

# *The Commonwealth of Massachusetts*

*Department of Environmental Management*

*Division of Forests & Parks*

*Region 2 P.O. Box R*

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## **ANNUAL REPORT**

**July 1, 1979 - June 30, 1980**

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Field Studies of Improved Formulations of B.T. (*Bacillus Thuringiensis*)  
and Gypcheck (nucleopolyhedrosis virus)

A cooperative program with the U. S. D. A., Aphis, Methods Development Center at the Otis Air Base was undertaken to test the effectiveness of two new formulations of B. T. and the virus known as Gypcheck. ( See the attached work plan G.M. O.1.1. ) Preliminary work began in January 1980 with the selection of tentative spray and check blocks in the Warwick, Northfield, Erving and Wedell State Forest areas. In February plot establishment commenced. The Erving State Forest Headquarters building served as the base of operations. Wln McLane, who headed the project, from the Otis Center supplied a small house trailer that held all the supplies and equipment needed for the field work. Two U.S.D.A. 4x4 vehicles were supplied for use on the more difficult forest roads. One federal employee was on the job daily to act as field leader. The tree crews from regions 2,3,4 were used throughout the project. Additional federal and state employees were brought in to assist in the actual spraying operation.

The aerial spraying of the fifty acre blocks was carried out from the Orange Airport. The trailer was moved to the airport to serve as the operational headquarters and storehouse. Prior to spray operations the project was advertised in the local papers, spot announcements made on the local radio station and all public safety officials notified in the towns having spray plots. Several meetings with concerned citizens took place.

The spray plane was an Ag-truck, a single engine, low wing aircraft. Both the pilot and aircraft were supplied by the U. S. D. A.



On May 22 the spray operation. Gypcheck was to be applied late each afternoon until completed. The B. T. was to be applied each morning until completion. A problem developed with a new formulation of an ultra violet ray screen that is used to protect the virus from the sunlight. This caused delay of the virus application until the last days of the project when the screening material was replaced by the manufacturer. The B. T. applications began at 5:00 A.M. on May 23 and ended on June 6 with each treatment block being treated twice. The Gypcheck was applied to four blocks on June 6 and to two more on June 7. Unforecast showers on June 7 and high winds on the following two days plus the increased age and size of the Gypsy Moth caterpillars made further spray application inadvisable and the spraying phase of the project was terminated.

Marking of the spray blocks was accomplished by sending four tethered balloons aloft just prior to application and retrieving them as soon as the application was completed. The field crews then moved to the next block and repeated the procedure.

Larval counts were conducted as per the work plan. The data collected has not been analyzed at this time. Fall egg mass counts are to be done in October before a final assessment of the project can be completed.



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## Aerial Survey

The annual aerial survey for insect defoliation was conducted in early July 1979. The entire state was viewed including the islands of Nantucket and Martha's Vineyard. The following acres of defoliation were recorded.

Gypsy Moth - 229,230 acres. Statewide. 126,025 of these were in the 0 - 30% range, 76,725 acres - 31 - 60% and 26,480 acres of 61 - 100%.

Pine Needle Miner 27,400 acres in the Carver, Plymouth, Wareham area.

Diplodia 280 acres in Edgartown.

Larch Sawfly 480 acres in Middlesex County.

Dead and dying trees 13,775 acres in western and central Massachusetts

Unknown cause 2,110 acres on the south shore and Cape Cod.

Unknown cause 39,400 acres in western Mass. (west of Conn. River).

A new system of reporting from each district was begun in the summer of 1979. The aerial maps were copied for distribution to each supervisor as usual. For the first time each area of defoliation on each individual map was code numbered. The supervisors returned a list with the corresponding numbers and the cause of the problem in each of numbered areas. In the majority of the cases the returns indicated that the Gypsy Moth was the defoliator. Other causes listed were logging operations, change in water table, cankerworms, tent caterpillars or leaf tiers. One case of chemical dumping was discovered by a supervisor making his inspection of a marked area.

In June 1980 an aerial survey was conducted in western Mass. for defoliation by the Oak Leaf Tier. The survey covered Berkshire County and the western edges of Hampden, Hampshire and Franklin Counties. No attempt was made to survey eastern Franklin due to the heavy defoliation being caused by the Gypsy Moth. 17,660 acres were recorded. These have not been checked out by ground crews for verification at this point in time.

