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THE PESTICIDE DEBATE -- AN APPRAISAL

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What are pesticides?

Pesticides, literally, are materials that kill pests -- ideally only pests. Unfortunately, however, most pesticides are what biologists term biocides, that is materials that destroy life. The selectivity for pests, where it exists at all, usually depends upon the method of application or means of entrance into the body. Some materials, for instance, are eaten by some animals but not by others, or they go through the skin of some but not others. Obviously, the most potent pesticides are likely to be potent biocides, for they should destroy pests quickly. However, if one uses potent biocides, then he may not only destroy pests, but other animals too -- man included. The problems created by this will be discussed here. We shall, however, confine ourselves to insecticides, for to expand into rodenticides and other pesticides would make this far too long.

Before World War II, relatively few poisonous materials were available for pest control, and most of these were pretty generally admitted to be very toxic. Therefore, ordinary persons who used them handled them with great care. Research before World War II was directed strongly toward the discovery of materials that would be less dangerous to man and to valuable species of animals. Among insecticides, three major classes were recognized: contact, stomach, and fumigant. The first class included such as soaps, and petroleum derivatives. The second class included those that, when eaten by an insect, poisoned it, and included such virulent materials as arsenic, sodium fluoride, and formaldehyde. It was fully recognized by all that these were dangerous, and generally they were only used by experienced people. The third class included volatile compounds, such as hydrogen cyanide, carbon disulfide, nicotine, and pyrethrum. Some of these materials, such as hydrogen cyanide, were totally unselective and killed anything, while others, such as pyrethrum, were fairly selective for insects. Among rodenticides, the materials were almost entirely stomach poisons, including arsenic, phosphorus, thallium salts, and strychnine. Again, these were known to be very dangerous and were handled with care.

The discovery of DDT shortly before World War II, and its extensive use during the war, led to a search afterward for compounds related to DDT and subsequently for other materials that could be used as insecticides and rodenticides. While some attempts were made to find more selective pesticides, as for example the discovery of the rat-killing Warfarin, the general trend of research was toward developing more and more potent biocides, as insect resistance developed to the killing effects of new insecticides. Thus the chlorinated hydrocarbons, which include DDT, soon failed to control some insects, and this led to experiments with the more dangerous phosphorus containing compounds. These actually had started their scientific life as war nerve-gases. Shortly, a wide variety of insecticides and rodenticides became available, occasionally put on the market before adequate tests could be made to insure their safety when used by persons with no idea of their nature.

Among the insecticides, many new contact insecticides were developed, chiefly chlorinated hydrocarbons, which included DDT, Dieldrin, Aldrin, and a host of others. Among stomach poisons, used in baits, were many organic phosphorus-containing compounds of rather stunning toxicity to almost all animals. The use of these in baits supposedly prevents their entrance into useful animals or man. A new family of insecticides emerged, contact-fumigants, materials which could kill either on contact or by their vapor so that they could act as fumigants. These included organic phosphorus-containing compounds, carbamates, and chlorinated hydrocarbons, such as Chlordane. The use of materials such as derris and pyrethrum, which are rather selective for insects, but of relatively low toxicity, rapidly dropped off. In short, there was a tendency toward the one-shot stunning kill, rather than long range, slow reduction in numbers.

The so-called pesticide problem, that is the possible hazard to plant life, wildlife, and man himself through injudicious use of pesticides, is thus due in large part to the development by chemical industry of a tremendous number of new pesticides which have been released, as never before, to persons with essentially no knowledge of the hazards they pose if used incorrectly.

<u>What are pest insects and why are controls needed?</u>

There are about 700,000 species of insects now known, and competent entomologists believe that over a million species of insects will ultimately be found. Obviously, most of these live so far from man and his crops that they are of little or no economic importance. However, many insects do compete with man for things that he desires, or even attack his body, and are therefore considered pests. It is these insects that pesticides are designed to control.

