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PARASITISM OF LEPIDOPTEROUS LARVAE BY BESSA HARVEYI (TNSD.)

by

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INTRODUCTION

A previous paper (Turnock and Melvin 1963), noted that Bessa harveyi (Tnsd.) is primarily a larval parasite of sawflies, and only occasionally of Lepidoptera. Hosts in latter order noted in the above paper were: Eupithecia luteata Pack., Nepytia canosaria Wlk., Semiothisa signaria dispuncta Wlk. (= granitata Wlk) Nymphalis antiopa L. and Archip sp. Tests designed to confirm the field records of various agencies in North America, and to determine if B. harveyi can oviposit and develop in these other lepidopterous hosts, were conducted from 1960 to 1962, and the results are detailed herein.

METHODS

Adults of B. harveyi reared from larch sawfly cocoons were placed in screen cages (3rd cube) containing a fresh sugar solution absorbed in cotton wads in a petri dish and lepidopterous larvae on fresh foliage. As soon as eggs of the parasite were seen, or after 48 hours, whichever came first, the parasitized larvae were removed and reared in a jelly jar. These tests were conducted in a rearing room at 70°F.

RESULTS

A total of 1,207 larvae representing 50 species in 11 families were tested. Eggs were laid on only 370 of the larvae representing 36 species which included representatives of all the families tested (Table I). The successful develop-

ment of B. harveyi in Eupithecia luteata, Semicthisa signaria dispuncta, Nympholis antiopa and an Archips sp. were confirmed, but oviposition only occurred on Nepytia canosaria. A summary of oviposition by host family (Table II) emphasize wide variety of larvae that B. harveyi would lay eggs on. On the basis of percentage of larvae attacked and number of eggs per larva, B. harveyi seemed to show some preference for larvae of the families Geometridae, Lycaenidae and Papilionidae (Table I). However, oviposition on the few sawfly larvae tested as checks greatly exceeded that on lepidopterous larvae. More eggs were laid on green, glabrous, medium-sized larvae than on larvae than on those of other sizes, colors, or degrees of setation.

The parasite was reared successfully on only 47 larvae of 19 species in 10 families: 10 Geometridae; 2 Pyralidae; 2 Tortricidae; and one species in each of the Gelechiidae, Lycaenidae, Noctuidae, Notodonidae and Nymphalidae (Table I). Unsuccessful parasitism was usually due to the death of the host. The latter was often associated with multiple parasitism. The Tortricidae, Gelechiidae, Lycaenidae and Geometridae had the highest percentage of successful parasitism (Table II).

DISCUSSION

Laboratory tests have confirmed that B. harveyi can develop successfully in lepidopterous hosts. The scattered records of parasitism from field collections by this species show that caterpillars are rarely utilized for oviposition by B. harveyi under natural conditions. Although many species were inadequately tested due to a shortage of larvae, oviposition was recorded on larvae of some species of 11 families including both micro- and macro-

Lepidoptera of various sizes, colors and degrees of setation. Comparison of the number of eggs on lepidopterous larvae with those of sawfly confirms the decided preference for the latter by B. harveyi. Successful parasitism occurred in only 13% of the larvae on which eggs were laid. Very high rearing mortality makes it difficult to determine whether the parasite may be successfully reared in other hosts than those indicated.

The scarcity of field records of B. harveyi emerging from lepidopterous larvae indicates that this parasite must be more discriminating in its oviposition habits and/or less capable of completing its development than was indicated by cage tests. Differences in larval habits may also be a factor in the selection of hosts; the lepidopterous larvae most commonly found in tamarack bogs in the larval stage are solitary while the preferred sawfly hosts of B. harveyi are gregarious.

REFERENCES

- Turnock, W. J. and J. C. E. Melvin 1963. The status of Bessa harveyi (Tnsd.) (Diptera: Tachinidae). Can. Ent. 95(6):646-654.

