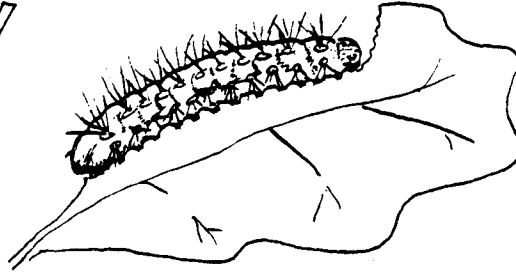


THE GYPSY MOTH

A HOMEOWNERS GUIDE

PUB. P-3



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For: **Citizens for Lexington Conservation**
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When we think of Springtime in Lexington we are likely to envision Robins singing, honeybees visiting the apple blossoms, daffodils nodding in the breeze. Maybe even a furry caterpillar on a green leaf. But who would ever expect to see ten thousand caterpillars on a single tree? This spectacle may well be encountered in parts of Lexington this year due to the current population boom of the Gypsy Moth. Each homeowner who has trees which might become infested should keep an eye out for Gypsy Moth activity and should be aware of the options which are open to him if the caterpillars appear. This information bulletin is intended to help the homeowner recognize the Gypsy Moth and respond calmly and rationally to any infestation which may affect his property.

Where does the Gypsy Moth come from?

The Gypsy Moth is an insect which has become a household word in many areas of New England. It is actually far removed from its native home in Europe and Asia. It was accidentally introduced into the United States in 1869 by a scientist in Medford, Massachusetts who brought it here with the idea of finding a new source of silk. The Gypsy Moth escaped from his laboratory and, lacking the predators and other natural controls which kept its numbers in check back in Europe, was able to quickly establish itself as a pest. Despite many years of expensive efforts at eradication and control, the Gypsy Moth has spread throughout the Northeast and is here to stay.

Is the Gypsy Moth a moth or a caterpillar?

Its both. The Gypsy Moth goes through a number of different stages during its life cycle, though it is most noticeable during its caterpillar stage. Starting in late April the overwintering eggs start to hatch into tiny caterpillars. These young caterpillars climb to the top of their host tree and suspend themselves on silken threads. As the wind catches these strands they may be carried from one tree to another. Sometimes they are carried only a short distance, but in strong winds they may travel miles. For several weeks the caterpillars feed upon tree leaves (each caterpillar eating about 25 leaves). Then they enter a pupal stage. From this stage they emerge as moths. The moths exist solely to reproduce - they do not

eat during their brief lifespan. Each female moth will lay an egg cluster which contains from 75 to 700 eggs. The egg masses, which are visible throughout the winter, resemble tan to rust-colored patches of sawdust approximately 1 to 2 inches long.

What trees will the caterpillars attack?

Gypsy Moths feed on a number of different trees, but they do have certain preferred types. They prefer deciduous woodland species such as Oaks, Birches, Willows, Apples, and Basswood. In severe infestations in which preferred species are denuded, the older caterpillars may turn to other deciduous species and to evergreens.

What happens if my tree is defoliated? Will it die?

Deciduous trees are usually not affected by defoliation until more than 50% of their leaves are lost. Even after complete defoliation, a normally healthy deciduous tree will usually leaf-out again in a matter of weeks, showing little sign of its former leafless state. If the tree is strong, it can probably withstand several years of defoliation without suffering permanent damage. But if the tree is already weak or dying, it may be unable to recover from a severe defoliation. The more years in succession in which significant defoliation occurs, the more likely it is to damage the tree.

Softwoods (Pines, Spruces, and Hemlocks) do not tolerate defoliation well. Only the strongest pines can survive a complete defoliation. It is fortunate that Gypsy Moths normally bypass these species.

How can I tell if I have a "weaker" tree?

Suburban trees may be stressed by various factors such as road salt, herbicides, pavement over root systems, air pollution, and lack of water. Trees growing on dry rocky hillsides are usually not as strong as those growing in deep moist soil. Trees with a number of dead limbs are probably already dying and may be susceptible to further damage by defoliation. As will be pointed out later, a homeowner can often turn a weak tree into a stronger one by proper fertilization and watering.

What about our forests and woodlands? Will Gypsy Moths damage them?