Note should be made of the variety of pest problems presented by insects, to indicate the importance of the development of some means for living with, or without, these animals. Attacks of insects upon crops and stored foods are too well known to need documentation. Periodically someone makes an estimate of agricultural losses to insects each year in various parts of the world. The figure is always enormous. Obviously, such figures are almost guesses, for we do not know whether all the food would come through, if the insects did not eat it, and we generally do not know how much they actually have eaten. It has been estimated that insects may cost up to $14,000,000,000 a year, in the United States alone, in lost crops and stored foods. This includes such diverse situations as destruction of whole fields of wheat or whole stands of timber and the discard of a box of cereal by a housewife because it has become infested with weevils. Many insects attack materials that man expects to use for clothing or housing, or eat ornamental plants. Again these need little documentation, and, as with agricultural and stored products pests, it is extremely difficult to estimate the amount of damage, but it is very large. Lastly, insects may feed on man himself, or on his domestic animals, causing damage and discomfort or carrying diseases. Mosquitoes, for instance, not only suck blood -- usually not enough to cause any direct medical problem -- but they carry, and are the only carriers for, such important diseases as malaria, yellow fever and dengue. Other disease-carrying insects include lice, fleas, tsetse flies, blood-sucking bugs, horse-flies, to mention only a few. Modern methods of control for these pests has made possible man's living in security in many parts of the world where formerly the average individual died early of insect-borne diseases.

Considering this wide variety of pests, I think it can be fully granted that pest control is necessary, or at least desirable. Those who seek to justify the use of almost any insecticide under almost any conditions do this on the basis of lives and food saved. While we may admit that pest control is necessary, or at least desirable, the creation of potential hazards to man and other animals in achieving it may not be.

Conceivably, in controlling an epidemic of disease, the lives of some wild animals, or even a few humans might need to be put in jeopardy. This situation, however, very seldom arises. Under other circumstances, one may ask whether the end, even though admittedly desirable, justifies the means.

Are newer insecticides more desirable?

By the time of World War II, the dangerous nature of many of the insecticides then in use was well recognized, and precautions taken to prevent accidents were quite effective. Since World War II, the more general distribution of insecticides to uninformed persons, and their increased toxicity to a wide spectrum of animals, including man, has led to what is now called the pesticide problem. This was highlighted by the publication of the book by Rachel Carson, The Silent Spring. One of the major defenses given by advocates of the newer insecticides is that the effectiveness of these materials is much greater than of the materials used earlier. Such claims are, of course, extremely hard to document. I think, however, we need, before we admit that increased expense for insect control, and increased hazard to wildlife and man are justified, to look at the evidence.

There is no space here to review the plethora of figures and statistics that have been used by proponents of the newer insecticides to justify their use in place of earlier materials. Suffice it to say that in most cases they are like estimates of insect damage. It is interesting, to note, however, that in this case the advocates of large scale use of insecticides do not admit -- as they do with estimates of damage -- that these are almost guesses. Thus one finds tremendous variation in the figures cited to prove that the newer insecticides are more effective or more desirable.

On the TV program following the publication of Miss Carson's book, an expert from the U.S. Department of Agriculture pointed to increases in production of many agricultural crops, and stated that this was, at least in part, brought about by the use of newer pesticides. He pointed out that there were 900,000,000 pounds of insecticide used per year in the United States. Shortly after this, however, the same person said that only 28% of the crops in the United States were protected by pesticides. Obviously, the large increase in productivity, could then not have been due even largely to the pesticides, for the increase apparently occurred all over. One is left then with the question: How much of this increase in crop production was due to better fertilization, use of hybrid plants, use of plants with resistance to insects and diseases, and to mechanization?

