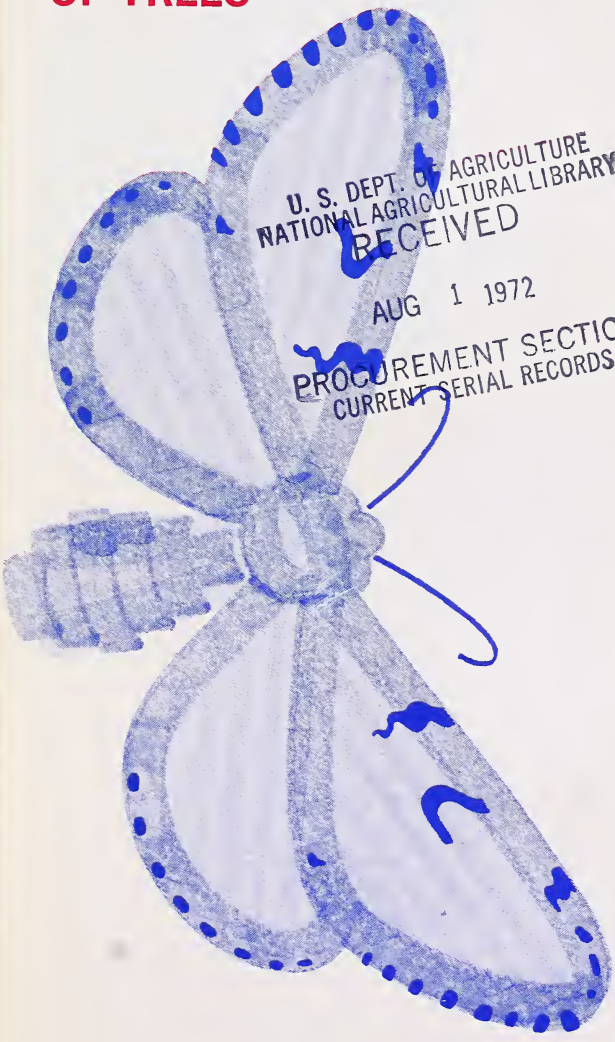
gypsy moth

A MAJOR PEST OF TREES



U.S. DEPARTMENT OF AGRICULTURE • PA-1006

ST–5322-15

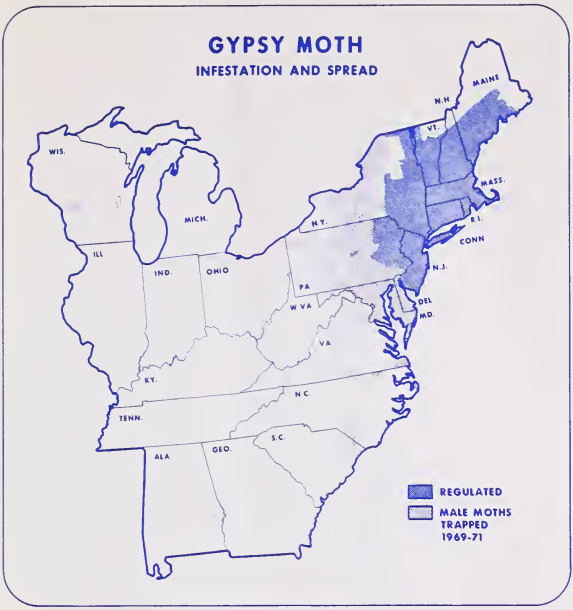
gypsy moth

A MAJOR PEST OF TREES

The gypsy moth is an insect that is one of the most important forest pests. They are harmless in the moth stage, but as caterpillars feed on the leaves of forest, shade, ornamental and fruit trees and shrubs. A single defoliation can kill some softwood trees; two or more defoliations can kill many types of hardwoods.

Gypsy moths have been in this country since 1869, when specimens imported from Europe escaped during experiments being performed by a Massachusetts naturalist. Extensive Federal-State control and quarantine operations confined destructive gypsy moth populations to New England, New York and Pennsylvania for many years.

In recent years, gypsy moth populations have built up to high levels, with spread occurring throughout much of the Northeast and into parts of the South. Approximately 25 percent of the nearly 2 million acres of trees damaged in 1971 suffered from 70 to 100 percent defoliation. Trees on over 40 percent of the acreage were lightly defoliated, with from 5 to 60 percent loss of leaves. The 2 million figure is twice the acreage defoliated in 1970, more than six times the 1969 damage, and twelve times more defoliation than recorded in 1968.