In our type of woodlands, Gypsy Moth infestations tend to merely weed out the weaker trees which would have been crowded out anyway in a few years. This gives the stronger trees room to grow and the end result is to speed the natural succession of developing forests toward a stand of fewer but larger trees. The resulting forest is generally more diverse and more resistant to future Gypsy Moth invasions as well.

How long will the Gypsy Moth outbreak last? Can we eradicate them?

Typically the infestation lasts only two or three years. A sudden collapse generally occurs due to bad weather, starvation, or the outbreak of a virus disease which sweeps through the population like wildfire. After this many years may go by without noticeable moth activity. There appear to be no control measures which can be taken to cause this collapse to occur any sooner. In fact, extensive efforts to kill caterpillars sometimes merely keeps their population within the limits of the food supply and prolongs the infestation. Control efforts are more wisely spent in selectively protecting trees from damage until the population collapse occurs.

What about natural enemies of Gypsy Moths? Can they help?

The U.S. Department of Agriculture has introduced a number of Gypsy Moth natural enemies from Europe into the United States. Some of these have become well established and are quite beneficial in slowing the spread of the moths and reducing the duration of infestations. Especially important are parasitic wasps and flies which attack both Gypsy Moth eggs and caterpillars. Large predatory beetles (such as the Calosoma beetle) kill many caterpillars. The White-footed Mouse has been found to be an important predator of the caterpillars as well. Birds such as Chickadees, Blue Jays, Orioles, Catbirds and Cuckoos will eat caterpillars.

If only a few Gypsy Moths invade your property, these natural enemies may well wipe them out and prevent an infestation. But if a real outbreak gets underway, these natural controls may be overwhelmed. Hence the natural enemies should be encouraged as preventative measures - but they cannot be expected to halt a severe outbreak by themselves.

What should I do about Gypsy Moths on my property?

Before spending time and money on control measures, it is wise to think about just what you are trying to achieve. If you think your trees are strong enough to withstand defoliation and that the temporary nuisance of the infestation will not disturb you, then doing nothing may be a reasonable choice. If you decide to implement controls, then you should establish priorities. Which trees are more valuable? Which are weak enough to be damaged by defoliation? If trees were significantly defoliated the previous year, they may deserve a little extra care. Trees along public ways will probably be protected by the Town. So you may wish to concentrate on the trees which are back from the street.

Can I just pay someone to spray my trees with insecticides?

This is the most expensive control option, but it will prevent defoliation if done properly. Pesticide applications must be timed to occur after the caterpillars have started feeding but before defoliation occurs. Rainy or windy weather will delay spraying. Many commercial arborists are overbooked for the Gypsy Moth season, so finding an applicator may be difficult. You may have to commit yourself before you are sure that the spraying will really be needed.

If you decide to hire a commercial applicator, it would be advisable to ask about the type of pesticide being used. The chemical insecticide Sevin (carbaryl) has been rejected by a number of towns and governmental agencies due to concerns over its potential health effects. It should also be kept in mind that chemical insecticides will kill the natural enemies of pests and may result in other problems later with other pests - so keep spraying to a minimum.

Can I use insecticide myself?

Most homeowners are poorly equipped for the safe and effective use of insecticides on shade trees. However, the bacterial insecticides containing Bacillus thuringiensis (such as Dipel and Thuricide) appear to be quite safe for use by even inexperienced persons. This material must be sprayed directly onto the leaves and not upon the caterpillars (the caterpillars are killed only after they eat a piece of a sprayed leaf). This is the material which is being used by the Town of Lexington on roadside trees. The main limitation the homeowner will encounter is the inability to completely cover all the leaves in taller trees.

What about non-toxic control measures?

There are several control measures which do not involve spraying. These are described in the attached table entitled "The Homeowner's Guide to Do-it-yourself Gypsy Moth Control". Destroying egg masses is one of the simplest and effective ways of reducing the level of the infestation. A combination of techniques usually works best. If you don't want to take care of it yourself, you might consider hiring neighborhood youngsters to destroy egg masses or trap caterpillars for you.

I just can't stand the sight of all these caterpillars!

No matter what control measures we apply, there will still be plenty of caterpillars in view. If you are one of those people who think "worms" are incredibly ugly, perhaps you will feel a little better if you keep reminding yourself that it's only a temporary phenomenon.

