A WOMAN PARASITE HUNTER

Irene D. Dobroscky

"GO WEST, young man," said Horace Greeley. After working at the Boyce Thompson Institute for Plant Research for six years I felt that this advice applied to me, also. At the Institute my title was assistant entomologist and plant pathologist, as my work was with plant virus diseases and their insect vectors. While at Cornell I had specialized in both these fields and my Master's thesis was on insect parasites of birds. During the time I was at the Institute, I worked on the morphology of the insect which carried the virus of aster yellows and this was the topic of my Doctorate thesis at Cornell. Later my special problem was to find the cause of a disease called "False-blossom" of the cranberry. This work was carried on partly on the cranberry bogs of New Jersey where I collected insects and partly at the greenhouses of the Institute where I raised healthy cranberry seedlings for the experiments. Within two years I was able to prove without a doubt that this was a virus disease and was also able to pinpoint the insect vector. It has been a source of satisfaction to me to reflect that as an individual I was able to solve for the cranberry growers one of their most serious problems, whereas the government is reported to be now spending twenty million dollars to compensate these growers for a government-imposed debacle.

In 1930, I decided to "Go West," and a friend from the Institute went along in my "Dauntless Dodge." Before we reached Los Angeles, we knew what it was to be stuck in snow drifts at the top of the Rockies at Berthould Pass; to see the Dodge literally carried through the mud by a willing coterie of cow boys; to jounce over miles of corduroy road, and to ride endlessly, squinting into the western sun over unpaved desert roads.

In a half-hearted way, I had been looking for a job. In Tucson, Arizona, there was an opening in field extension work but they just couldn't give it to a *woman*. This was a wall I came up against several times, even though they admitted that my qualifications were excellent.

However, my heart was set on getting to Hawaii. Two of my colleagues at the Institute, Dr. Helen Purdy and Dr. L. O. Kunkel, who had both worked for the Hawaiian Sugar Planters Association, had filled me with such glowing tales of the beauties of Hawaii that nothing short of getting there would satisfy me. Besides, as an entomologist I was well acquainted with the remarkable work which had been done with parasitic insects on this island. So the Dauntless Dodge and I took sail from San Francisco for Honolulu. Luck was with me, for on shipboard was Mr. D. T. Fullaway, the Government Entomologist of Hawaii. With nothing to do for five days but talk, we soon became well acquainted and it was through his knowledge of my qualifications that I was offered a job a couple of months after landing. Hawaii lived up to all my expectations. The land and the people were surpassingly fair and even the scientists were mellow and human.

One of the scientists of the Experiment Station of the Hawaiian Pineapple Canners' Association had discovered that the yellow-spot disease of pineapple was a virus disease and a thrips was the vector. Here was a problem quite similar to the false-blossom of cranberry. But in New Jersey the growers controlled the offending insects with insecticides, in Hawaii they decided to try control with a parasitic insect. It was known from literature that the bean thrips of California was parasitized by a very small Chalcid, a member of the wasp order. There was also a record of thrips being parasitized in Java. With this information as a start, it was my assignment to hunt for such a parasite in the Philippines and failing there, to go to Java. I had just one week in which to read the literature on the subject, plan how to carry out the work, get together the necessary equipment and finally to climb on board the beautiful Empress of Japan with the trusty Dodge. It took nineteen days to get from Honolulu to Manila. Those were the days before Amelia Earhart.

If I thought the Hawaiian Islands a paradise, I found Manila in May just the opposite. Here one had to get up early and get in a full day's work by one o'clock, then hurry home to eat and take an obligatory siesta under a mosquito bar in a darkened room until the sun began to set. At this time, everyone was glad to go out to see the magnificent spectacle of the sun setting over Manila Bay in the most fantastic riot of clouds and colors to be seen anywhere in the world.

Armed with letters of introduction, I was welcomed at the Bureau of Science and given an office. Dr. Fajardo, who had studied plant pathology in the United States, was assigned to help me start looking for parasites. Several times we visited the nearby Chinese truck-crop gardens where night soil was being used. In spite of close observation I was not able to find any insects on these crops. As for the Chinese farmers, they were much amused to see a white woman in their midst and their Chinese comments were no doubt untranslatable.