I recall, in 1936, considering a position as a research assistant in the Entomology Department of The Pennsylvania State University, working on insect control in apples. At that time, the farmers were using oil and arsenic sprays. When properly applied -- and relatively few sprayings were necessary -- the farmer usually had to remove some apples from his trees, if the remaining ones were to be large and marketable. In brief, so many apples were set, because of the protection from insect damage afforded by these sprays, that the trees could not bear all of them, and it was necessary to cut the crop back selectively, so that the apples that were left could be of the good size and quality. The research program, at that time, dealt mainly with details of insect control, for the growers apparently had the major problems of apple production licked, including insect pests. I was therefore surprised, on returning to Penn State in 1947, to hear about large scale research programs using the newer chlorinated hydrocarbons in these same apple orchards. When I left, the farmers were using fourteen separate sprays, with many compounds, fighting insects that were unknown as pests in 1936. Now, the question is: Were more apples being taken off the trees so that the remaining ones could be of marketable quality? With farm surpluses in many commodities, and with pruning back to achieve proper quality in other crops, I think it is not too obtuse for one to ask: Have we really, in spite of claims, effectively improved our situation by using the pesticides whose safety is now questioned?

A good bit of the increasing toxicity of pesticides has been necessitated by insects' development of resistance to these insecticides, and the replacement of one pest by another. The development of resistance to DDT by houseflies is too well known to need repeating, but it has led to attempts now to control houseflies by more and more potent poisons used in baits. Not a few experts have pointed out that the success of DDT, when it was first used, seemed to lull many persons into a sense of security and led them to cancel out means of control they had used formerly, including clearing up manure piles and garbage dumps. In short, by producing large crops of flies, which formerly were not allowed to develop, these people intensified the problem until the flies overwhelmed the insecticides' potentialities.

An interesting, if tragic, case of pest replacement has been reported in a recent Bulletin of the Entomological Society of America. On the Island of Sardinia, an immense campaign to destroy the malaria carrying Anopheles labranchiae was mounted. This utilized chiefly DDT and was based on attacking the breeding areas and resting places near human habitation. The program was very costly, but finally was successful in bringing Anopheles labranchiae almost to extinction on that island. Unfortunately, it now seems that another species, Anopheles hispaniola, is replacing the former malaria carrier. It has been enabled to do this, because the aquatic larvae of this mosquito can stay in deeper waters and thus are not exposed to the surface insecticide which has killed Anopheles labranchiae, and the new pest does not use the resting places that are sprayed for control of Anopheles labranchiae. This is only one case of others cited in the article in which one pest has replaced another, when the newer insecticides are used. Obviously this is no direct argument against attempting to control pest species, but many advocates of large scale use of insecticides prefer to ignore this, while insisting that, without the newer insecticides, disease would be rampant and the human race would be starving.

We must always keep in mind that we are asking the question: Do the ends justify the means? Would the older insecticides have worked as well as the newer, if the same amount of research had been devoted to finding improved methods of application. The control of malaria in Sardinia by the annihilation of Anopheles labranchiae seemed to be a tremendous victory for DDT. However, in other parts of the world, malaria control has been achieved by draining the breeding places of mosquitoes, or by the use of home-grown pyrethrum plants to produce this insecticide, which is almost harmless to man and domestic animals. In short, the evidence so far does not prove -- if we use the rigid levels of proof demanded for hazards by the proponents of insecticides -- that the newer insecticides have been so much more efficient that they are absolutely necessary. However, for the sake of argument let us assume that they are and that certain insects must be controlled by these insecticides. We might then ask: Are there possible undesirable side-effects, if these are not used correctly?

What are the hazards to man?

It is quite natural that human beings should center their interest on themselves. However, when this becomes a matter of concern only for immediate human health, it may be short-sighted. As I hope to show the hazard to man directly may be, by far, a minor problem arising from incorrect use of insecticides. We should not underrate it, but also we should not believe that, if an insecticide could be so used that the danger to man would be eliminated, while other effects on the environment remained, all would be well.