THE HOMEOWNER'S GUIDE TO DO-IT-YOURSELF GYPSY MOTH CONTROL

TIME OF YEAR	WHAT'S HAPPENING	WHAT TO DO
September - late April	Gypsy Moth egg masses are overwintering. Each egg mass contains 75 to 600 eggs which will hatch in late April. Eggs are being eaten by woodpeckers, chickadees, and mice. They are also being parasitized by small wasps. The wilt virus disease incubates in eggs over the winter.	Destroy as many egg masses as possible by painting with creosote, kerosene, or turpentine. Or scrape them into a can and burn or bury them. (If you just scrape them off onto the ground, many will still hatch.) As few as 10 egg masses can produce enough caterpillars to significantly defoliate a tree, so dispose of all you can safely reach.
Late April- mid May	Eggs hatch and the young caterpillars climb to the tree tops and hang from silken threads. The wind may blow them into new areas. They feed by day and rest under leaves at night.	If you find caterpillars still hatching, kill as many as possible: once they climb up the trunk, they will be out of reach. Cold rainy weather at this stage keeps them from feeding and may starve many.
late May - early June	Caterpillars have grown larger and are now capable of defoliating trees. At this stage they feed at night and descend to hide under leaf litter during the day (although in very heavy infestations they may feed both day and night). They can move from one tree to another only by crawling - hence they can't disperse far at this stage. In cases of heavy infestations, where preferred tree species are denuded, they may begin to feed on evergreens.	Use rope or twine to tie wide strips of cloth (such as burlap) about the trunk at a convenient height. Fold the top half down to form a skirt (see Figure). Caterpillars will seek out the fold as a daylight resting place. Each day knock them off into a bucket of soapy water and dispose of them. Put a band of tree wrap* or aluminum foil around the tree trunk. Apply a strip of Tanglefoot* on this band. This sticky substance will trap caterpillars trying to climb the trunk. As above, destroy caterpillars which become trapped. This is an effective way of preventing the larger caterpillars from feeding on evergreens.

* Available at garden supply stores

TIME OF YEAR

WHAT'S HAPPENING

WHAT TO DO

July-August

Leaf-eating stops and the caterpillars are transformed into brown, hard pupae. After a couple of weeks the adults emerge as moths. Mating occurs and eggs are laid. Pupae are eaten by birds and White-footed Mice. They are also attacked by beetles and wasps.

Continue to destroy caterpillars. Destroy as many pupae as can be found. Knock egg-laying females off trees with a hard stream of water from a garden hose.

Before Summer

Defoliated trees need nutrients to replace leaves which may be eaten.

Fertilize and water trees to help them replace lost leaves. Get good advice on how and when to fertilize.

After the infestation

Natural controls are suppressing new outbreaks.

Diversify your plantings. Consider species which Gypsy Moths dislike such as Ash, Balsam Fir, Walnut, Catalpa, Juniper, Locust, Red Cedar, Sycamore, Rhododendrons, Tulip Tree, Holly, Arborvitae, Mountain Laurel, or Horse Chestnut.

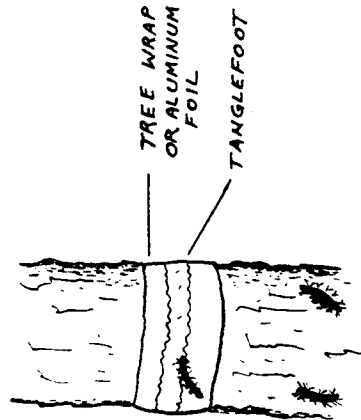
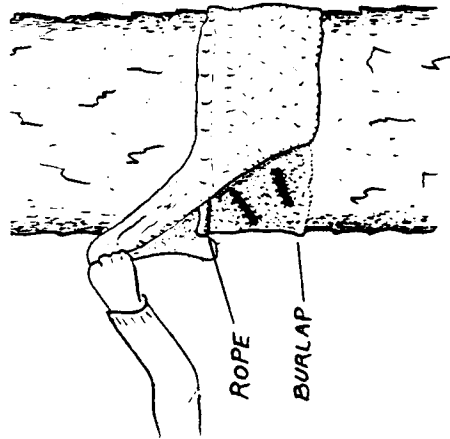
If you have a small woodlot, leave some leaf litter on the ground to provide cover for White-footed Mice, shrews, and other natural enemies of Gypsy Moths.

Put out winter feed or nesting boxes to encourage insectivorous birds in the vicinity.