Because these gardens were not productive of insects, I decided to go to the Agricultural College at Los Banos, 44 miles south of Manila, a place that about ten years later was the site of a Japanese concentration camp. Around the College, various test crops were planted, including soy beans. They were in bloom and close examination showed they harbored thrips. A paper bag full of infested flowers was collected and taken back to the laboratory in Manila. Tearing apart the flowers and collecting the thrips I noticed three minute wasp-like insects. Putting one of these creatures in a small vial with a few larval thrips, I soon discovered that the little wasp climbed on the back of the larva and tried to pierce the abdomen with its egg-laying ovipositor. After watching and seeing the process repeated a couple of times, I was sure that this was IT. Golden nuggets never looked better to a prospector than this minute insect did to me. It was so small that several of them could dance on the head of a pin. Yet it is by means of such tiny things that scientific progress is made. Not being able to contain myself for joy, I rushed down the hall to show my treasure to the scientists from the Rockefeller Foundation who were working on bird malaria. This was my great moment. It was just about a month since I had landed and I had already found my parasite. But, of course, this was only a good beginning; I still had to rear it and bring it back alive to Hawaii.

I decided to move to Los Banos, home of the parasite. Here I had an old laboratory building all to myself. It had been built by the Hawaiian Sugar Planters' Association and previous scientists had made history here. They as well as I were no doubt pestered by bat bugs which dropped down from the ceiling. I, at least, did not find a cobra as my predecessors had. With the help of a native boy, Emilio, I worked here for several months. Emilio, whose wages were fifty cents a day, would go off with my collecting net and swoosh around with it, collecting all sorts of insects. He would also pick a bag of bean flowers and bring them to me in the laboratory.

In the course of time I was able to work out the complete life cycle of the bean thrips and its parasite. It took the thrips about three weeks to complete its cycle but the parasite lived inside its host only about eleven days. These figures were significant, for the parasites had to reach Honolulu alive after an ocean trip of nineteen days. Several unsuccessful attempts were made to send vials of parasitized thrips. Whenever a ship was leaving for Honolulu, I'd package up some of the insects, drive to Manila, then walk

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spread. However, it will also be useful for the control of many established species of limited distribution whose numbers may be greatly reduced at certain seasons of the year. For example, it might be used in the spring against a garden insect that survives the winter in only small numbers. Also, it might be used against a pest after the population has been brought under control by insecticides, so that it is possible to outnumber economically the few survivors by sterilized insects reared in the laboratory.

Dr. Knipling has also proposed that it may not be necessary to rear the insects in the laboratory for sterilization, but that suitable sterilizing chemicals might be found to be distributed in baits to sterilize most of the males in the native population which would then compete with the remaining normal males for mates.

The Entomology Research Division is now completing arrangements for practical field tests on some small Pacific islands to try the sterilized male technique for the eradication of the oriental fruit fly and the melon fly.

Fruit fly control with sterilized males is complicated by the fact that females mate repeatedly. Therefore, one mating with a released sterilized male does not completely destroy the reproductive capacity of a native female. Also, laboratory studies have shown that long-lived males may regain a degree of fertility in their old age. They do not tolerate a dose of gamma-rays sufficient to sterilize them for life. In spite of these technical difficulties. experiments with mixed populations of caged flies have shown that it is possible to produce a high degree of sterility in the males and that a preponderance of these sterilized insects so reduces the biotic potential of a population that control is effected.

Laboratory studies are in progress on sterilization techniques for a number of insects affecting plants. The task requires ingenuity and intensive, highly technical experimentation. However, the scientific principle was firmly established in screwworm eradication and its application is certain to be of benefit in the future control of some plant insects.

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down the longest pier in the world and entrust my package to the ship's doctor. Invariably I would have one or two flat tires to mend on this trip, due to the tack-laying tactics of the natives.

