

THE BATTLE WITH THE BUGS

By BERT E. POWELL



HERE is an underworld not invaded by novelist or playwright. Yet in it occur strange and often subtle dramas of survival and destruction. Nor is it a noiseless underworld. Every evening after a hot sunset it forms an orchestra which shrills out its prowess and flaunts its coming achievement. And in all the world there is no orchestra so well paid. To be sure it gets little in the matter of attention, but in ways more substantial it is rewarded handsomely. For it is permitted to levy toll upon the corn and the wheat, the cabbage and the apple, as they grow. It is allowed to eat the profits of the miller and the grain dealer. Certain members of the shrilling tribe go farther and demand greater concessions in their greed. Not satisfied with money tribute, they exact human lives. Their gruesome tracks are made upon the faces of little children. Then from places where poverty forces women and babies into filth and sickness, they take wing and they bear their death message into homes fair and clean—homes where the inmates cannot concern themselves with life's wretched ones. And so nature in her inexorable circle from which neither the proudest nor the poorest can escape, herself supplies the link which brings the miserable home to the fair one.

But reducing it to a dollars and cents basis which all of us understand, what would you say the insects of this country cost us each year? Millions of dollars! More in fact than our entire system of public school education, from the kindergarten to the university!

Moreover whole sections intended by nature for the production of particular crops often are compelled to abandon them for no other reason than insect infestation. This is especially true of horticulture. Myriad, indeed, are the insect foes that infest vegetables and fruit. If ever the life of this underworld is brought upon the stage as that of the barnyard has been, it may well open with this plant of the truck grower:

The insects are busy in clover and grass. A-hatchin' out sorer fer my garden sass. They're happily hummin' this giddy refrain. The old mule will still be your air-yo-plane.

Now the farmer has found himself helpless before this foe which must be fought with microscopes and laboratory mysteries. Consequently he has appealed to the man of science whom everyone despises in the day of prosperity and rushes to consult when the world is awry.

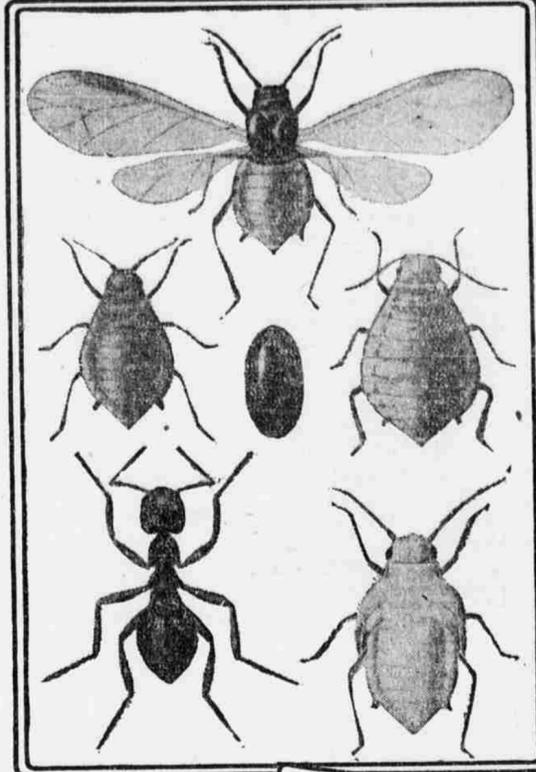
Let me tell you of what has been accomplished by one man with a microscope. His name is Stephen A. Forbes and he is state entomologist of Illinois. His chief work in this position is to exterminate "economic insects," as those which damage the growing things are called. He is also head of the state laboratory of natural history and professor of entomology in the University of Illinois. He has held these offices 25 years, which means that he has spent a quarter of a century fighting the predeceous instincts of economic insects, barring an occasional short lapse to fight the economical instincts of state legislatures. Naturally he is on intimate terms with a vast number of bugs.

For a practical knowledge of an insect, the ability to recognize it in all its phases is a mere beginning. Its dietary must be known, not only what it prefers but what it likes next best and what it will eat to escape starvation; how the weather affects its health, its temper, and its power of multiplying; is it subject to contagious diseases? If so, how may it be induced to catch one? Also it is well to know how its neighbor bugs regard it. Whether the sight of it arouses the instinct to protect or the instinct to kill. For there are bugs so kindly disposed toward other bugs that they will carry them to their food supply, hatch their eggs for them, and bring up their offspring. The sole duties they leave to those they protect are breathing, eating and multiplying.

