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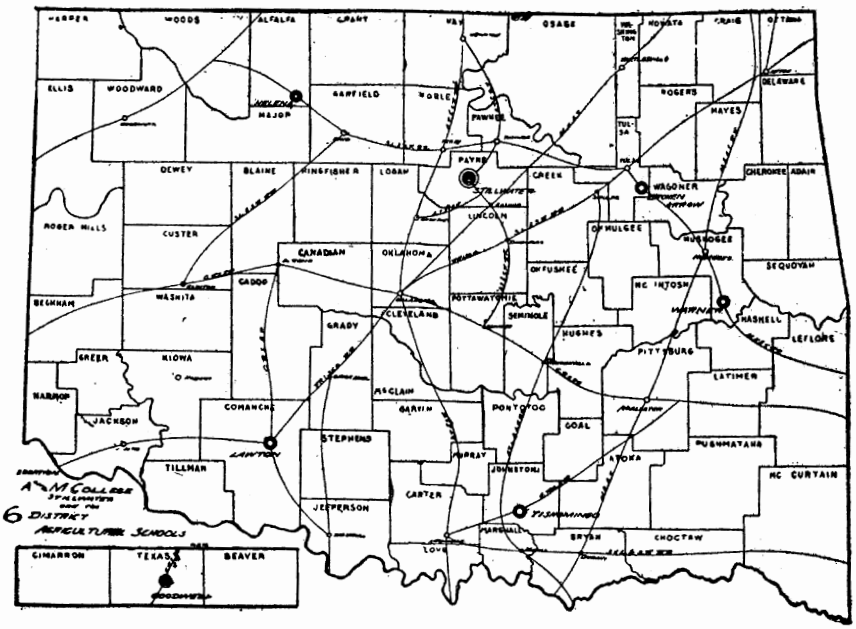
THE TWIG GIRDLER

BY

C. E. SANBORN

ENTOMOLOGY



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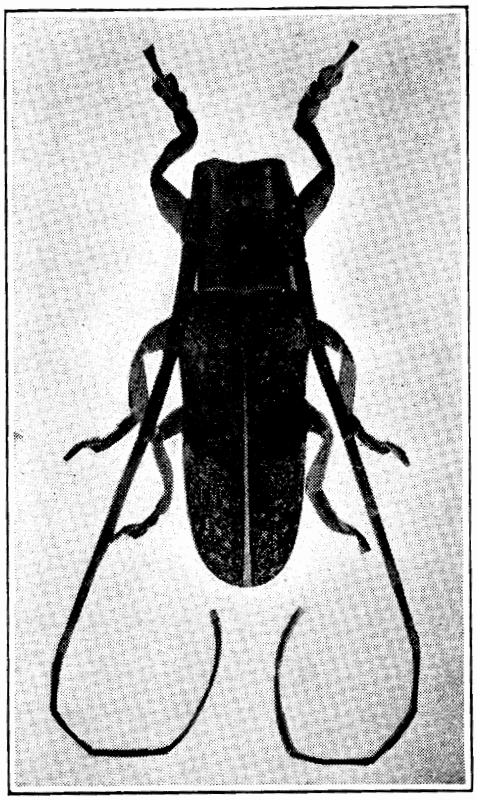

THE TWIG GIRDLER (Enlarged)

EARLY HISTORY, PRESENT DISTRIBUTION AND FOOD PLANTS

The earliest data concerning this insect and its habits were made by Haldeman ° in 1837. Since then it has been noticed practically throughout the United States east and south of and including Kansas. Many fallacious ideas have been entertained concerning it on account of the peculiar scharacter and conspicuous damage of its work, and the non-observance of the insect in connection therewith. For instance, a Judge Brown * of Illinois found branches girdled from his persimmon trees, and concluded, that since the opossum was fond of the fruit, it might be that it had gnawed off the terminal branches in order to obtain the persimmons.

Apple.	Orange.
Birch.	Peach.
Cherry,	Pear.
Cotton.	Persimmon.
Elm.	Plum.
Hackberry.	Quince.
Hickory, pecan, etc.	Rose.
Linden.	Salt Cedar.
Locust.	Tamarisk.
Maple (soft).	Walnut.
Oak.	Willow.

° Am. Phil. Trans. V. 10, p. 52.
* Am. Ent. Vol. 1, p. 57, 1868.

THE TWIG GIRDLER

(Oncideres cinguldta and texana.)