We might just make a few remarks about toxicity of poisons, for this subject has been much misunderstood. Considering speed of action, poisonous effects may be classed as acute, or chronic. Acute effects are those that arise almost immediately; chronic effects are those that develop only after some time. To kill an animal with an acute dose, fairly large quantities of poison may be needed. With many compounds, however, continued feeding or injection of very small amounts over a long time can result in chronic poisoning; the animals gradually sicken and die. Chronic poisoning can be, in general, of two types: cumulative and pathological. In the case of cumulative toxicity, the poison accumulates in the body, until it ultimately reaches a toxic level. In pathological toxicity, the poison destroys or injures tissues in the body, and this destruction or injury continues until it oversteps the bounds of normal function.

Now, let us take DDT as an example of toxicity. The dose necessary to kill a human being acutely is relatively high. But, if DDT is taken in for a long period of time, the liver is gradually damaged in carrying out the destruction of the DDT. Slowly, liver cells are destroyed, and if these cannot be replaced satisfactorily, the liver fails. This pathological toxicity is supplemented by accumulation of DDT in the fat. Obviously this type of toxicity is difficult to diagnose and to study.

Another important factor in the toxicity of poisons is how they can enter the body. They may go through the skin, may have to be eaten and absorbed from the digestive tract, or may enter as vapors through the lungs. Obviously the amount needed to kill animals would be quite different in these three cases. Taking DDT as an example again, the rate of absorption of dry DDT powder through the human skin is so extremely minute that dry DDT powder can be put on the skin without risk. It is because DDT is selectively taken up by the skin of insects that it is potent against them. If, however, DDT is injected into a man, it is about as toxic for him as for insects. If taken into the digestive tract of man, DDT is also a reasonably toxic material. The exact toxicity level depends on how it is taken in -- the dry powder is relatively insoluble; if oils or fats are present, however, the DDT dissolves in these and is carried with them into the body. DDT has essentially no vapor toxicity. On the other hand, Chlordane, of the same class of insecticides, penetrates the human skin fairly easily, and is toxic as a vapor to both insects and man. These differences in action, depending upon the route of entrance, and on modes and times of action are what can lead to seemingly hopeless arguments between scientists in discussing the relative dangers of different insecticides.

Obviously, then, a complete study of all types of toxicity, even for one insecticide, is an expensive and time-consuming procedure. With drugs, which are to be taken into the human body directly, these elaborate tests must be carried out, even though long times are necessary to discover possible chronic effects. Even so, an occasional unfortunate incident, such as with Thalidomide, occurs. Since insecticides are not designed to be taken into the body, the laws regarding tests have not been nearly so stringent, and have left much to the discretion of the chemical companies. Obviously, they are under pressure to get the insecticides out, for most of these companies are working along the same lines, and new discoveries are apt to be made almost simultaneously. In the hope that, with correct warnings on containers or release only to qualified personnel, possible hazards will be eliminated, insecticides may be put out before adequate tests can be made.

Determination of acute toxicity, which usually involves merely the injection of increasing amounts of material into animals until the level producing death is discovered, are routine. It is these figures that are often given to indicate that insecticide A is less or more toxic than insecticide B. We now appreciate that such statements may give quite a false picture. Thus, insecticide A may, <u>acutely</u>, be less toxic than insecticide B, but, if taken in for a long time, insecticide A may be much more toxic than B. In some cases, an insecticide amy actually be non-toxic at low levels, no matter how long continued; in others not.

These are dire effects, however, and much more concern is felt by some doctors about subclinical effects, that is those that do not bring to person to medical care, but reduce the person's efficiency or make him more prone to diseases. Yet, testing for these chronic effects takes a great deal of time and money.

One year ago, the United States Surgeon General pointed out that only three insecticides had been given full toxicity tests. Yet, an average of three new insecticides is produced every month, and there are about 60,000 insecticide formulations on the market. In short, we are falling far behind in making adequate tests of the safety of insecticides. One might say that the large number of formulations does not mean anything, for these are composed of a relatively small number of insecticides. It is by no means so simple, however, for enhancement of activity in mixtures is something that is very well known to toxicologists. Two materials each of which by itself is relatively harmless, when mixed, may become quite harmful. Thus the various formulations should have some study also, because the mixtures might change the hazards to man.