First let me tell you about the fight against the chinch bug. As everyone knows, the chinch is a devil-devastator whose evil intentions are backed with energy and resourcefulness. When it starts to take what it wants from the farm there is just one thing it leaves—the mortgage. For more than a generation scientists in all parts of the country directed their intelligence against its instinct; and instinct won the victory. It seemed that reason could not fathom the cause of the outbreaks nor find a way to prevent them. In despair the men of science were for saying as did the old Irish woman of the rain that spoiled her potatoes, "There's no reason in it, it's just the will of God!"

And right there it seemed the problem would have to rest. But an occasional persistent brain was unable to accept this solution. Observations went on not only week by week but day by day, and often even hour by hour. Even so it was a work that proceeded slowly. The chinch bug was hard to make rules for. Indeed, it seemed more an exception to rule than the French language. For instance, scientists flattered themselves that one thing was proved concerning his chinchship viz., the abandonment of wheat culture meant an end to chinch bug ravages. But farmers made the sad discovery, quite unintentionally, you may be sure, not at all for the sake of enlightening the men of science, that the abandonment of wheat may even increase the chinch devastation. For if they have become numerous and can find no wheat, they will accept oats, barley, grass or corn. The abandonment of wheat to be effective against the chinch, must take place at the beginning of an outbreak.

Therefore Dr. Forbes straightened his mortarboard, polished his microscope and prepared for wholesale slaughter. He was going to wade deep, not in gore but in bug juice. The

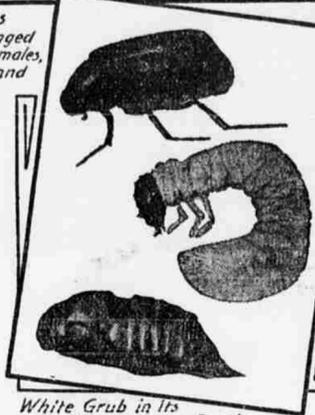


CORN ROOT APHIS AND ITS ATTENDANT ANT: Winged Female, Two Wingless Females, Egg and Pupa of Aphis, and Worker Ant.

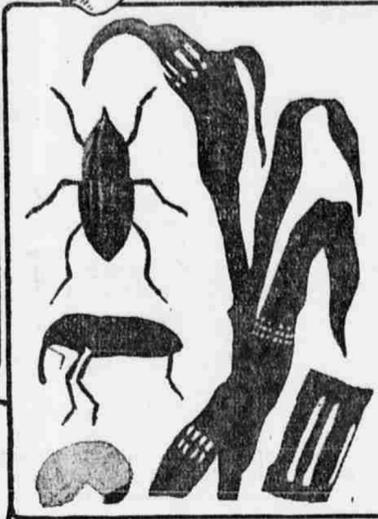
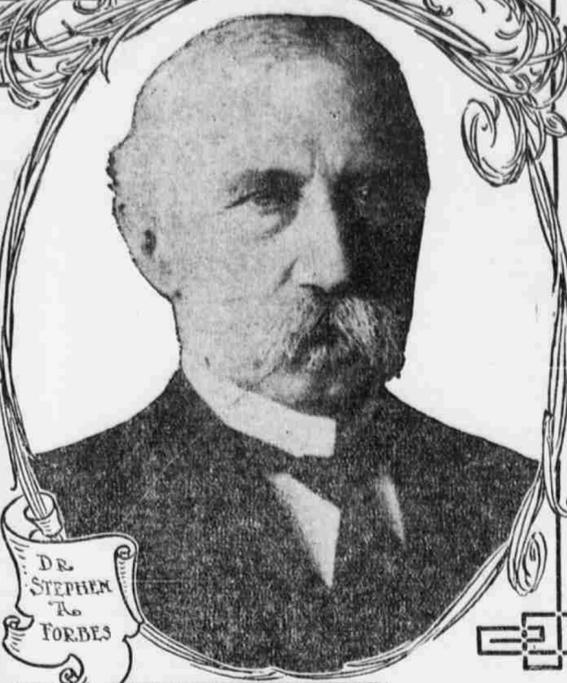
first plan was to present the chinch with a contagious disease. It had been observed that it was subject to a fungous disease similar to that of the common house fly, which left the dead covered with a white mould. Why not spread it? It was tried upon the university fields and the bugs took it most obligingly and died most successfully. Before it could be considered more than an experiment, however, it was necessary to try it on a larger scale. Consequently letters were sent among the farmers, asking for boxes of sound bugs. These bugs were to be given the disease and returned with directions for spreading it. The response was surprisingly immediate. Boxes of bugs poured into the express offices and yet more boxes of bugs. Farmers from neighboring states heard of the offer and they, too, went bug hunting. The express companies worked overtime. The assistants in the entomologist's office became mere undertakers for bugdom. The mouldy bugs were sent out on their beneficent mission of destruction. Then the results came in. They varied; they did, indeed. Some thought the entire entomologist's office should be fitted out with a golden, glorious halo as the rescuer of its country; others alas! thought a fool's cap would fit the case more exactly.