This is one of the wood working insects that subsists during its larval period on the wood of branches which have been girdled from the tree by the adult female. The peculiar method of pruning the live branches for the development of the young is very striking, and often is noticed by parties who are least observant along the lines of nature.

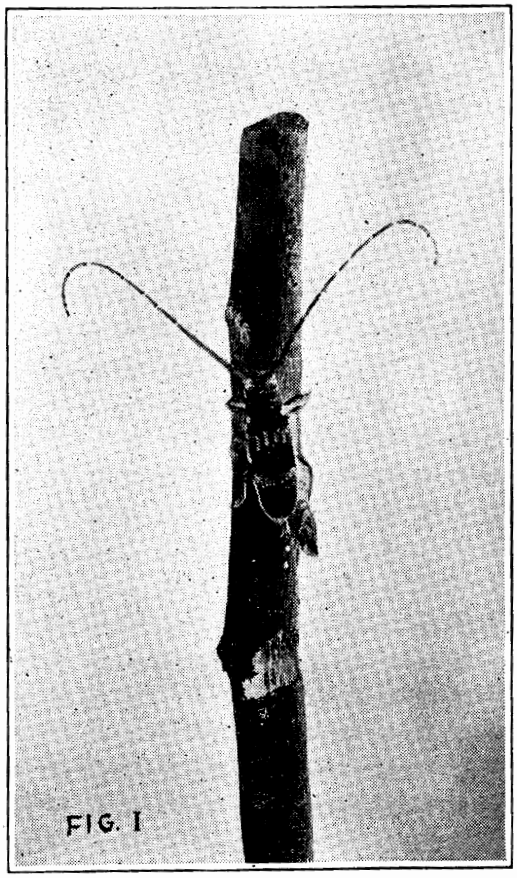

FIG. 1

The adults begin to emerge about the first of August from branches girdled the previous fall. When the pupa transforms to the adult stage, it sheds its pupal skin, and remains quiet until the body covering hardens. Then within a few days or a week it gnaws a hole through the bark, and issues forth from the branch. (See Figure 1.) During this time its coloration has changed from a copper brown to an ashy gray, which is similar to the bark of the trees on which it is found. This protective coloration is remarkable, since it is not easy to find one of these bugs, although they remain on the bark of the trees much of their time.

In addition to this sympathetic protective method of coloration the beetle has an alarming "squeak" which it gives forth when

disturbed. This noise which is not unlike the squeaking of a new shoe is made by rapid successive bendings of the body at the junction of the pro and mesothorax. Furthermore, it threshes about with its long whip-like antennae, turns its head upward and downward, while with its mandables it grabs and bites fiercely, and on the whole acts ferociously.

Within one or two weeks after emergence the sexes pair, and the females begin to girdle and to oviposit in the branches which they girdle. In selecting a branch in which to oviposit, she traverses and examines it very carefully with her antennae. By so doing she locates a point where she desires to girdle the branch. With her body parallel to the branch and facing the basal end she proceeds by penetrating the bark with her mandibles thus cutting into the wood. She then makes a similar insertion about three and one-half millimeters from this place toward the basal end of the branch, then with her mandibles she clasps the bark thus cut at the end near the incision last made, then near the middle, then near the end first cut, thus partially separating the entire piece from its place, then she grasps the end first severed, and removes the whole from the tree by raising her head. After rending the piece free, she turns her head a little to one side, and with a ventrade movement of the labium she pushes the bundle from her mandibles as she opens them, thus casting it free. By moving a little to the right or left of the first incision, she repeats this process until the space girdled extends about half way around the branch and about as deep in the center as the length of the front side of her head, which is about four or five millimeters. She then moves either to the right or left of the girdle, or to its opposite side, and continues the operation desisting only at intervals of about an hour in order to remove by aid of her ovipositor small cuttings or sap which has accumulated in the girdle. Finally she girdles entirely around the branch, or until the latter has become so weakened that it bends downward. If she completely girdles the branch and it does not bend or break off, the incision will be about the same depth all the way around, excepting a shallow place where the girdle meets. In such a case the branch will remain connected longer than when it is girdled nearly through, but not completely around. In either instance the branches are likely soon to be disconnected by the wind. In rare cases, ,however, they remain connected, or in dropping lodge in branches that may be beneath them. Unless some accident happens, that is, the premature dropping of the girdled twig, or a sudden bending which might close the girdle at the point where the insect is at work, thus entrapping her, the female generally after completing the girdle will bgin to oviposit in that part girdled from the tree. In rare instances, however, they oviposit at intervals in the branch while the process of girdling is under way.