DAMAGE

A single two-inch caterpillar eats one square foot of leaf surface every 24 hours. Large infestations contain millions of caterpillars and degrade aesthetic and recreational values of forests, parks and wooded homesites.

Tree losses can be severe following an outbreak. For example, in 1968, gypsy moth infestations were observed for the first time in the Newark, N.J., watershed. Over the next two summers, a total of 17,855 acres sustained repeated defoliations at levels ranging between 75-100 percent on nearly all susceptible tree species. In 1971, New Jersey foresters reported more than 1,000,000 oaks, 39,000 eastern hemlock and 8,000 white pine killed as a direct result of gypsy moth feeding.

The number of trees killed by gypsy moth defoliations is actually a small percentage of those stripped of their foliage each year. Even a single defoliation may seriously weaken a tree, however, making it susceptible to secondary attack by other insects or plant diseases. A 1971 survey in the Morristown National Historical Park, for instance, showed that many oaks weakened the

previous spring by gypsy moth defoliations died during the winter from "secondary" causes.

The question arises: "If gypsy moths are so destructive, why do we still have forests in New England after nearly 100 years of infestation?" The answer is that sizable tree losses did occur during the moth's first 50 years in New England. The forest makeup of New England is not the same now as it was 100 years ago. Tree stands susceptible to gypsy moth damage have, in large part, been killed off and replaced with species more resistant to, or not favored by, the insect pests. Southern areas now being invaded are those with a high percentage (up to 90 percent) of susceptible trees used for wood products. The extensive oak forests of the Appalachian and Ozark Mountain ranges, and Southern oak-pine forests, are considered especially vulnerable to gypsy moth defoliation.

HOSTS

Preferred hosts of the gypsy moth are oak, apple, alder, aspen, bass-wood, gray and river birch, hawthorn, and willow. The insects also attack beech, other birches, cedar, cherry, elm, black gum, hemlock, hickory, hornbeam, larch, maple, pine, sassafras and spruce. Species not favored by the gypsy moth include ash, balsam fir, butternut, black walnut, catalpa, red cedar, dogwood, holly, locust, sycamore and yellow-poplar.

NATURAL CONTROLS

Gypsy moth populations and damage are regulated to some degree in countries where the pest originated by the activities of parasites, predators, and insect diseases. Pesticides are also needed. Periodic outbreaks still occur despite a full complement of "natural enemies."

Native enemies of the gypsy moth also exist in the United States—but not in large enough numbers and kinds to effectively check the gypsy moth in this country. Natural controls on U.S. gypsy moth populations include insectivorous birds such as cuckoos, black birds, grackles; and mammals

BN - 38774

such as shrews and white-footed mice. Native *Calosoma* beetles are voracious killers of the caterpillars. Wilt disease, caused by a polyhedral virus, attacks gypsy moth larvae, often wiping out large concentrations of caterpillars. In addition, low winter temperatures can cause considerable egg mortality in unprotected situations.

ST–5321-9

IMPORTED ENEMIES

USDA began importing and attempting to colonize foreign enemies of the gypsy moth as early as 1905. More than 40 species have been introduced. Eleven parasites (seven attack larvae, two feed on eggs, and two destroy pupae) and two predators have become established in the Northeast. USDA and cooperating States have set up rearing laboratories and, in 1970 alone, released approximately 51,825,000 parasites.

Control of the gypsy moth by its natural enemies has been less effective than hoped for because (1) several of the most important parasites from Europe could not be established in the United States, (2) pesticides used to suppress intolerable gypsy moth populations can reduce temporarily some insect parasite and predator levels, and (3) alternate host insects are not always available in outbreak areas for the second or succeeding generations of many imported parasites. This lack of alternate hosts also places severe limitations on USDA's ability to establish parasite colonies in uninfested areas as a deterrent to pest spread.

USDA RESPONSIBILITIES

USDA has been working with gypsy moth infested States since 1906 in an effort to control and prevent the spread of this pest. Department responsibilities in cooperative Federal-State programs are divided among four USDA agencies.

IMPORTED ENEMIES

USDA began importing and attempting to colonize foreign enemies of the gypsy moth as early as 1905. More than 40 species have been introduced. Eleven parasites (seven attack larvae, two feed on eggs, and two destroy pupae) and two predators have become established in the Northeast. USDA and cooperating States have set up rearing laboratories and, in 1970 alone, released approximately 51,825,000 parasites.