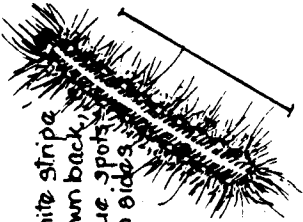
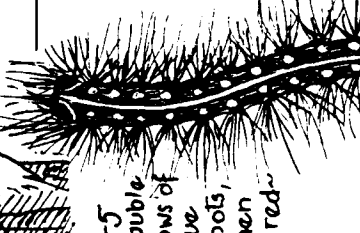




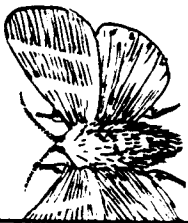

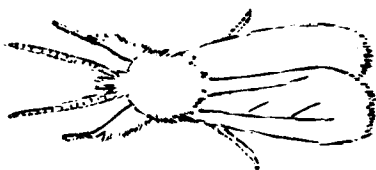
Road salt, herbicides, and pavement are all sources of stress for trees. Try to keep them away from your important trees. Remember that the healthier the tree, the faster it can recover from defoliation.



GYPSY
MOTH
EGG
MASS




TREE WRAP
OR ALUMINUM
FOIL
TANGLEFOOT

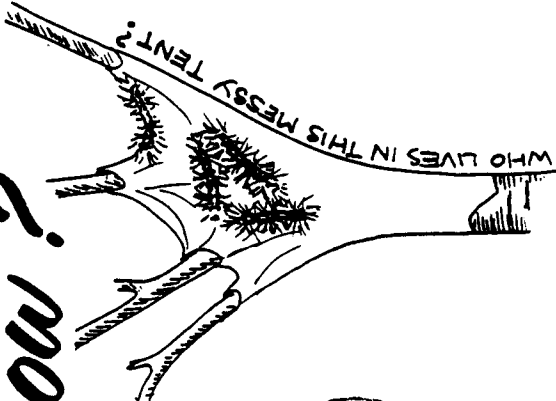
EGGS	<p>TENT CATERPILLAR</p>  <p>Dark varnish-like finish around twig.</p>	<p>GYPSY MOTH</p>  <p>Buff colored ~ cover hard round egg.</p>	<p>FALL WEDWORM</p>  <p>Covered with white hairs - on underside of leaf.</p>
LARVA	 <p>White stripe down back, blue spots on sides.</p>	 <p>4-5 double rows of blue spots, then 6 red.</p>	 <p>Color varies ~ distinctive black spots.</p>
PUPA	 <p>White silken Cocoon attached to bark.</p>	 <p>Dark brown ~ attached by a few threads.</p>	 <p>Pupa in cocoon in soil.</p>
ADULTS	 <p>Buffy with white stripes on fore wings.</p>	 <p>♂ dark ~ About life size ~ ♀ light ~</p>	 <p>white, sometimes with spots.</p>

M.S.S.

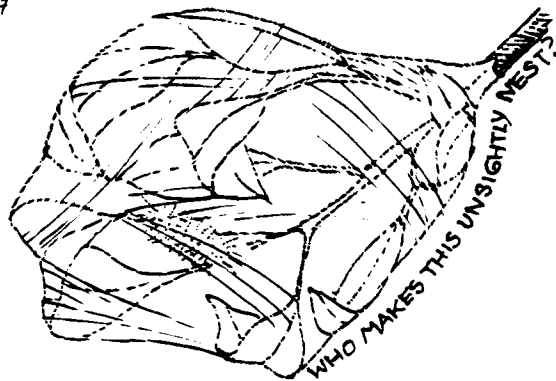
? Do You Know ?



WHO EATS OAK LEAVES?