A spot check of two tiers of towns south of the New Hampshire border from Roylston to Northfield show Hemlock on an estimated 75,000 acres are being subjected to feeding by Coleotechnites (Recurvaria) apicitripunctella. This insect mines the needles and webs them together in a flat nest where the larvae overwinters. These areas will be surveyed again in 1980.

#### Oak Leaf Tier - *Argyrotoza semipurpurana*

In October 1979 branch samples were again collected in eastern Franklin County. These were taken from the red oaks on the same sites as they have been since the mid 1970's. These sites are in the area most heavily damaged by the tier. Evaluations were made by Parker Snowden, U. S. Forest Service and this writer. The two counts and predictions of both agreed that the tier was declining in this area with 0 - 5% defoliation all that should occur. Branch samples will be collected in the fall of 1980 to ascertain if the decline continues.

#### Parasite release and evaluation

Two pupal parasites and one larval parasite were released in July. This completed the releases of parasites for 1979 supplied by APHIS. (Animal Plant Health Inspection Service - U.S. Dep't. Agriculture) The pupal parasites of the Gypsy Moth released were *Brachymeria lousis* - 6,500 and *Coccygostinus disparis* - 4,500. The larval parasite was *Pezomachus japonicus* - 3,500. The release sites were in the towns of Wendell, Montague and New Salem. The first two are on state forest lands and the third on M. D. C. property. All sites had heavy Gypsy Moth populations. Collections of pupae from these sites failed to produce any of the released parasites. However, large numbers of the pupae were observed in these areas with the typical exit holes caused by the emerging of an adult *Brachymeria* species. This was particularly true in the New Salem area where field estimates of this parasitism ran as high as 55%.



This figure was arrived at by collecting handfuls of pupae and evaluating the first one hundred counted from each of several sites on Fairview Hill.

In early 1980 the Otis Methods Development Center, Otis Air Base became the coordinator for the parasite distribution program. This center is part of APHIS - U.S.D.A. and carries out research on the Gypsy Moth.

More emphasis was placed on recovery of parasites from the release sites. The Otis Center provided individual containers with sufficient pre-mixed diet to sustain a caterpillar for several weeks. One larva was placed in each container and left until death or pupation occurred. Each was then checked for the presence of disease or a parasite. This method is far better than the feeding of oak leaves to caged larvae as was done in past years. The larvae were collected from ten sites in which parasites had been released in 1978 and 1979. These sites were located in Montague, Leverett, Wendell, and New Salem. One hundred larvae were collected from each site for seven weeks. As pupation began the pupae were collected at the same rates from the same sites and continued into July 1980-August 1980.

Upon examination of the 7,000 containers of larvae several species of parasites were recovered. Wilt disease was also noted in some of the containers. The parasites recovered were *Apanteles*, *Blapheripa pretensis*, *Coopsilura concinata*, *Parasetigana agilis* and several unidentified tachinids. Also recovered was *Phobocampe* (*Hyoosoter*) *disparis*. The recovery of this parasite was from the Wendell - Montague area. This is the first time since this writer began to study and evaluate the parasites and predators that *Phobocampe* has been found. Larvae of the Half Line Geometer, *Phigilia titea*, was heavy in this area along with the Gypsy Moth. Twelve *Phigilia* were placed in individual containers and for a 'first time anywhere' *Phobocampe* was recovered from one of the larvae.



It was also noted that the *Phigilia* was feeding heavily on eastern white pine as well as the hardwoods. This evidently has not been recorded before and does not appear in any literature published about this insect.

For the 1980 imported parasite release program three species were requested. One was *Rogas lynantirae*, a native of Japan, which is a parasite of second to fourth instar larval stage Gypsy Moth. The other two were the pupal parasites *Brachymeria* and *Coccygomimus* that were also released in 1979. Rearing problems in the laboratory caused the cancellation of the *Rogas* releases. The two pupal parasites were released on nine sites in the towns of Calisle, Concord, Hudson, Stow, New Salem and Wendell. None of the sites used in 1978 or 1979 were used in 1980. Pupal collections will be completed in late July or early August and evaluations made late in August.