Table I

Oviposition and successful parasitism by B. harveyi of larvae of forest defoliators
under experimental conditions

Species	No. of larvae		No. of eggs laid per larva	No. of emerged adults of <u>B. harveyi</u>
	Tested	Attacked		
GELECHIIDAE				
<u>Gelechiid complex</u>	33	10	1.4	3
GEOMETRIDAE				
<u>Biston cognataria</u> Gn.	3	2	2.0	0
<u>Caripeta angustiorata</u> Wlk.	4	3	5.0	1
<u>Cosymbia pendularia</u> Gn.	3	0	0	0
<u>Deuteronomus magnarius</u> Gn.	1	0	0	0
<u>Eufidonia notataria</u> Wlk.	10	9	18.3	10*
<u>Eupithecia filmata</u> Pears.	5	2	4.5	0
<u>Eupithecia luteata</u> Pack.	7	4	1.2	1
<u>Eupithecia palpata</u> Pack.	3	2	1.0	2
<u>Hypagyrtis piniata</u> Pack.	6	0	0	0
<u>Hyperetis amicaria</u> H. - S.	1	0	0	0
<u>Lambdina fiscellaria fiscellaria</u> Gn.	1	1	1.0	1
<u>Nepytia canosaria</u> Wlk.	6	5	1.4	0
<u>Philobia aemulataria</u> Wlk.	1	1	1.0	1
<u>Protoboarmia porcelaria</u> Gn.	19	5	1.0	0
<u>Prochoerodes transversata</u> Dru.	1	0	0	0
<u>Rheumaptera hastata</u> Linn.	12	6	1.7	2
<u>Semiothisa bicolorata</u> Fabr.	27	15	3.6	1
<u>Semiothisa oweni</u> Swett	1	1	1.0	0
<u>Semiothisa signaria dispuncta</u> Wlk.	162	65	2.4	8

Table I continued

Species	No. of larvae		No. of eggs laid per larva	No. of emerged adults of <u>B. harveyi</u>
	Tested	Attacked		
LYMANTRIIDAE				
<u>Parogyia plagiata</u> Wlk.	2	0	0	0
<u>Parogyia vagans</u> B. & McD.	2	2	1.3	0
LYCAENIDAE				
<u>Callophrys niphon clarki</u> Free.	22	15	2.8	4
NOCTUIDAE				
<u>Acronicta impressa</u> Wlk.	1	1	1.0	0
<u>Eupizeuxis americalis</u> Gn.	1	0	0	0
<u>Feralia jocosu</u> Gn.	9	6	1.5	0
<u>Orthosia hibisci</u> Gn.	2	1	1.0	0
<u>Lithophane</u> sp.	1	0	0	0
<u>Palthis angulalis</u> Hbn.	2	0	0	0
<u>Raphia frater</u> Grt.	1	1	3.0	0
<u>Zale duplicata largera</u> Sm.	82	31	2.1	4
NOTODONITIDAE				
<u>Cerura occidentalis</u> Lint.	4	3	1.7	0
<u>Datana ministra</u> Dru.	59	0	0	0
<u>Ichthyura albostigma</u> Fitch.	1	1	1.0	1
<u>Nadata gibbosa</u> J.E. Smith	4	1	1.0	0
<u>Schizura concinna</u> J. E. Smith	37	26	1.5	0

Table II

Summary by families of oviposition and successful parasitism of different species

by B. harveyi

Family	Species		Larvae		Eggs per parasitized larva	Per cent successful parasitism	
	Total no.	Per cent attacked	Total no.	Per cent attacked		of eggs laid	of larvae attacked
Gelechiidae	1	100	23	43	1.4	21	30
Geometridae	20	75	336	48	3.8	5.7	17.5
Lymantriidae	2	50	4	50	1.3	0	0
Lycaenidae	1	100	22	68	2.8	9.5	26.7
Noctuidae	8	62	99	40	2.0	5.1	10.0
Notodontidae	5	80	105	30	1.5	2.1	3.2
Nycteolidae	1	100	29	3	1.0	0	0
Nymphalidae	1	100	184	23	4.2	1.2	2.4
Papilionidae	1	100	1	100	6.0	0	0
Pyralidae	3	67	166	34	1.3	2.7	3.6
Tortricidae	7	71	238	5	1.2	26.7	33.3
All families	50	72	1207	31	1.9	5.5	12.7
Diprionidae	1	100	10	100	1.0	0	0
Tenthredinidae	9	100	9	100	18.5	0	0