It would be wrong, however, to leave the impression that, as far as direct hazard to man is concerned, the new insecticides represent a major threat. It is obvious that these insecticides have been in common use for about 15 years and human deaths from them have been very few. As a matter of fact, many of the cases which have been studied have been those in which human beings have accomplished or attempted suicide, or in which, as in the early days of DDT, someone anxious to show that he was a brave fellow swallowed a quantity of the material only to find that he had underestimated its potency. This is not to say that there are not some records of accidental deaths and injuries caused by insecticides. Again figures are hard to come by, particularly where deaths do not result. It has been reported that, in California, there were in a year 850 cases of accidental injury, with some deaths. These were mostly in agricultural workers, who accidentally spilled or sprayed materials on themselves.

It seems to me, however, that too much discussion of the human hazard has been given to the possibility that someone is going to get enough insecticide to be killed or injured immediately. Probably for most insecticides this need be a minor hazard if proper precautions are taken. The discussion has tended to dwell on this point, because it is the most dramatic. Much more important, however, may be the gradual accumulation of insecticides in the body, interfering with body functions, maybe not enough to cause death, but enough to weaken the person. All of us are now constantly exposed to insecticides that are fogged or sprayed, or are left on foods. The concern of the U.S. Public Health Service over the last has led, for agricultural products, to the setting up of so-called tolerances, that is, maximum amounts of insecticide residues that can be on foods if they are sold for human consumption. These limits are based on what is known about the toxicity, and often represent a compromise to allow use of the insecticide for the production of a specific crop. Most proponents of wide scale use of insecticides feel that the tolerance limits have been set too low. The more extreme of the anti-insecticide group feel that no insecticide at all should be on any food. This is the so-called residue problem in a nut-shell.

It is obvious that if one is to set tolerance limits intelligently, it is not only the acute toxic dose that he needs to know, but also the chronic dose, and the latter should be that producing even subclinical effects. As we have already noted, however, long times and expensive experimental procedures are needed to discover these; so very few insecticides have been completely tested. Here again, is an area in which arguments can rage back and forth. Proponents of large scale use of insecticides say that we may have to take some chances to save food and lives, in the belief that, if the worst comes to the worst, man may develop resistance as have insects. On the other hand, many people feel that we should take no chances, and that proofs of safety should be demanded from those who would put insecticides on our foods.

The matter has many facets. Thus, it is characteristic of DDT, and other chlorinated hydrocarbons, to accumulate in fatty tissue, for they are fat soluble. Rather large quantities of DDT can be stored in fat in a relatively inactive state for long periods of time. This can form a reservoir of potential hazard. For instance, in experimental animals with DDT in the fat, starvation, causing the animal to draw on its fat and so to release the DDT into the blood, can cause the animals to suffer acute intoxication from the DDT. In man, it is rather easy to test for exposure to DDT by sampling the fat, which can be done painlessly. In recent years, public health agencies throughout the world have tested fat samples from human beings, and in general they find that all, except in the most out-of-the-way places, contain DDT. In the United States, the over-all average is 5 - 8 parts per million of DDT in the fat; in agricultural workers, the average is 17 parts per million. In England, the average is only 2 parts per million; there, much stricter regulations have been made on use of insecticides. It is probable that these levels of DDT in the fat could be supported without damage, but one wonders what will happen in starvation, or where someone decides to reduce weight drastically and thus releases considerable DDT into the blood. It is interesting to speculate on whether the result that might be produced, which would be unlikely to be death, could be clearly recognized by ordinary medical checks.

The possible long-time effects of insecticides on man are little known. For instance, some people have allergic reactions to some insecticides or to materials used to dissolve them. To say that this is merely their own problem is to miss the point. The point is that an allergy caused by pollen, for instance, is not the result of man's actions. But an allergy caused by a man-made material, added knowingly to the environment, is something else again. I think it is fair to ask, for example, whether fogging large masses of insecticides -- most of which is not useful at all, because it is blown about in the wind and never reaches the insects -- to which let us say as few as 1/10 of one percent of the population is allergic, is justified.