But although the disease project could not be called a complete success, means were found which make it possible to raise grain even in the very worst of the chinch outbreaks. The barrier methods and sprays with a kerosene emulsion will catch them every time. Just after harvest the scarcity of food in the wheat fields arouses in the chinch an instinct to migrate. On foot it sets out to get an appetite for corn. This is the time to make a ridge between the infested field and the field the chinch desires to infest. This is done by plowing a backward furrow which is packed with a light roller or by hand and has a line of tar poured upon it from a can with a tubular spout. Post holes are dug at intervals of about twenty feet. By keeping the tar line fresh his chinchship cannot cross, but will follow it to the posthole, into which he speedily tumbles. It then is merely pleasant recreation for the farmer to travel out and pour a weak solution of kerosene upon his accumulated enemies. Kerosene is an excellent death dealer for these pests. When they get into the cornfields the farmers of Illinois sally forth with an emulsion containing four per cent of kerosene and half as much whale oil soap mixed by five minutes simple beating with a stick. This is flung by hand upon the corn in the cool of the day when the insects feed most thoroughly and when there is less danger of injury to the corn. Sometimes a single application does the work; when the infestation is very bad two and even three may be required.

Now let us talk about corn exclusively for a while. With that staple at its present price and with the grave gentlemen who produce statistics as hens produce eggs—the louder the cackling, the smaller the statistic—assuring us that it is on its lofty perch to stay, it seems that the farmer will have to cultivate automobiles and bad habits as obesity cures for his bank account. But, halt! Nature provides several. There is the weather, more exasperating and with less regard for a poor



White Grub in its four stages: June Beetle, Egg, Grub and Pupa.



Corn Bill-Bugs, Grub of same and Corn Plant showing Bill-Bug injury.

man's purse than rich relatives on a visit, there is the fretful soil which gets sour like a colicky baby, and there are sturdy, hungry insect foes. Over two hundred of these attack corn, forty capable of doing notable damage. It is in discovering the way to conquer a pair of these precious rascals that Dr. Forbes has made his most valuable single contribution to science. They are the corn field ant and the corn root-aphis or, as it is better known, the corn root louse. For a long time they were the particular scourge of the corn grower who supposed that they operated each on its own account. Through the research of Dr. Forbes it is now known that one is helpless without the other. The resourceful and industrious ant is entirely unable to extract the coveted sap from the corn root, and the stupid aphis would, if left to itself, starve in the very presence of the corn. But the ant can carry the aphis to the corn root and deposit it thereupon; the aphis can extract the sap and then exude it, thus passing it on to the ant. Therefore it was not a problem of exterminating two foes but of outwitting the clever little ant. Were it banished, the aphis would soon disappear. The wretched little soft-bodied hunk o' creation can do nothing for itself except lay eggs and suck corn sap. The ant gives it a home in its own burrows, hatches its eggs for it, carrying them to the warm surface if they are slow, bearing them farther into the ground if they threaten to hatch before its food supply is ready. And this protection extends through the aphis' life. If, because of plowing or other inadvertence, the ant finds its charges scattered, it will cheerfully collect them and reconstruct its home if that has been molested also. The ant has nothing else to do and it is as active as an outraged Puritan conscience. However, methods of control have been found. The use of the disk and crop rotation will exterminate them. The root-aphis refuses entirely to occupy ground planted to oats, so this crop is of the greatest importance in clearing fields of them. Also by disking two or three times with a 20-inch disk in spring, especially on a sunny day when the ants are likely to have their charges near the surface, they will be killed and scattered and their nests so broken up that even the enthusiastic little ant cannot reconstruct the colony.

Another enemy of the corn that Dr. Forbes has caught by cultivation is the bill bug, as certain beetles are called because of their long, hard snouts, which they poke into the farmer's business to ruin it. This time the cultivation must be with the plow instead of the disk and in the autumn instead of spring and in the fields of grass where the bill bugs breed. These bugs are distinguished by a belligerency which is only equaled by their strength of claw. One variety appeared in Illinois which looked so large to the harassed farmers that it was christened "elephant bug." Chickens turned into the fields to feast upon them fled in flapping, comical flight, unable to relieve their terrified souls by a squawk, as their bills were tightly held together by the