Damage Done By These Beetles. The amount of damage that a few of these beetles can do is marvelous. Take for example, one of their favorite food plants, the pecan tree. In figure 2 is shown a tree which bore its first crop of pecans this summer. The arrows in the illustration each indicate where about two or three feet of branch was girdled from it this fall by one insect. One female can easily girdle all of the branches from two five-year-old trees or five three-year-old trees, or fifteen or twenty two-year-old trees. The direct damage, therefore, caused by the girdling of select stock can easily be computed at about ten dollars per female beetle without taking into consideration the damage caused by the pernicious food habits of both sexes.

In native forests the damage is not much noticed at present, yet it is very great, and must be checked in them before subjection of the pest can be accomplished in nearby orchards.

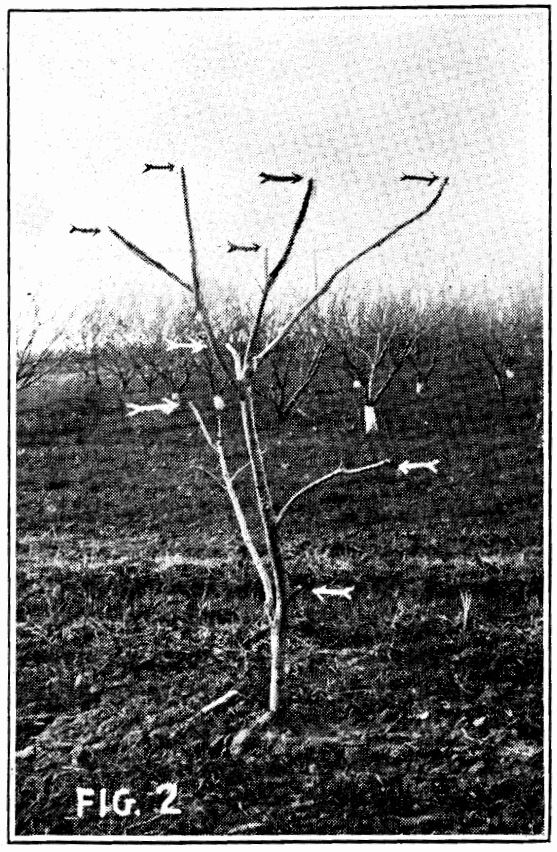
FIG. 2

Oviposition and Incubation. In this state oviposition is begun about the first of September and continues until the time of heavy frosts late in the fall. The beetle generally oviposits in the branch after she has finished girdling it. Whether it drops to the ground or not, she remains on it,—unless frightened by a long fall or the sudden bending of the branch, and selects places for oviposition near the bases of lateral buds or twigs. Her selections sometimes vary, but her method of oviposition seldom varies. First by means of her mandibles she gnaws a hole through the bark to the wood, then she reverses her position, and facing the girdle as she clings to the branch, she bends her ovipositor cephalad after she has inserted it in the puncture. With considerable exertion she forces the egg between the bark and the wood toward the girdle from the puncture. A light colored viscous discharge from the ovi-

positor is then deposited in the puncture, this hermetically seals it for the protection of the egg and the consequent development of the larvae.

After this operation of placing the egg, which lasts about fifteen or twenty minutes, is complete, she again reverses her position, examines the puncture with her mandibles, thus perfecting any defect in the seal, then proceeds backward two or three inches and lacerates and gores the bark, presumably to render the location of the egg puncture less conspicuous in order that it may not be noticed by enemies looking for the egg.

The number of eggs deposited by a single female varies from about ten to one hundred and fifty. The greatest number I have found in a single girdled branch is thirty. Sometimes they are deposited near a lateral side or on both sides of a bud or twig, and in exceptional cases they are deposited in the lateral twigs. In the latter instance, however, the branch is always about equal in size to that from which it arises. When first deposited, the egg is white or glaucous, but the moisture in the cell where it lies is of such a nature as to stain it, causing it in some instances to become dark in color. It is about three millimeters long and one millimeter in breadth. As it lies between the bark and the wood it becomes flattened by the compression caused by the bark, which in drying contracts against it and the wood. (See illustrations in figure 3.)

