

THE GYPSY MOTH



*Nature's
Ecology
Disrupter*

A GAIN IN 1971, gypsy moth caterpillars are expected to cause widespread damage throughout much of the Northeast, and the foliage of oak, birch, basswood, maple, apple and other hardwoods is high on their list of favorites.

Concerted efforts by state and federal authorities, custom applicators and concerned citizens have so far limited the range of this voracious insect to most of New England and New Jersey along with eastern areas of New York and Pennsylvania. It seems likely, however, that it will eventually break out of this confinement. To some extent, in fact, it already has since Somerset County on the Pennsylvania-Maryland line was last year officially declared an infested area. This marks the most westerly reach of the gypsy moth and poses an ominous threat that creeps ever nearer to the 100 million acres of valuable hardwood forests in the Ozark and Appalachian mountain ranges. Widespread defoliation in these areas could very easily lead to alarming losses that would have serious economic effects on timber and timber-related industries.

Last year, gypsy moth caterpillars partially defoliated almost one million acres of trees. This represents an area considerably larger than that encompassed by Rhode Island. In New Jersey alone, 130,000 acres were stripped while almost 370,000 acres in Connecticut were subjected to similar damage. New York's losses were extended over 430,000 acres of leaf canopy.

Obviously, this kind of damage drastically alters our environment and upsets the ecological balance. Dead and dying trees offer songbirds and game insufficient shelter, forcing them to move elsewhere. Snakes—including poisonous species—are driven by higher ground temperatures to lower altitudes and thus closer to man. Campsite cover and watershed protections are destroyed and rain causes erosion. In addition to creating severe fire hazards, dead and dying trees destroy the beauty of our woodlands.

Naturalist Brought Moth to U.S.

The tragic fact is that the gypsy moth is not even native to this country, having been imported from Europe to Medford, Mass., in 1869 by a French naturalist who was attempting to crossbreed it with silkworms. A quirk of fate caused

a cage of these caterpillars to be smashed in a windstorm, enabling them to escape into surrounding woodlands. Thriving in an environment virtually devoid of natural enemies, the gypsy moth increased rapidly. By 1880, almost 400 square miles around Medford had been heavily infested.

The life cycle of this insect begins in late April and early May when an average of 550 tiny caterpillars hatch out of their fuzzy, buff-colored egg cases. Climbing at once into the tops of preferred trees, they begin feeding on leaves, moving downward as they grow larger on thin silken strands to feed on foliage at all levels. When hardwood foliage is in short supply, these pests will turn to the needles of hemlock, pine, spruce and other evergreens. Whereas two or three defoliations are usually sufficient to kill hardwoods, a single stripping is fatal to evergreens.

While still in an early growth stage (or instar), caterpillars are small enough to be swept off strands and carried by winds from hilltop to hilltop—often for distances of up to 50 miles. As fully grown caterpillars, they measure about two inches in length and can be readily identified by the rows of blue and red spots on their dark brownish bodies which are covered with such stiff hairs that birds won't eat them. If they fall into water, fish will reject them for the same reason.

After a feeding period that lasts up to 10 weeks, caterpillars go into their two-week pupal stage from which they emerge as moths. In this adult form they mate, and during late July and early August the females deposit egg cases on convenient sheltered surfaces such as tree trunks, stone walls and fenceposts, thus completing this vicious cycle. Unfortunately, however, female moths don't limit egg-laying locations to stationary objects. They'll also lay eggs on cars, trailers, trucks, boats and even in the wheelwells of jet aircraft. This is what makes efforts to control the range of these pests so difficult.

Even though stringent quarantine measures continue to be enforced each year by all nine states currently known to harbor gypsy moths, traps put out last year under state supervision caught male moths in Virginia, Maryland and Delaware. Inspection teams in Florida, Minne-

sota, Texas, Wisconsin, Virginia and California destroyed egg masses found on vehicles—all of which had passed through infested camping areas in New England.

But sheer luck is not enough to prevent gypsy moths from striking out trees. Clearly, a sensible control program must be maintained if these insects are to be held in check. However, chemical control is only one answer to a complex problem that also demands what the New Jersey Department of Agriculture calls an "integrated approach." As the term implies, this supplements so-called natural controls with the use of chemicals as a means of checking insect damage but not at the risk of upsetting the balance of nature or altering the ecology.