#### Anastatus Project - An Established Imported Parasite.

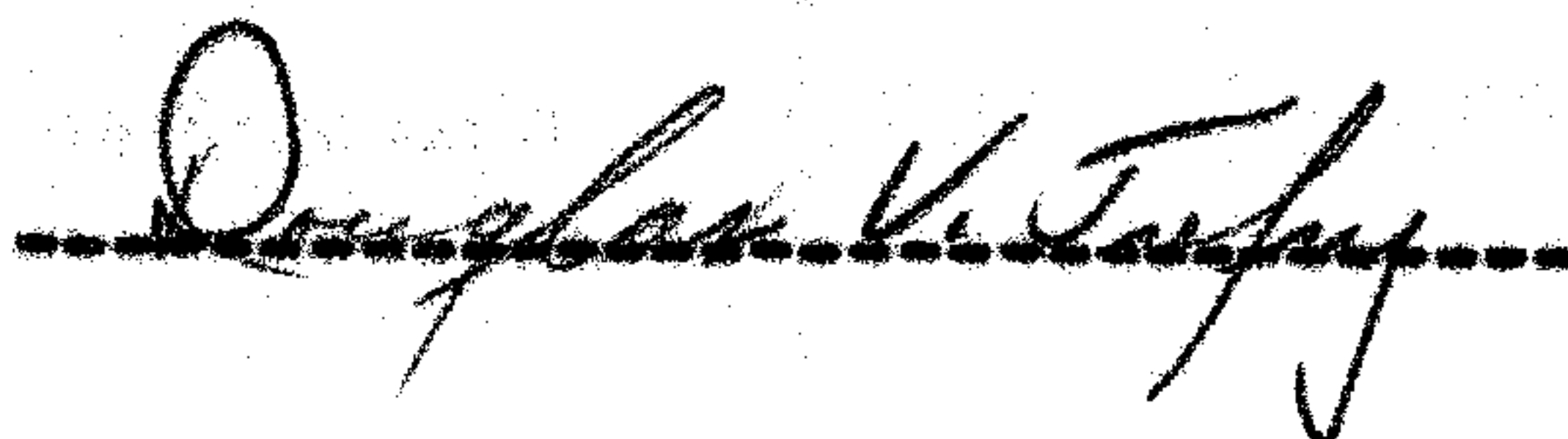
In 1972 in studying the species of parasites to be found in this state at that time *Anastatus* was found in several of the areas used as collection sites. *Anastatus disparis* is a single hosted, single generation parasite that attacks and overwinters in the eggs of the Gypsy Moth. The female of the species cannot fly and the spread of the species is very slow. In 1927 the last releases of the *Anastatus* was on a line from Richmond, N. H. to Barre, Vt., to Norwich, Conn. In collecting egg masses and evaluating them in 1972 it appeared that the westward spread of *Anastatus* was spotty and stopped at the Connecticut River.

A relatively simple (as opposed to rearing in captivity) method of establishing this parasite in new areas was found in the literature in 1978. Gypsy Moth egg masses can be collected after the caterpillars have hatched from heavily parasitised areas and placed where the parasite is desired. Egg masses were collected in Sharon, hatched and then as the *Anastatus* emerged some six weeks later evaluated for the best collection



sites. An area with an average emergence of 57.2 *Anastatus* per egg mass was selected. More than 2,200 masses were collected by bureau employees from the Sharon site. In past years host egg masses from Wendell, New Salem and Montague failed to produce any *Anastatus*. This being an area that was experiencing a build-up of Gypsy Moth it was decided to place the parasitised masses on several sites in those towns. Masses were also placed in an infestation on the Prescott Peninsula in the Quabbin Reservoir. It was calculated that 128,700 *Anastatus* were released in this manner. Egg masses were collected from each site in the fall of 1979 and in every instance the *Anastatus* was found. The best emergence being 10.4 adults per mass and the poorest being 5.4 per mass. Egg masses will be collected from these release sites in the fall of 1980 for future evaluation.

For the past two years egg masses from Great Barrington, Hancock, North Adams and Williamstown have been collected and observed. No *Anastatus* was found. In June of 1980 egg masses from Franklin, Canton, Millis and Mansfield were collected after earlier study and set out in three of the Berkshire communities. The fourth, Hancock, was left to act as a control area. In Great Barrington 3,680 *Anastatus* were released, in North Adams - 1,200 and in Williamstown - 800. In addition to those areas parasitised egg masses were set out in towns that showed no *Anastatus* from the egg masses collected in 1979. Thirty towns were evaluated. Carlisle, Hudson, Wendell and Northfield received 31,440 *Anastatus* in total. Another 31,440 were given to the M. D. C. for distribution about the Quabbin Reservoir. Egg masses will be collected and evaluated from these areas in the fall of 1980 also.



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