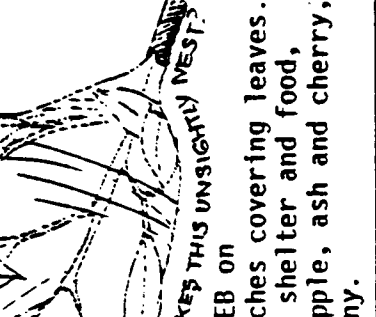
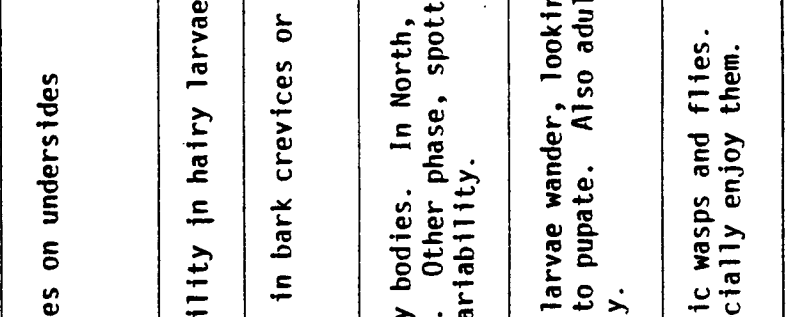
WHO LIVES IN THIS MESSY TENT?



WHO MAKES THIS UNSIGHTLY NEST?

For more information write:
PUBLIC SERVICE INFORMATION
MASSACHUSETTS AUDUBON SOCIETY
LINCOLN, MASSACHUSETTS 01773



OBVIOUS SIGNS OF CATERpillARS & FOOD PREFERENCES	TENT CATERPILLAR SPRING	GYPSY MOTH JULY	FALL WEBWORM LATE SUMMER
MGS	 <p>WHO LIVES IN THIS MESSY TENT?</p>	 <p>WHO EATS OAK LEAVES?</p>	 <p>WHO MAKES THIS UNSIGHTLY NEST?</p>
MGS	<p>TENT in crotch or fork of tree which serves as shelter from storms and noonday sun. Larvae eat preferably wild cherry or apple outside the tent.</p>	<p>SKELETONIZED LEAVES Preferred foods are oaks, willows, birches and many others. Older larvae eat also pines, hemlocks, spruces and many more.</p>	<p>WEB on ends of branches covering leaves. Web provides shelter and food, preferably apple, ash and cherry, for the colony.</p>
LARVAE	<p>Band of 300-400 eggs encircling twig. Rounded ends and coating of waterproof "varnish". Eggs hatch about May 1.</p>	<p>Laid in masses with covering of buff colored scales from abdomen of female.</p>	<p>Laid in masses on undersides of leaves.</p>
PUPAE	<p>The hairy larvae with 4 red lines and a row of white spots.</p>	<p>Very hairy with rows of spots, 4-5 blue, then six red.</p>	<p>Great variability in hairy larvae.</p>
ADULTS	<p>Oval silken white cocoon held in place by irregular threads.</p>	<p>Conical, dark brown pupa about 1" long attached by a few threads.</p>	<p>Loose cocoon in bark crevices or loose soil.</p>
DISPERSAL	<p>Appear in early summer as robust, hairy moths, dull-yellowish or reddish-brown with simple wing pattern and feathery antennae.</p>	<p>Brown (male) and larger white (female) moths emerge in July and August. Females almost never fly.</p>	<p>Densely hairy bodies. In North, mostly white. Other phase, spotted with great variability.</p>
PREDATORS	<p>Fully grown larvae wander, looking for a place to pupate. Also adult moths can fly.</p>	<p>Very small, but long-haired larvae spin silken threads from leaf edges and are carried by the wind up to 20 miles.</p>	<p>Fully grown larvae wander, looking for a place to pupate. Also adult moths can fly.</p>
PREDATORS	<p>Many natural enemies. Cuckoos like them and 40 more species of birds eat them.</p>	<p>A European species which has now developed some parasites and predators.</p>	<p>Many parasitic wasps and flies. Cuckoos especially enjoy them.</p>



FALL WEBWORM

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The fall webworm (*Hyphantria cunea* (Drury)) is a small white moth about 1½ inches in size whose larvae are responsible for the unsightly tents which have appeared in many trees this summer. The tent caterpillar (*Malacosoma americana* F.) is a different species altogether. Tent caterpillars spin their tents in early spring as soon as the leaves begin to unfold and have become adult moths by summer. Fall webworm caterpillars, on the other hand, are active in the late summer and early fall. They occur over most of North America and are always present in low numbers. This summer we have experienced an unprecedented outbreak of them.

In our area fall webworms have one generation a year. The larvae hatch during the summer from eggs, laid on the undersides of leaves. Soon after hatching, they spin a 'tent' to protect themselves, enlarging it as they grow to include more and more foliage to feed on. In late summer or early fall they leave the web and fall to the ground where they pupate in the leaf litter. They over-winter as pupae and the adult moths emerge the following June or July to lay their eggs and begin the cycle again.

