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HYMENOPTERA AND AN INQUILINE MOTH REARED FROM THE GOLDENROD GALL CAUSED BY *Gnorimoschema gallaesolidaginis* RILEY (LEPIDOPTERA)

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Abstract

From 98 goldenrod galls caused by *Gnorimoschema gallaesolidaginis* Riley, collected on Jan. 8, 1949 at Hamilton, Ontario, there emerged one adult of the moth *Epiblema scudderiana* Clemens, two ichneumonid wasps, *Calliephialtes notandus* (Cress.), two other ichneumonid wasps, *Glypta caulicola* Cush., 348 (33.9% male, 66.1% female) braconid wasps, *Apanteles cacoeciae* Riley and 229 perilampid wasps, *Perilampus fulvicornis* Ashm. *P. fulvicornis* was probably a hyperparasite emerging from larvae of *Apanteles cacoeciae*.

MATERIALS AND METHODS

On January 8, 1949, 558 galls caused by *Gnorimoschema gallaesolidaginis* Riley were removed from stems of goldenrod, *Solidago* sp., in fields adjacent to the campus of McMaster University, Hamilton, Ontario. The dead stems of the goldenrod stood upright in the fields and a gall was removed by breaking a stem a few inches above and below the gall. On January 9, 39 of the galls were split lengthwise with a scalpel and their contents were examined. One gall contained a white pupa of an ichneumonid wasp and each of the other 38

contained a yellow caterpillar. The caterpillars wriggled sluggishly when disturbed and some crawled slowly about when removed from the gall. The remaining 519 galls were placed in numbered shell vials in order that insects emerging from them might be collected and examined. Each gall was placed in a vial of dimensions 95 mm. x 25 mm. and the vial was closed firmly with a wad of cotton. The vials were placed in cardboard trays and were kept at room temperature. They were examined daily and insects which emerged from the galls were removed from the vials and were preserved in fluid or pinned. On May 6, 1949 all the galls were removed from the vials and were discarded.

RESULTS

During the period January 17 to March 27 a single moth and 581 hymenopterous parasites emerged from 98 of the galls. The remaining 420 galls produced no insects. In most cases the parasites emerged from the galls directly but in a few instances the appearance of the parasites was preceded by the emergence of the lepidopterous larva. In such a case the larva moved about in the vial for a few hours and then became quiescent. The parasitic larvae emerged from the caterpillar, leaving only a shrivelled skin, and spun cocoons on the glass of the vial adjacent to the dead larva. The names of the insects which emerged from the galls and the numbers of each species that emerged are summarized in Table 1. The only moth that appeared was an adult of *Epiblema scudderiana* Clemens. The parasitic wasps represented in the collection were as follows: *Calliephialtes notandus* (Cress.) and *Glypta caulicola* Cush. (Ichneumonidae), both determined by Mr. B. D. Burks of the U. S. National Museum, *Apanteles cacoeciae* Riley (Braconidae), determined by Mr. C. F. W. Muesebeck of the U. S. National Museum and *Perilampus fulvicornis* Ashm. (Perilampidae) determined by Mr. A. B. Gahan of the U. S. National Museum.

LEPIDOPTERA

Olethreutidae

Epiblema scudderiana Clemens

A single moth of this species emerged from a gall on March 7. The typical fusiform shape of the gall was modified by a secondary swelling at its upper end. From a hole in this swelling the empty pupal skin projected obliquely upward,

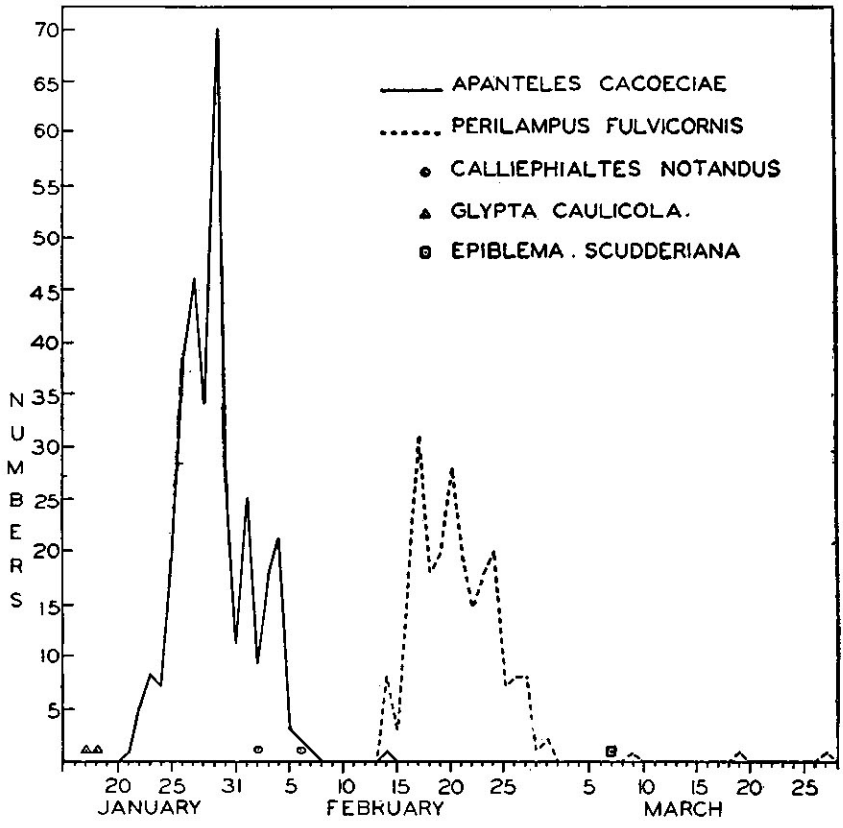

Figure 1

Periods of emergence of insects reared from galls.