Of more concern to many is the fact that some insecticides are members of classes of compounds which have known cancer-producing action. Thus, carbon tetrachloride is well known to produce cancer; indeed it is used in some laboratories to produce liver cancer in experimental animals. This takes very low doses over long periods of time. Now, carbon tetrachloride is a chlorinated hydrocarbon, as are DDT and many other insecticides. The question naturally arises whether these materials, if present for long times at low dosage levels, with an animal as susceptible to cancer as man is, might produce the disease. Again, we are faced with the question of how long we should wait to get the answer, before we use an insecticide that may control important medical or agricultural pests.

Possible vapor toxicity of many insecticides has generally been poorly studied. After all, it is quite difficult to determine how much is taken into an animal when breathing a vapor. Some insecticides, however, have significant vapor toxicity. For instance, we did some research on the vapor toxicity of Chlordane, with mice as experimental animals. Unfortunately, the box in which we sealed the mice with the vapor allowed the gas to escape, and thus we discovered, by accident, that it was harmful to human beings as well. Four or five of us who were working in the room with this box suffered from headaches while the experiment was going on. Almost all had their eyes checked, feeling that maybe the headaches were a symptom of a need for glasses. It was only when all compared notes that we discovered what was happening. With the removal of the Chlordane vapor from the room, all these harmful effects disappeared.

The question obviously is: Are we justified, considering what we know about toxicity to man, in using insecticides for broad scale insect control? The answer here is probably that we are. The insecticides -- if used with possibly a little more caution than heretofore -- do not seem to pose a significant immediate threat to man's life. If the question is raised about possible subclinical and long-range chronic effects, the answer is by no means so clear-cut.

To be continued

LETTERS: From D.M. Goudie, British Columbia, Canada, 1 Sept 1964.

"...As a result of Item:-Vol 26, No 2,page 12 /in THE ELEPAIO/ Wanted (2)(c) Wildlife experiences, I tender the enclosed /Survival/, a true experience in every detail. To me it was a remarkable demonstration of adaptability from the days when the buffalo bird used to follow the herds to take advantage of insects disturbed by clumsy feet. Their extreme tameness causes me to speculate that foster parents may have instructed Miss Cowbird that I was a friend. This last speculation stems from the fact that our white-crowned sparrows nested, but subsequently no sparrow fledglings were in evidence. Last year Mr. & Mrs. White-crown called me to remove a large garter snake climbing in the box-wood over their nest. Again they called me to help get rid of a tame crow with similar designs on the brood. Needless to say there was quite a lift in the trust they put in human help. Especially this human.

"In reply to your query; we are not on the flyway to Hawaii. We have looked in vain for sanderlings, ruddy turnstones and golden plover. We are on the mainland, on the inside passage east of Vancouver Island. I believe they travel the West coast of the island."

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SURVIVAL

The lawnboy started up with a business-like roar at the first pull. The front lawn had to be done, and I was mowing up and down the center, reefing the cuttings towards the outsides. Rounding the upper end I suddenly was brought to a halt of necessity for fear of scaring away, or even bumping into, a small bird that appeared out of nowhere that was obviously not the least bit scared of the commotion caused by the motor.

She was about 7" long, blackish beak and legs, jet black eye, predominantly fawn all over. Her back was faintly scaled and her breast and abdomen were lighter fawn with dark interrupted stripes. Her beak was not large and long like a starling's or short and stubby like a finch's bill, but medium.

She walked like a hen; not hopping, as one might expect from her size. In fact she was poised and elegant, with the foot-work of a boxer; advancing with one foot outthrust, followed by the other when she was sure she would not be caught off balance in the in-fighting for the earthworms which had been outraged by the vibration of the mower overhead.

