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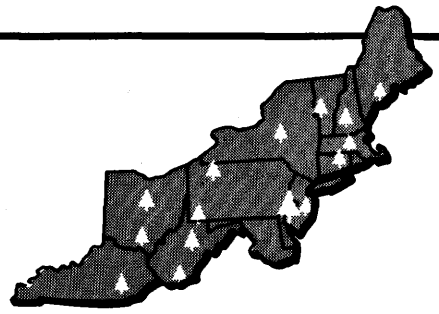

FOREST SERVICE, U.S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA. 19082

ALTERNATE HOSTS OF *BLEPHARIPA PRATENSIS* (MEIGEN)

—PAUL A. GODWIN and THOMAS M. ODELL
Northeastern Forest Experiment Station
Forest Insect and Disease Laboratory
Hamden, Conn. 06514

Abstract.—A current tactic for biological control of the gypsy moth, *Lymantria dispar* Linnaeus, is to release its parasites in forests susceptible to gypsy moth damage before the gypsy moth arrives. The basic assumption in these anticipatory releases is that the parasites can find and utilize native insects as hosts in the interim. *Blepharipa pratensis* is being used in this way.

The efficacy of such releases has not been demonstrated. The present state of our knowledge about the niche requirements of gypsy moth parasites in general, and *B. pratensis* in particular, does not permit an evaluation now. However, we do have sufficient information to determine the crucial point of whether *B. pratensis* can live and develop in particular native lepidopteran species that are potential hosts.

We report here on the survival of *B. pratensis* in eight potential North American hosts.

Background

B. pratensis females lay their eggs on the surfaces of vegetation. Upon ingestion by a gypsy moth larva, the egg hatches in the gut and the maggot bores through the gut wall into the hemocoel. Within 24 hours most maggots bore into a longitudinal intersegmental muscle. The maggot remains there as instar I until the gypsy moth larva pupates. After this event, the maggot quickly completes its development and leaves the pupa to pupariate, about 7 days later *(Shields 1976).* Infection of host, then, requires that the egg be ingested.

In Europe, *B. pratensis* is an oligophagous parasite *(Mesnil 1950; Herting 1960).* In North America it has been recovered from field-collected larvae of the tent caterpillars *Malacosoma americanum* (Fabricius) and *M. disstria* Hubner *(Schaffner and Griswold 1934; Bess 1936).* Schaffner and Griswold reported it from *Datana integerrima* Grote and Robinson; *Symmerista albifrons* (J. E. Smith); *Graptolitha* sp.; *Catocala* sp.; and an unidentified noctuid. The number of *B. pratensis* recovered from these naturally infected species was extremely low. The incidence was highest (1:46) for the *Catocala* species, and lowest for *Datana in-*

tegerrima. It has also been recovered from *Stilpnotia salicis* (Linnaeus) *(Schaffner 1950).*

Thompson *(1913)* fed *B. pratensis* eggs to a number of forest lepidoptera in the laboratory. The parasite successfully developed in *M. americanum* and *M. disstria,* but none survived in *Nymphalis antiopa* Linnaeus, *Orgyia leucostigma* (J. E. Smith), or *O. antiqua* Linnaeus.

Except for the tent caterpillars, the record is too fragmentary to tell whether *B. pratensis* survives only rarely in the species observed—in some special set of circumstances—or whether *B. pratensis* can develop normally, but is out of phase either in time or place, or both, with other potential hosts.

For our purposes, we have simply bypassed the time and place aspects of infection and fed eggs directly to larvae in the laboratory.

Methods

The species studied were collected in the field, brought to the laboratory, and reared in environmental chambers at 25°C and 60% RH with 16 hours of light (6:00 am to 10:00 pm). Penultimate and last instar larvae were fed *B. pratensis* eggs by placing two eggs on an edge of a 1-cm² piece of leaf in a 100 x 15-mm petri dish. If the eggs were not eaten within 12 hours, the eggs were removed and replaced with a new leaf fragment and eggs. The larvae were then reared to the pupal stage to await the emergence of the maggot, if any.

For each species, a number of larvae equal to the number tested was reared to check for the incidence of natural infection. After pupation, the puparia were weighed; and 14 days later they were radiographed to determine whether pupation had taken place *(ODell et al. 1974).*

Results

B. pratensis was not recovered from any of the larvae reared to check for natural infection.

No *B. pratensis* maggots emerged from the following species: *Heterocampa guttivitta* (Walker), *Dasychira basiflava* (Packard), *Nymphalis antiopa,* or *Acronicta* spp. The data are summarized in Table 1.

B. pratensis maggots did emerge from *Malacosoma americanum, M. disstria, Hemiluca maia* Drury, and *Anisota senatoria* (J. E. Smith).

Only in *M. disstria* did *B. pratensis* survive as well as it did in *L. dispar.* Survival in all other species was significantly lower. However, the insects that developed in *M. disstria* were significantly lighter. The mean weight of 3-day-old puparia from *M. disstria* was 0.0933 g, and from *L. dispar* 0.1194 g. On the other hand, *B. pratensis* did not survive as well in *H. maia,* but those individuals that did survive were not significantly lighter (0.1053 g) than those from *L. dispar.*

With the gypsy moth we have found a close correlation ($r^2 = 0.8548$) between the weight of a pupa and the weight of the *B. pratensis* puparium that develops from it. *M. disstria* pupae are smaller than gypsy moth pupae, so

Table 1.—*Survival of Blepharipa pratensis in host species reared in the laboratory*

Host species	Larvae fed eggs	Maggots emerged	Puparia	Average puparium weight	Pupae	Survival to pupation
	No.	*No.*	*No.*	*g.*	*No.*	*Pct.*
L. dispar	100	53	53	0.1194 ± .0249	49	49.00
M. disstria	62	37	37	.0933 ± .0139	23	37.17
M. americanum	100	38	38	.0643 ± .0104	20	20.00
H. maia	100	12	14[a]	.1053 ± .0321	7	7.00
A. senatoria	100	2	3[a]	.0584 ± .3195	1	1.00
H. guttivitta	30	0	0	0	0	0
D. basiflava	14	0	0	0	0	0
N. antiopa	8	0	0	0	0	0
Acronicta spp.	54	0	0	0	0	0

[a]Radiographic examination of host pupae showed that some maggots did not emerge, but pupariated within the host pupa.

the smaller puparia were to be expected. *H. maia* pupae are as large as gypsy moth pupae.

At the moment, we do not know the relationship of puparium weight to subsequent adult fecundity and survival; nor do we know whether differences in the magnitude of adult survival and fecundity can compensate for differential maggot survival. The interaction of these and other processes will determine, in the end, what species can support *B. pratensis* in the field in the absence of *L. dispar.*

We have shown here only that *B. pratensis* can survive to the pupal stage in a number of native species, given that a *B. pratensis* egg is eaten.

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