Control of the gypsy moth by its natural enemies has been less effective than hoped for because (1) several of the most important parasites from Europe could not be established in the United States, (2) pesticides used to suppress intolerable gypsy moth populations can reduce temporarily some insect parasite and predator levels, and (3) alternate host insects are not always available in outbreak areas for the second or succeeding generations of many imported parasites. This lack of alternate hosts also places severe limitations on USDA's ability to establish parasite colonies in uninfested areas as a deterrent to pest spread.

USDA RESPONSIBILITIES

USDA has been working with gypsy moth infested States since 1906 in an effort to control and prevent the spread of this pest. Department responsibilities in cooperative Federal-State programs are divided among four USDA agencies.

The **Animal and Plant Health Inspection Service** enforces provisions of the Federal gypsy moth quarantine and carries out detection surveys to pinpoint pest spread or population buildups. APHIS initiates control operations in recreation areas and trailer courts in conjunction with State agencies when such action is essential to prevent long-range pest spread; conducts methods development investigations to find better ways of using pest control techniques and weapons; and releases parasites and predators.

The **Forest Service** conducts control projects on Federal lands and cooperates with State agencies in infested areas to protect endangered forest resources. FS also conducts research on biological and chemical agents to develop new control tools and technology, integrating them into the gypsy moth pest management system.

The **Agricultural Research Service** initiates research and development to provide safer and more effective tools such as sex attractants with which to control the gypsy moth, and introduce potentially effective parasites and predators.

The **Extension Service** coordinates USDA's education and information activities designed to keep the public informed about all phases of cooperative gypsy moth programs.

BN-8259

TX–457 *ADULT FEMALE*

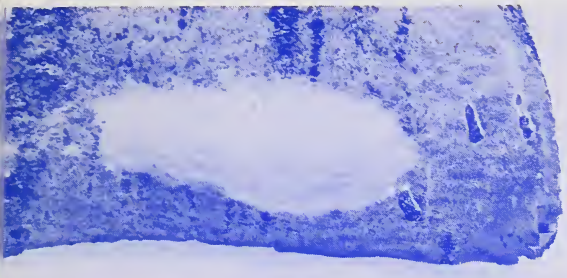
TX–458 *ADULT MALE*

DESCRIPTION AND HABITS

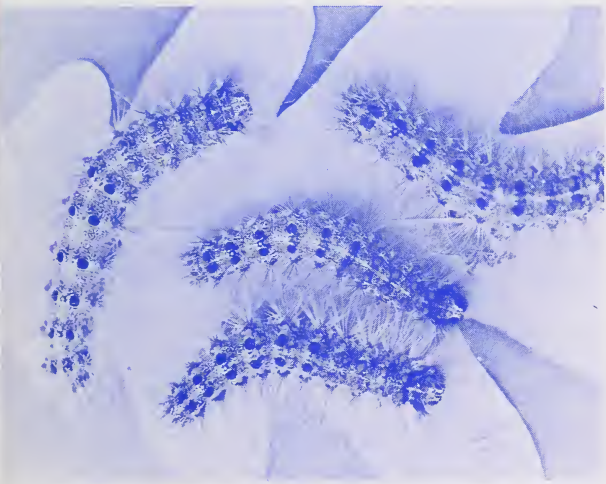
The gypsy moth develops in four stages—egg, larva (caterpillar), pupa (cocoon), and moth. It has one generation a year and overwinters in egg masses attached to trees, stones, walls, logs, and other objects. Each gypsy moth egg mass contains up to 1,000 eggs and is covered with buff or yellowish hairs from the abdomen of the female. The velvety egg masses average about 1½ inches long and about ¾ inch wide.

Eggs begin hatching in late April or early May. The brownish, hairy caterpillar is easy to identify in later stages by the pairs of red and blue dots on its back. Mature caterpillars are from 1½ to 2½ inches long.

Natural spread occurs during the pest's larval



EGGS



BN-15039

LARVAE

stage. Caterpillars drop from tree tops on silken threads. During high winds these threads act as sails and the lightweight larvae may be blown over many miles.

Caterpillars enter the pupal "cocoon" stage late in June or early in July, emerging from their pupal cases in 10 to 14 days as moths. Males have dark brown forewings and a 1½ inch wingspread. Female moths are white, with a wingspread of about 2 inches.

The pests do not feed in the moth stage and female moths do not fly. Depending upon weather and location, egg laying in the Northeast occurs between July and September.