Fall webworms attack over 100 species of plants. Fortunately, one of their favorites is the wild cherry or choke cherry, a short-lived 'weed' three of little value, prominent along roadsides and other rights-of-way.

As with most other insects, the number of fall webworms present in any particular year varies widely and control is dependent on a variety of factors. Weather, the presence of bird and small mammal predators, food supply and the abundance or scarcity of insect predators all influence the magnitude and severity of their outbreaks. One entomologist theorizes that this year's population might be the result of a lack of insect predators caused by weather conditions. Regardless of the cause of the outbreak, you should rest assured that it will be self-limiting. As with the oakleaf skeletonizer outbreak in 1970, the population will reach a certain level, then decline, subject to natural controls.

As these outbreaks are self limiting, we recommend no widespread action for the eradication or control of fall webworms. If you have 'webs' on your trees and wish to remove them, a practical method is to destroy the web with a stick. On a taller tree the webs can be broken up with water under pressure from a hose. The breakup of the web and consequent exposure of the larvae to the elements is usually sufficient to control them. However, as an additional measure, the area that was enclosed by the web can be painted with liquid roofing tar. If incineration is available and the portion of the tree involved is not large, the affected branches can be cut off and burned.

Many trees, particularly those in cities and inner suburbs, are subject to poor growing conditions which add to the stress caused by insects. Soil compaction, air and salt pollution, and lack of water due to paving each add their burden. Watering and feeding your trees regularly will help to offset these poor conditions. For further information about insects and trees send 10¢ and a self addressed, stamped envelope for Suburban Birds and Forests or \$1.50 plus 30¢ postage for The Suburban Woodland to the address above.



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OAK LEAF SKELETONIZER

The oak leaf skeletonizer (Bucculatrix ainliella) is a small moth whose larvae feed on the leaves of oak trees. Its food plants include red, black and white oaks.

There are two generations of skeletonizers a year in eastern Massachusetts, with the moths active during the latter half of May and late in July and early in August. The eggs are laid on oak leaves and the yellowish-green larvae feed during June and early July and from late August until frost. When they hatch, the larvae first burrow inside the leaf and feed but as they mature they emerge to graze on the surface. Ultimately they eat the whole leaf except for the ribs (hence their name) and grow to be about 1/4 inch long. Ordinarily, quarter-inch caterpillars wouldn't be noticed, but when it is time to pupate, they disperse by spinning down from the oak trees on long, silken threads. These dispersing caterpillars and their threads are often more troublesome than the defoliation of the trees. Their cocoons are spun on fallen leaves or debris on the ground and sometimes on the trunks of trees.

Like many other insects, the oak leaf skeletonizer population has spectacular ups and downs. Most of the time it is present in low numbers but periodically, it escapes from natural controls and breaks out in great numbers. This has happened recently in Massachusetts in 1961, 1969, and 1970.

Oak leaf skeletonizers, like other living things, exist in a complex web of relationships within the suburban woodland. Their numbers are controlled by predators, including other insects, birds and small mammals, parasites, weather, disease and food supply.

In general, an outbreak of oak leaf skeletonizers, even a severe one, does not permanently damage or kill oak trees. Crowded or drought-stricken trees, or street trees weakened because of a lack of water and nutrients or salt contamination, are naturally less able to withstand insect attacks than healthy trees. But the relationships between plants and their insect enemies have evolved over long periods of time and the very fact that oak trees are a prominent feature of New England vegetation attests to their ability to survive insect attacks.

We recommend no action against the oak leaf skeletonizer. Like so many other insect outbreaks, that of skeletonizers will subside due to natural controls and the majority of oak trees will recover. The use of an insecticide against oak leaf skeletonizers will kill many beneficial insects, including the insect predators and parasites which help keep the skeletonizers and other harmful insects in check. In addition, spraying during the spring and early summer, when many birds and small mammals have young, reduces their insect food supply just at a time when they need it most. If you feel you want to do something to assure that your trees will stand up well against insect attacks — watering and feeding them regularly will keep them healthy and resistant. For further information about insects and the suburban woodland, send 10c for our pamphlet, Suburban Birds and Forests or \$1.50 for our booklet, The Suburban Woodland.