encircling claws of what were meant to be their banquets. As for sprays, the bugs throw upon them. Dr. Forbes had his assistants in the fields before it was found that plowing the infested grass in the autumn would practically do away with the pest. Of all the foes which the agriculturist must fight, none presents a more difficult problem than the white grub. For one thing, there are many species. Illinois has about thirty—differing in habits, but all endowed with an original and hard working brand of natural cunningness. They attack plants at the roots, and it is not at all uncommon to find whole acres of grass where the sod can

be rolled up like a carpet. By preference they devastate grass, but if the supply is scant, they are willing to ruin small grain, corn, strawberry plantations, woodlands, and, indeed, many other situations. They are especially difficult to combat because the life history is hard to follow from the first to the last stage. Only a single specimen has been bred from the egg to the beetle and its life cycle occupied three years. So far the best remedy has been found to be in cropping, especially in planting the infested ground to clover. Well-known enemies of the white grub also are the festive porker, which will dig a foot for a nice fat one, and crows and crow blackbirds.

Occasionally a farmer notices that a field which has been brown from a grub ravage becomes green and alive. He is inclined to think it a clear case of the Lord remembering the righteous; as a matter of fact another insect has appeared and is working out another set of instincts. This is the Tiphia, a member of the solitary wasp family. It stings the grub into submission and then glues to its thick hide an egg which in a few days hatches into a veritable vampire. It sucks from its host its life juices, leaving the shell to crumble back to earth.

Trees, both those in natural forests and those which have been planted, "noble and helpless products of nature," to quote Dr. Forbes, are often dragged to a slow and unsightly death through insect infestation. Have you never late in May or in June noticed upon shade trees little wads of cotton? Each wad, you will see, if you look, projects from a brown cap, which is the female maple scale. It is a native insect parasite of the soft maple. It will infest, besides the maple, the linden, box elder, elm and honey locust. These cotton wads are the soft bed in which the careful female lays her eggs, and each female can be rolled upon to deposit something like 3,000 eggs in her own particular little wad. Dr. Forbes found after considerable experiment that a kerosene emulsion was effective in disposing of these pests. A 20 per cent. emulsion could be used in winter if the roots of the trees were protected, and a 10 per cent. in summer. It is made by dissolving one pound of common soap in one gallon of water by boiling. This is removed from the fire and two gallons of kerosene poured in. With a spray pump the mixture is then forced back into itself for about five minutes, when it will look like a thick cream, and no longer separates on standing. Seventeen gallons of water added to the three gallons thus prepared will give a 10 per cent. solution. The cost will be 4.3 cents a gallon and three or four gallons will save a large tree from destruction.

Doubtless you have noticed upon the apples you brought home in a paper bag and those that fell from your own cherished tree a crescent mark. This means that a busy little curculio has had its beak in your apple before you and has probably laid an egg at the sign of the crescent curculio. A spray compound of 12½ ounces of acetate of lead and four ounces of arsenate of soda to fifty gallons of water, if used three or four times, will catch practically all these orchard destroyers.

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THE DOCTOR'S IDEA. Invalid—Doctor, I must positively insist upon knowing the worst. Dr. Wise—Well, I guess my bill will be about \$85.

Doll House Library. A search for a child's short story, "The Griffin and the Minor Canon," in a volume all by itself revealed to a persistent city shopper the thought and money that are expended on the furnishing of dolls' houses. Book stores had not the story in a single volume, but in a department store one young woman interviewed had recently been transferred from the toy department and was able to contribute a helpful hint. "I think," she said, "you can find it in one of the dolls' houses downstairs." Curiosity had by that time become a sauce to literature, so the shopper hurried downstairs to inspect the doll houses. Three of the most expensive houses contained libraries consisting of a score of diminutive books and each book contained a child's story complete. One of them was "The Griffin and the Minor Canon."

A Bernhard Trick. Mme. Sarah Bernhard, who is supposed to be something of an artist as well as an actress, was recently called upon in one of her marvelous creations to enact the role of a sculptor, and to model a certain bust in view of the audience. This fairly electrified the critics, but when going into rhapsodies over the technical skill in handling the clay which Mme. Bernhard exhibited they showed that they know little of the artistic tricks of actors and actresses; as a matter of fact, she does nothing of the kind. The bust is modeled and baked, and over it is placed damp clay of the same color. This the talented actress merely pulls off, exposing the beautifully modeled head underneath.

A Fitting Design. "I want an estimate on 10,000 letter heads," said the professional-looking man with the silk hat. "Any special design?" asked the engraver. "Yes, sir," replied the caller. "In the upper left-hand corner I want a catchy cut of Patrick Henry making his memorable speech, and in distinct letters, under the cut, his soul-inspiring words, 'Give me liberty or give me death.' You see," he added, handing a card to the engraver, "I'm a divorce lawyer, and want something fitting."—Lippincott's.

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