As the lawn was cut she kept close to me and became used to my reassuring voice, cocking her eye up at me in the most trusting manner. In fact, it was not possible to give her the slip, because I was pushing around a noise-maker which she had come to associate with a well-balanced diet.

When a free and natural creature puts its trust in me, sensing instinctively that I will not harm it, then I become a fall guy. I had thought it was a female starling at first glance. Now I was sure it was a female cowbird, our smallest blackbird. If it had been a starling, it surely would have sensed my strong resentment to that pest's invasion which is deluging our B.C. countryside. Now that I had established that it was a cowbird, (how many many times have I taken their parasite eggs out of helpless chipping sparrows' nests?), this being friendly to me was a distinctly unfair tactic.

My neighbour talked across the fence to me. We discussed the chances of survival with so many cats about. Miss Cowbird walked onto the terrace and stood between us, patiently listening, waiting for me to resume foraging for her.

The land breeze slid slowly along the ground and over the terrace wall, dropping into the patio. WOW!! Up over the wall rocketed a white apparition with flailing paws and lashing tail. The explosion invoked warnings and help from all sides. Miss Cowbird streaked around the corner out of sight. After preliminary chastisement, so did the cat.

What were the chances! Oh well----we would have to wait and see.

Ten minutes later, cutting the last little trimmings at the other end of the lot, outside the gate, a silent little person, not a feather ruffled, flew in to a landing at my feet, looked up. "Well, when do we get the next worm?," the enquiring eye seemed to say.

There was a warm feeling. She had survived.

July 29, 1964

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From Mrs. Helen Y. Lind, 934 Kealaolu Ave, Honolulu, Hawaii

Mrs. Lind responded to our call for information on materials to help junior members and teachers.

In 1956, when the Cub Scout Pack #116 at Kahala was newly organized, she prepared a mimeographed outline for bird watching (emphasis on the backyard birds of Kahala) to be used by the adult leaders. This material was used in lieu of the "Mainland bird" program found in the regular Scout literature. She also prepared a coloring sheet of "Common Birds of Kahala." The Scouts sat on the lawn and colored by observing the birds in action. The birds used were the N.A. and Brazilian cardinals, mynahs, English sparrow, and white-eye.

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Field Trip, Aiea Loop, August 9, 1964.

The August 9 field trip, scheduled for the Poamoho Trail, was diverted to the Aiea Loop when we could not get definite assurance from the military that we would not be considered targets or at least trespassers.

The trip got underway at about 9 o'clock from the picnic grounds at the end of the paved road. Five visitors and five members made up the party. The weather was clear and bright, but a fine mist kept blowing in from the Koolau summit.

We had the good fortune to be able to observe the leiothrix and the elepaio at close range for considerable time near the point where the Aiea trail loops over into the Halawa trail.

The following is a list of the birds recorded by Miss Kojima:

Amakihi	18	Brazilian cardinal	9	Chinese dove	1	Mynah	1
Apapane	5	N.A. cardinal	3	Leiothrix	10	Ricebird	26
Elepaio	8	Barred dove	2	Linnet	3	White-eye	8

Maurice V. King, Jr.

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NOVEMBER ACTIVITIES:

November 8 - Field trip to study shore birds. Bring lunch, water, and if possible, your car. Transportation cost ($1.00) to be paid to the drivers. Meet at the Library of Hawaii at 7:00 a.m. PLEASE NOTE TIME
Leader: Mike Ord, telephone: 587-328

November 9 - Board meeting at the Honolulu Aquarium Auditorium at 7:30 p.m. Members are always welcome.

November 16 - General meeting at the Honolulu Aquarium Auditorium at 7:30 p.m. 1964 Christmas bird count will be the topic for the night. For further information call Mike Ord, telephone: 587-328.

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MAILING ADDRESS: P.O. Box 5032,
Honolulu, Hawaii, 96814

DUES: Regular - $3.00 per annum, Regular out of State - $2.00 per annum, Junior (18 years and under) - $1.00 per annum, Life - $50.00.