YOU CAN HELP

One of the main avenues of artificial gypsy moth spread today is through the movement of mobile homes and recreational vehicles. In 1970, for instance, trailer owners who stopped at an infested campground in Connecticut unwittingly carried gypsy moth egg masses (each containing from 100 to 1,000 individual eggs) as far away as California, Florida, Minnesota, Texas, Virginia and Wisconsin.

Campers and mobile home owners can help stop the spread of gypsy moths by carefully inspecting their recreational vehicles, mobile homes and camping equipment before traveling from infested to uninfested areas. The undersides of trailers, hitches, vehicles, joints of truck cab and camper, steps, awnings, camper-trailer extensions, gas bottle rims, any loose metal underneath trailers and any other equipment should be thoroughly inspected. Also, all wheels should be checked on both sides. Any egg masses, caterpillars, pupae, or moths found should be removed and destroyed.

ADVICE TO HOMEOWNERS

Individual homeowners can do little to protect their trees in heavily infested areas. Small trees and shrubs can be treated, but equipment needed for spraying trees of 25 ft. or more is not readily available to individuals.

Nonchemical methods of killing gypsy moths are available. Homeowners can hand kill caterpillars, trap the pests by encircling tree trunks with a wide band of sticky substance called Tanglefoot; tie burlap or cloth strips around trees to trap the caterpillars so they can be destroyed; hand remove pupal cocoons; or smash egg masses. But, none of these methods is very effective because the caterpillars can spread from neighboring infested properties.

The only way to successfully reduce gypsy moth populations in heavily infested areas is through communitywide action. Communities interested in initiating gypsy moth control projects can obtain technical advice from State agriculture or environmental agencies, Federal plant protection and forestry officials, or local county agricultural agents.

PROGRAM ACTIVITIES

Federal-State cooperative gypsy moth programs consist primarily of four related functions—regulatory, survey, control, and research and development.

Regulatory: Federal and related State quarantines are imposed to prevent artificial spread of gypsy moths by regulating the inter and intrastate movement of materials that might carry hitchhiking moths, larvae, pupae or egg masses from infested to noninfested areas. Such materials include timber and timber products, woody plants, and stone and quarry products.

Survey: Gypsy moth surveys help Federal and State officials plan and conduct regulatory and control work and aid USDA scientists seeking new and better methods of combating the destructive moths. Basically, three types of surveys are conducted: (1) In the winter, ground crews compile egg mass counts used for predicting caterpillar populations and in planning control and regulatory activities. (2) The trapping of male moths is conducted during late summer in parks and campgrounds within infested areas (to discover where the danger of spread via trailers or mobile homes is high) and traplines are maintained outside infested portions of the northeast (to spot natural or artificial spread). (3) Finally, aerial surveys are conducted throughout the summer and fall to determine the extent and intensity of gypsy moth defoliations.

Control: Federal and State pest control officials give prime consideration to the safety and health of people, crops, livestock and wildlife when planning and conducting control programs. They avoid spraying lakes, rivers and reservoirs and similar areas of environmental or health concern.

The insecticide currently used against the gypsy moth is carbaryl. It is nonpersistent, breaking down quickly and leaving no harmful residue. Carbaryl is low in toxicity to birds, fish, wildlife and humans; but precautions must be taken to safeguard bees. In 1971, some 350,000 acres were treated with carbaryl to protect trees and stop artificial spread by hitchhiking gypsy moths.

Pilot projects are underway integrating biological methods into Federal-State cooperative gypsy moth control programs. For example,

USDA scientists are attempting to counter natural gypsy moth spread by intensifying trapping and by releasing parasites wherever moths are caught for the first time.

Research and Development: USDA has underway an intensified research and development program to provide weapons to bring the destructive gypsy moth under control. The program concentrates on developing means of managing gypsy moth populations. Selective biological controls having minimal adverse effects on nontarget organisms and the environment in general are being sought. Limited use of chemicals will also be part of the overall gypsy moth management system of the future—which will capitalize on the best features of each control method, while minimizing possible environmental hazards.

Techniques and weapons expected to be operational in the next five years include: an improved scientific procedure for predicting and evaluating gypsy moth population trends, environmental impact and the consequences of applying different pest control methods; a bacterial insecticide, *Bacillus thuringiensis;* production and use of a virus that is a critical factor in halting natural outbreaks; and the use of disparlure to confuse male moths and prevent mating.

ANIMAL AND PLANT HEALTH INSPECTION SERVICE
FOREST SERVICE • EXTENSION SERVICE

Issued May 1972

☆ GPO : 1972 O - 464-926

For sale by the Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402 - Price 10 cents