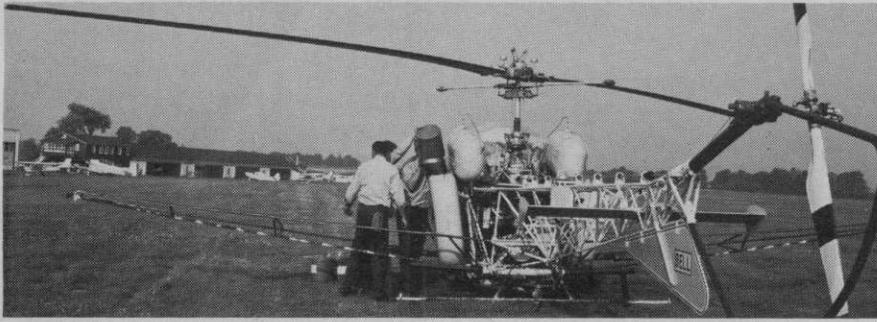
Control Approaches Varied

Federal and state authorities continue to work with natural controls and are raising and releasing parasites, predators and sterilized male gypsy moths in the hope that they will substantially reduce populations of this pest. Work also continues on insects sex attractants and insect disease organisms. But these undertakings are expensive to maintain, and William Gillespie, Assistant Commissioner of Agriculture in West Virginia and chairman of the National Gypsy Moth Advisory Council, has stated that the \$360,000 being spent annually for these purposes will have to be augmented by an additional \$875,000 each year for the next five years if results are to remain favorable. Furthermore, there is little reason to assume that these natural controls will ever entirely replace chemicals.

The current public outcry against the use of chemical pesticides would have us believe that we can dispense with these materials entirely. But the matter is not that simple. And while the debate rages, gypsy moths and other forest and shade tree insects continue to devastate our landscape. With nationwide restrictions against the use of DDT in effect, federal, state and municipal authorities have been compelled to find suitable substitute insecticides that offer acceptable insect control and yet are compatible with current environmental concerns.

Sevin carbaryl insecticide appears to be one of the answers, and again in 1971 this product is to be included in many public spray pro-





This is the type helicopter rig used by New York's state conservation department in its Gypsy Moth control program.

mulations can be applied by air and also through ground equipment such as modern high-pressure sprayers and mist blowers.

The New York Program

Here is the approach being taken to combat gypsy moths in New York.

Commissioner Henry L. Diamond says the Department of Environmental Conservation will undertake landowner surveys in the lower Hudson Valley and on Long Island to determine those areas eligible for aerial spraying. Aerial spraying is one element of a "controlled multi-faceted program," he says.

"It is the professional judgment of the Department that a carefully regulated spraying operation should be conducted in the Lower Hudson Valley and on Long Island, beginning in mid-May and running for six to eight weeks. The extent of the spraying program will be based on landowners' consents, the size of the eligible tracts and funds available."

Other aspects of the Department's gypsy moth control program include:

- Reliance upon natural biological controls such as a gypsy moth egg parasite to keep in check the infestation in Essex County in the Champlain Valley.