In order to synchronize the sea voyage with the parasite's life cycle, it was decided to make a half-way station at Kobe, Japan. When it came time for me to return to Honolulu, I brought along all the breeding stock and had it in my cabin for hourly care and observation. It took twelve days to reach Kobe, where Dr. Akiyama, a Japanese plant pathologist, was waiting with two Wardian cases full of onion thrips, which were taken to my stateroom. As the parasites emerged from their Philippine thrips they were placed in the cages of the Japanese thrips and so brought back alive to the Experiment Station in Hawaii.

By this time the Big Depression had hit the Islands and so, being a woman, and the last one added to the staff, I was quickly subtracted from the staff, in spite of the successful accomplishment of my mission.

Editor's Note

In the summer of 1932 I met Dr. Dobroscky and her "Dauntless Dodge" at Yellowstone Park and accompanied them on the last lap of their journey home from the parasite-hunting expedition. Every time we stopped for gasoline, little boys would look at the Philippine license plates and yell "How'd ja get across the water?" A year later, with women scientists still unwanted in depression times, we went into private practice as "The Plant Doctor." In 1935 the entomological half of this concern became Mrs. Carleton Van de Water and transferred her investigations to her own apple farm.—C.W.

BIRDS AND INSECT CONTROL

Roland C. Clement

DISCUSSION of the role birds play in controlling insect numbers has been plagued by two kinds of sweeping statements. On the one hand, enthusiastic bird lovers have repeatedly stated that insects would rule the earth if birds were eliminated. On the other, somewhat more objective observers, who discover that birds normally eat only 5 to 20% of the insect fauna, pronounce them incapable of controlling insect numbers.

The trouble is that we have only very recently learned enough about these interrelationships to ask the right questions. It should therefore not be surprising that we cannot yet give clear-cut answers. Indeed, we are learning that there can be no clear-cut answer to the over-simple question, "Can birds control insects?"

Let us first look at some of the evidence which has accumulated since 1885, when the Division of Economic Ornithology and Mammalogy of the U.S.D.A. was formed to collect such data. This division was destined to undergo many changes before being finally abolished in the 1950's. A few of the states actually made important studies even before 1885, and among these Illinois' S. A. Forbes and Iowa's F. E. L. Beal are credited with erecting the foundations and scaffolding, respectively, of American economic ornithology. Edward Howe Forbush of Massachusetts, and several workers in the federal division did outstanding work.

The standard method became that of identifying the contents of birds' stomachs collected throughout their range and at all seasons of the year. This gigantic, pioneering research job into the food habits of birds taught us what they eat, but told us relatively little about the effect of these food habits on the population levels of the prey species. Nevertheless, W. L. McAtee, a leading federal investigator in economic ornithology who has an enviable reputation for independent and original thinking, concluded in 1926 that the American literature on the subject contained 109 cases of demonstrable control of insects by birds, and 88 cases of suppression over local areas. It is useless to quibble over the validity of the data in each of these cases. We now need different types of studies to test the conclusions.

These early workers discovered that one half of the food of some 1400 species of American birds consists of insects, and that most of these birds feed their young a diet higher in insects than they themselves eat. A more detailed study by L. A. Rice in 1946 has shown that although birds took about 20% of the insect population in an Illinois woodland during the year, they exerted most pressure against four groups of rather large, soft-bodied insects, and left certain others almost untouched. The same study showed that a wintering flock of robins took five-sixths of the hibernating invertebrates (grubs, etc.) in the leaf litter of the forest floor.

McAtee, who once stated that "good economic tendencies" (if not achievements) are enough grounds for advocating the protection of the natural enemies of insects, also said that a "degree of control necessary to commercial success of a crop is rarely attained as a result of the work of natural enemies," whether parasites or predators. But perhaps this is too conservative a reading of still inadequate evidence.

Dr. Harvey L. Sweetman, in a valuable review of the literature,* placed moderate emphasis on the importance of diversity

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*Sweetman, Harvey L. 1958. *The Principles of Biological Control.* Wm. C. Brown Co., Dubuque, Iowa.