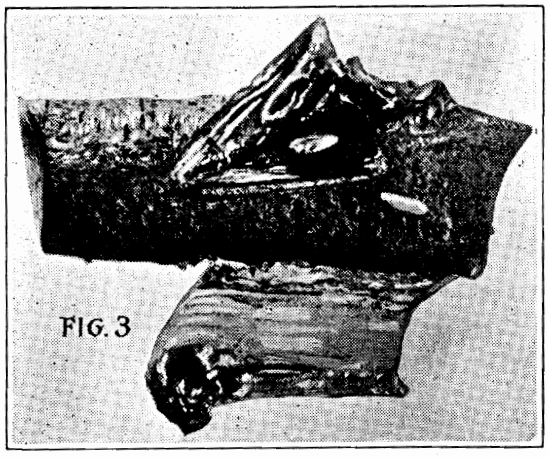

FIG. 3

The Larvae. On account of continual oviposition from September until frost, the larvae do not all hatch until late in winter. The egg generally hatches within about one week after it is deposited. The larva emerges from it at the end nearest the puncture between which points there is a vacant space in which it first feeds by eating the soft tissue bordering the hard wood. As development proceeds it eats the hard wood cells in proximity to the water tubes leading from the leaf scars near the base of the bud or twig.

After becoming about half grown, they may be detected by two or three distinct noises which they make in their food channels. One of these sounds is a light tapping or pounding which

seems to be made by the bending of the body at the junction of the thorax and abdomen, that causes the head, which is suddenly brought ventrad, to strike against the wood. Another sound seems to be made in the process of reaming out the tunnels by means of the mandibles; and another is made by simply gnawing the wood for the purpose of subsistence. Sometimes the twigs have the wood completely mined out by the larvae and only the bark is left as a house for them. In this mining sometimes one will make a mistake by cutting too much in a weak place, thus causing the bark to give way and break open. When this happens, it at once plugs the opening by shredding longitudinal fibers and placing them there. In addition to this craft they also prepare their dwellings with ventilators. (See Figure 4.) These openings are used more perhaps by the larvae for the purpose of casting its excrement from the tunnels than for the ventilation.

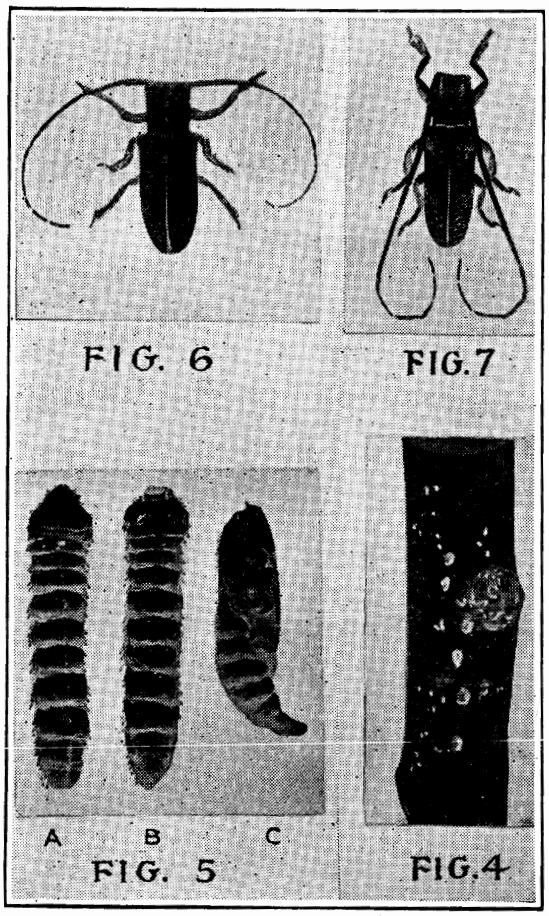

FIG. 6 FIG. 7

FIG. 5 FIG. 4

The Young Larvae. Head and mouth parts except distal end of mandibles light brown, latter black; eyes black, and located near the lateral bases of the mandibles; caudal half of thorax finely longitudinally corrugated. The whole thorax often turned ventrad so that its dorsum becomes its cephalic part. The head is located in the angle made by the dorsum of the thorax and the ventral plane of the abdomen. The latter sparsely hirsute, distinctly segmented, and densely minutely punctuate; a faint intermedio dorsal dark line probably due to the color of the substance in the alimentary canal sometimes extends caudad from the thorax. Sometimes two lateral lines not as distinct as the dorsal one are present; spiracles brown, protuberant and pointed.

The Adult Larva. Claucous, except mouth parts; mandibles black at base; remainder and other mouth parts brown; mouth parts except mandibles are also mounted with numerous brown setaceous hairs. Body sparsely brownish hirsute; spiracles brown; nine ventral segments, not including the two caudal ones, each mounted with about fifteen pairs of transverse pseudopodia; tergae of eight segments not including the two caudal ones similarly mounted except the dorsal tubercle composing the pseudopodia are not as symmetrical as the ventral ones. A rudimentary third row is partially represented cephaled each pair of transdorsal rows. Width four to five milimeters, length, twenty to twenty-eight millimeters. (See illustrations a and b Figure 5.)