only its lower end being still within the hole. The position of the pupal skin was similar to that figured by Holland (1916)

who discussed this species under the name *Eucosma scudderiana* Clemens, giving it the common name "The Misnamed Gall-moth" and pointing out that it is probably an inquiline in the spindle gall of goldenrod.

HYMENOPTERA

Ichneumonidae

Calliephialtes notandus (Cress.)

Two females of this species emerged from two galls, one on February 2, the other on February 6 (Fig. 1). Leiby (1922) records this species as being a common parasite in the goldenrod gall in North Carolina and present also at Ithaca, New York, and Barber (1938) reports that it accounted for parasitism of 4.83% of the galls studied by him in Virginia.

Glypta caulicola Cush.

Two males of this species emerged from two galls, one on January 17, the other on January 18 (Fig. 1). Cushman, (1933) in giving this insect the name *G. caulicola*, recorded that it was reared from the gall of *Gnorimoschema gallaesolidaginis*.

Braconidae

Apanteles cacoeciae Riley

A total of 348 wasps of this species emerged from the galls. The first emergence of males occurred on January 21, and the last on February 14; the first emergence of females occurred on January 22, and the last on February 7. Maximum emergence of males (25) and females (45) occurred on the same day, January 29 (Fig. 1). Of the total number, 118 (33.9%) were males and 230 (66.1%) were females, giving a ratio closely approximating 1: 2. These wasps emerged from 74 of the galls. As noted in Table 2 the maximum number of adults produced from a single gall was 18 and the minimum number was one. Possibly more than 18 actually emerged from a single caterpillar but failed to leave the gall.

Perilampidae

Perilampus fulvicornis Ashm.

A total of 229 adults emerged from the galls. The first appeared on February 14, the last on March 27, and the maximum emergence occurred on February 20 (Fig. 1). Smulyan (1936) states that the species of *Perilampus* appear to be largely hyperparasitic, and records that *P. fulvicornis* has been reared from *Apanteles* sp. He points out that this species has been reared in association with a number of lepidopterous insects, but that very likely it was hyperparasitic.

The specimens of *P. fulvicornis* reared from the galls were very probably parasites of *Apanteles cacoeciae.* They began to emerge on February 14, the day when the last *A. cacoeciae* appeared, and they reached a maximum emergence about three weeks after the day of maximum emergence of *A. cacoeciae.* Of the 98 galls that produced parasites 62 produced both *A. cacoeciae* and *P. fulvicornis.* In instances where large numbers of *A. cacoeciae* emerged from a single gall, e.g. 11 or more, only a few *P. fulvicornis* or none at all emerged; when several *P. fulvicornis,* e.g. 9, emerged from a gall no *A. cacoeciae* appeared.

DISPOSITION OF SPECIMENS

A few specimens of *Calliephialtes notandus* (Cress.), *Glypta caulicola* Cush., *Perilampus fulvicornis* Ashm. and *Apanteles cacoeciae* Riley are deposited in the collections of the U. S. National Museum. All others are retained in collections at McMaster University.

Table I

Insects reared from galls

Date	Apanteles cacoeciae			Perilampus fulvicornis	Calliephialtes notandus	Glypta caulicola	Epiblema scudderiana
	Males	Females	Total				
Jan. 17						1	
18						1	
21	1		1				
22	2	3	5				
23	4	4	8				
24	5	2	7				
25	6	13	19				
26	17	22	39				
27	9	37	46				
28	10	24	34				
29	25	45	70				
30	7	21	28				
31	3	8	11				
Feb. 1	9	16	25				
2	4	5	9		1		
3	11	7	18				
4	2	19	21				
5	1	2	3				
6	1	1	2		1		
7		1	1				
14	1		1	8			
15				3			
16				19			
17				31			
18				18			
19				20			
20				28			
21				20			
22				15			
23				18			
24				20			
25				7			
26				8			
27				8			
28				1			
Mar. 1				2			
7							1
9				1			
19				1			
27				1			
Totals	118	230	348	229	2	2	1

Table II

Distribution of Galls With Respect to Number of Parasites Produced

Number of parasites from a gall.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Number of galls from which *A. cacoeciae* emerged	7	17	10	11	8	3	9	2	1	0	1	1	1	1	1	0	0	1
Number of galls from which *P. fulvicornis* emerged.....	20	11	23	12	6	3	2	0	1	0	0	0	0	0	0	0	0	0

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