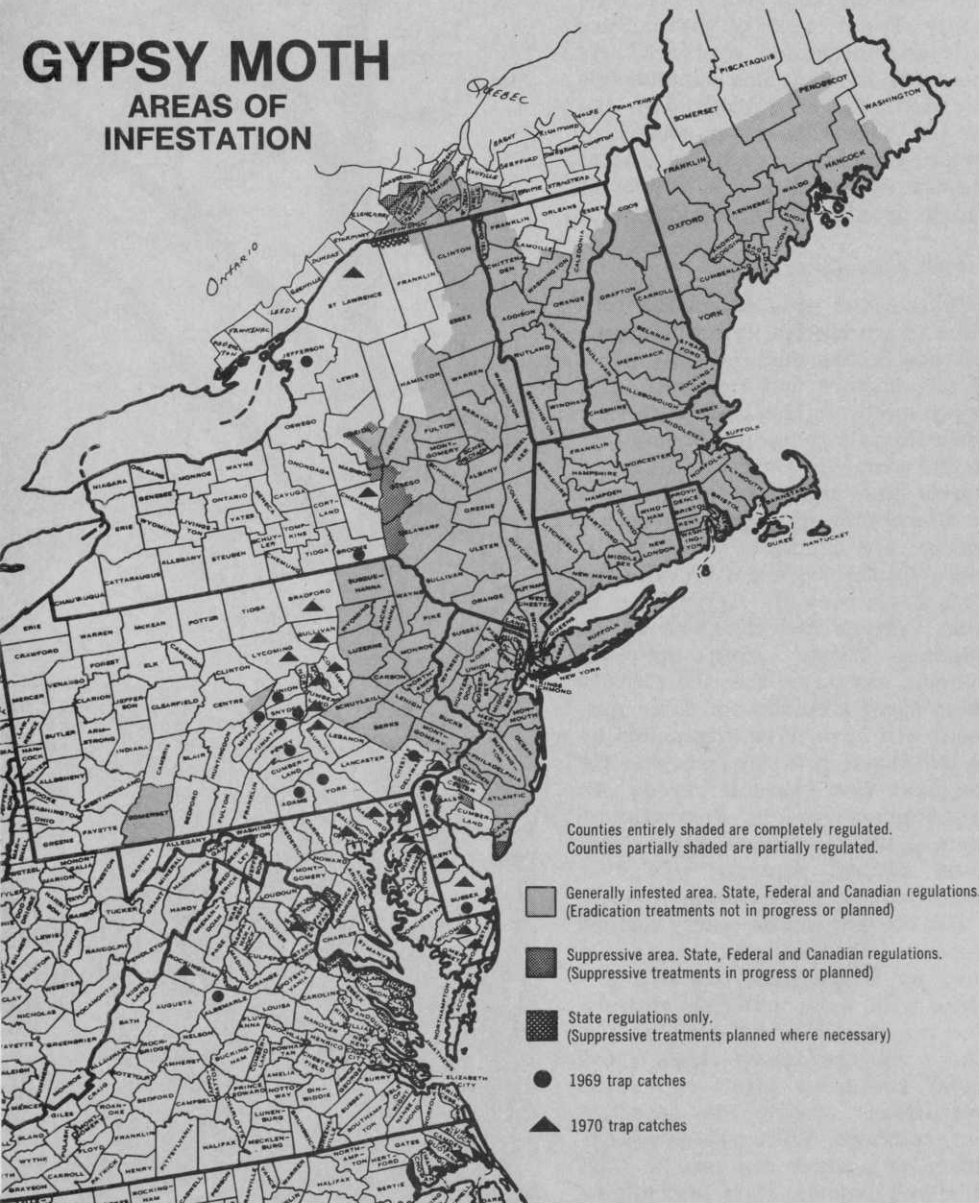
- Large scale experimentation on the use of the "sex attractant" and continuation of experimental work on other biological controls with emphasis on methods of inhibiting natural reproduction of the gypsy moth.

The spraying program would be an effort "to hold the line while we pursue a research program to develop adequate biological controls," the Commissioner says:

The aerial spray program would use a single application of the pesticide Sevin and would be undertaken with the approval of landowners. Spray blocks of less than 50 acres in size cannot be treated by air.

The intent of the spray program is to reduce the numbers of gypsy moths from their present epidemic levels to a point where natural biological controls may be effective. Similar spray programs in previous years have resulted in at least a 90% reduction in the gypsy moth population in areas treated only one time. It is hoped that in these treated areas, biological control in the form of a gypsy moth egg parasite—*Oencyrtus kuwanae*— and the introduction of other parasite species will provide the so-called "stacked control" required to keep