The Pupa. The pupal stage averages about eleven days in duration. Transformation of the larvae begins about the middle of July and continues until about the first of October. The pupa is quite sensitive and active. When agitated, it responds by turning rapidly over and over. By means of the strong spinuous hairs at the caudal end of the body it can obtain a firm foothold by means of which it can propel itself forward or backward through its tunnel with apparent satisfaction. When disturbed, it causes a frightening noise to be given forth from the bark, against which it turns and rasps with the short stiff hairs of its body, and a pair of sharp, thorn-like protuberances, which are located medio-ventrad the insertions of the antennae. The general color is light cream, except a median dorsal dark stripe that extends caudad from the thorax to the eighth segment of the abdomen; latter spinously hirsute. Size varies from four to six millimeters in width and from fifteen to twenty-two millimeters in length. (See C, Figure 5.)

The Adults. Description. "Body robust, covered with short prostrate hairs; head varied with fulvous, a slender fulvous line around the eye, a frontal indented line; antennae much longer than the body, but not twice as long; thorax obviously broader than long; slightly varied with fulvous; elytra with numerous obsolete small fulvous dots at base and tip broadly reddish brown; a broad cinerous somewhat undulated band on middle. Length 11-20 of an inch. This is not common; occurs on hickory."[°] (See male and female Figures 6 and 7.)

From the numerous adults which I have reared I find that the previous description holds good, except for the size of the body and the length of the antennae and occurrence. On nearly all males reared by me the length of the antennae was more than twice the length of the body. My smallest male was 4 mm. in width and 12 mm. long, with an antennal length of 21 mm. The

[°] Say.—Entomology of N. A. Vol. II, p. 330.

largest male was 6x12 mm. with an antennal length of 38 mm. The smallest female was 4x14 mm. with an antennal length of 18 mm. The largest female was 6x18 mm. with an antennal length of 23 mm.

Number of Generations. My experience proved conclusively that there is but one generation per year. The season of adult activity being from August until frost.

Experiments. During the month of February five bundles of girdled twigs were placed as follows:

Bundle Number 1 was placed under a tree on fallowed ground.

Bundle Number 2 was placed under the same tree on fallowed ground and covered with decaying leaves.

Bundle Number 3 was placed under the same tree on hard ground.

Bundle Number 4 was placed under the same tree on hard ground and covered with decaying leaves.

Bundle Number 5 was placed under the same tree in an open box which was nailed to the trunk of the former about four feet above the ground.

These experiments were checked up as follows:

Nnmber 1 developed six per cent of the eggs into adult beetles. In the beginning the eggs hatched and the young larvae mined the twigs to some extent, but the spiders, ground beetles, and mice preyed considerably upon them.

Bundle Number 2 failed to develop adults. The wood became punky and eggs did not all hatch, and the larvae which did issue soon died.

Bundle Number 3 developed four per cent.

Bundle Number 4 developed no adults and the wood became quite punky and soft.

Bundle Number 5 developed one hundred per cent. The wood remained dry except when moistened by rains.

These experiments prove that decaying wood is not suitable for the development of the larvae as previously supposed. The experiments prove that the best conditions for the hatching of the eggs and the development of the larvae is in twigs which do not fall to the ground, but hang on the branches or trunk of the tree, thus protected from the soil moisture and natural enemies of the developing beetles. The next best conditions are shown to be those of Number 3, whrere the branches may fall on hard ground where they may be protected from moisture to some extent and consequent decay.

Method of Control. During the season of oviposition the insect should be captured by hand in the infested orchards. The newly girdled twigs which are easily detected give proof that the girdler is near by. When she cannot be found on the last twig girdled, she is almost certain to be in the tree from which it was girdled,—girdling another twig or in a nearby tree performing a similar operation. The females should be captured if the trees on which they are working are considered as valuable.

Since the oviposition period begins in September and ends before the first of the year, and since the following generation does not issue from the twigs until the last of the following July, there is relatively a very long time for gathering the branches from and beneath the infested trees. There are both egg and larval parasites which destroy many in their immature stages. If the twigs are gathered and stored each year until about the first of July, then burned, all the twig girdlers contained in them will be destroyed, and meantime the egg parasites and probably some of the larval parasites will have escaped.

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