and in that which received other fertilizers.

During the process of extracting the cane juice all the borers contained within the cane are destroyed; hence the mode of handling this crop is a means of keeping it in check, which is not characteristic of the modes of handling the corn crop. This, with the complete burning off of all tops and refuse, as well as with the aids of parasites, whether animal or vegetable, are the only means we may look to by which the cane crop may be rescued from the ravages of this insect. The complete burning of the tops is of first importance in the checking of this insect's depredations; for if only a few tops are left containing a few borers, these will be sufficient to cause considerable damage the following season. As the borer is always worse after a mild winter and as but few borers are ever found in the stubble, this complete burning or incineration is particularly necessary in such cases in order to completely keep them in check.



Soft cane is subject to greater injury than hard cane, as it offers much less resistance to the borer; hence the propriety of using the "Purple" and "Ribbon," or such other hard varieties as may be found of equal value.

In selecting cane for seed choose that which has not suffered from the borer or is but slightly attacked.

In importing foreign varieties into our State, or even importing varieties containing the borers into a locality or localities which have not grown sugar cane, or if they have, have not had the borer, the imported stalks should be subjected to treatment that will free them from insect pests, and dipping them in hot water (120 degrees to 125 Fah.) or a one per cent. solution of carbolic acid is recommended. It will be well to resort to this in the importing of foreign canes especially, and protect ourselves from other species of borers as well as other insects injurious to sugar cane.

If the results from sorghum continue to be unsatisfactory, and there be any increase in the attack of the sugar-cane borer, it will be well to abandon the cultivation of sorghum in the event of its being so subject to injury by the borer. It has been observed that tracts of sugar-cane in the vicinity of sorghum have been more seriously injured than those more distant. This would indicate that sorghum acts as a breeding ground, as it ripens much earlier than the cane and thus many moths are bred, lay their eggs, and larvæ are hatched that would have perished were it not for the sorghum.

Ants have been found by some to prey upon the eggs of the borer moth, but this has not come under our observation.

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### The Parasite.

During the early part of the time spent in the study of the borer a parasite was discovered which proved to be the larval condition of a soldier beetle (*Chauliognathus Pennsylvanica*) and was found to readily devour the borer. Many of the parasites were found lurking between the clasping leaves and the



stalk, and on dissection of the cane, to find specimens of the borer, these little friends were often found in the passages in pursuit of their prey. Several specimens each of the borer and parasite were procured and placed in boxes, and it was but very few minutes before the borers were completely eviscerated, nothing being left but the heads and their skins. Pupa cases were placed within the boxes, and although they did not take hold of them with the same degree of vigor, yet the pupa cases were eventually emptied.

This discovery was made too late in the season for any definite results of the benefits of this insect to be estimated. The observations were made upon the Sugar Experiment Station of this State, and it was the opinion of those in charge that this insect diminished the number of the borers very considerably. It may be that this insect has long been a means of keeping the borer in check, but nothing has, to my knowledge, been recorded which would indicate the knowledge of its being parasitic upon the sugar cane borer.

Herewith we give a few questions which we are desirous of having the planters consider carefully during the coming sugar cane season, and if any information, can be given apart from those brought out by the bulletin and by these questions, we shall be please to receive it. It is our intention to have these questions, and perhaps others, put up in proper form and distributed to the different planters next fall. If they will kindly answer these as far as possible, much practical information may be procured which will be of prime importance in the study of this insect.

1. Have you the cane borer upon your place?
2. Have you ever been troubled with it and are now free from its ravages?
3. By taking average rows of your cane, in several portions of the field, give an estimate of what percentage of these canes are attacked.
4. Have you noticed any difference in the amount of damage done, between that of plant and stubble cane?

5. Do you find any particular kind of fertilizer destructive to the borer in any way if so, what one?

6. Do you always burn off your stubble, and have you at any time left the stubble unburned or partially so, and noticed an increase in amount of damage done by the borer?

7. Do you select your seed cane, and do you attach much value to the selection of seed cane from a borer standpoint?

8. What year do you consider that the borer has been worst with you and can you attach any special cause for its prevalence?

9. Have you ever detected a decrease in the percentage of sugar in cane badly attacked?

10. What time during the plant's growth are the first attacks usually made and at what time during the season do you consider them at their worst?

11. Is it your experience that after a warm and open winter the borer is more prevalent than after a severe one?

12. Have you noticed anything preying upon the borer and have you any preventatives of remedies to suggest?

Any habit which you think worthy of mentioning kindly record it.

Q. Do you find any other kind of evidence to the door in any way? A. No.

Q. Do you observe anything else? A. Yes, I saw the door was closed.

Q. Do you know what time it was? A. I don't know.

Q. Do you know what time it was? A. I don't know.

Q. Do you know what time it was? A. I don't know.

Q. Do you know what time it was? A. I don't know.

Q. Do you know what time it was? A. I don't know.

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