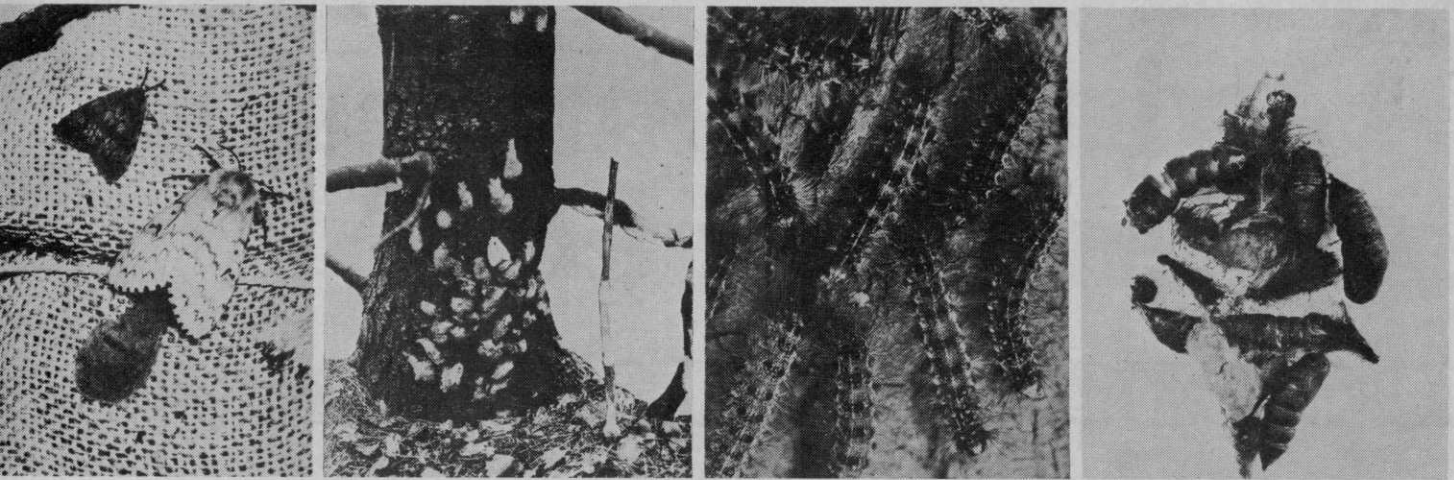
GYPSY MOTH AREAS OF INFESTATION



grams. Introduced in the United States 13 years ago, Sevin has been used all over the world to control many destructive insect species attacking 90 different crops and also trees, turf, flowers and shrubs. Sevin provides effective control and is not persistent. It does the job and then quickly breaks down into harmless components that do not

pollute water, soil or air. It is low in toxicity to man, birds, fish and other wildlife.

Several different formulations of Sevin are available for tree protection spray programs undertaken by custom applicators and governmental authorities. These include both wettable powders and liquid-type concentrates. Each of these for-



Identification from the left: Female gypsy moth (white) and male gypsy moth (gray); femal moths laying eggs on a tree; gypsy moth caterpillars (in late instar) hatch and feed on leaves; then go into pupal cases from which they emerge as moths.

the gypsy moth in check.

According to experts in the Department of Environmental Conservation Bureau of Forest Insect and Disease Control, *Oencyrtus kuwanae* can be employed to reduce infestations about 25% annually. This technique, therefore, is suitable for epidemic, or low level infestations and is used under those conditions.

Experimental work on other biological controls in addition to parasite and predator attacks on the

moth is being explored by the Department. Two of the most interesting attacks focus on a reproductive inhibiting technique.

One method is to synthesize the scent which female moths use to attract male moths for mating. This synthetic attractant is employed as bait in a trap. The hapless males follow the scent and are captured, thus removing them from the breeding population.

Experimentation with this "trap"

approach is planned for the Binghamton area and in Jefferson County in the Perch River-Cape Vincent area.

Another method is the "confusion technique" in which an area is saturated with the female sex attractant. It is thought that this odor will so thoroughly confuse male moths that a portion of them will be unable to mate. As yet, no area has been selected for experimentation with the "confusion technique."

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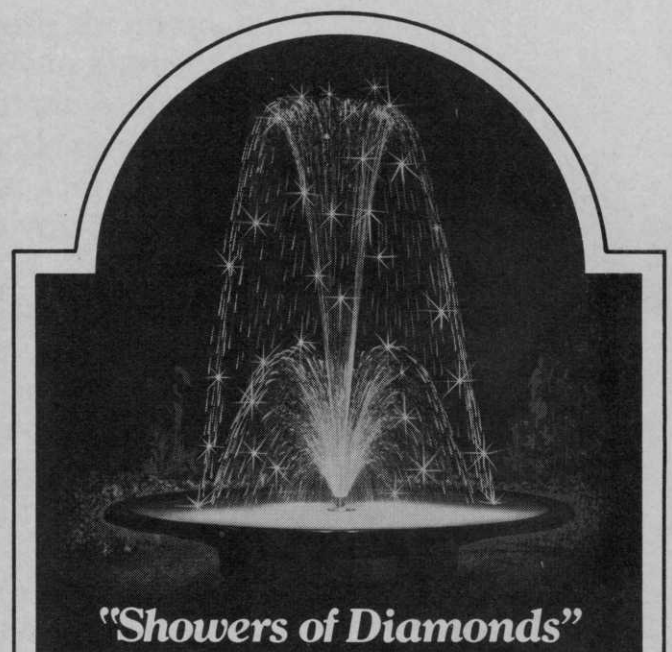
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