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## Mass Rearing the Gypsy Moth Pupal Parasitoids *Brachymeria Lasus* and *Brachymeria Intermedia* (Hymenoptera: Chalcididae) for Small-Scale Laboratory Studies

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**MASS REARING THE GYPSY MOTH  
PUPAL PARASITIDS *BRACHYMERIA LASUS*  
AND *BRACHYMERIA INTERMEDIA*  
(HYMENOPTERA: CHALCIDIDAE) FOR  
SMALL-SCALE LABORATORY STUDIES**

S. D. Stowell and H. C. Coppel<sup>1</sup>

ABSTRACT

An economical technique was developed for mass rearing the gypsy moth parasitoids *Brachymeria lasus* and *B. intermedia* using a factitious host, the greater wax moth, *Galleria mellonella* (Lepidoptera: Pyralidae). Percentages of host pupae producing adult *B. lasus* and *B. intermedia* were 72.2 and 67.5, respectively. Percentages of adult wax moths emerging from groups of pupae exposed to populations of *B. lasus* and *B. intermedia* were 3.4 and 9.8, respectively. Mean emergence times of males and females from parasitized pupae incubated at 29° C. were 12.1 days and 13.8 days for *B. lasus* and 11.9 days and 13.5 days for *B. intermedia*. This procedure provides a low-maintenance laboratory culture with high yields from host pupae.

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*Brachymeria lasus* (Walker) and *B. intermedia* (Nees), solitary, endophagous pupal parasitoids of the gypsy moth, *Lymantria dispar* (L.), have been used in both laboratory and field studies involving behavior, development, and other disciplines of research. Large scale production procedures have been developed for *B. intermedia* (Palmer 1985), however, due to the extreme complexity of these procedures, they were considered unsuitable for our needs. By developing a system which needs little attention, yet produces high rates of parasitization, we were able to produce large numbers of parasitoids at a relatively low cost.

MATERIALS AND METHODS

**Host Production and Preparation:** In rearing the host, *G. mellonella*, we used the procedure proposed by Mohamed and Coppel (1983). Materials for preparation of host pupae for parasitism include: 11x11x3.5 cm clear plastic boxes, lids each with a 5x5 cm hole covered with fine mesh screen; 2 cm lengths of Tygon tubing (1/4" IDx1/16" wall). The tubing is placed vertically in the box, filling the entire floor. Approximately 150 fully fed 5th instar wax moth larvae are placed in each box and covered with a lid. The larvae are incubated at 29° C. They pupate singly in the pieces of tubing, allowing the handling and removal of individual cocoons from tubing for parasitism.

**Parasitoid Production and Handling:** *Brachymeria* spp. adults (300-600) are

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Table 1.—Percentages of emergent adult parasitoids, adult moths, and no emergence from pupae exposed to attack by *B. lasus* and *B. intermedia*.

Species	No. pupae exposed	Emergent Parasitoids	Emergent Moths	No Emergence
		$\bar{x}^a$ (range)	$\bar{x}^a$ (range)	$\bar{x}^a$ (range)
<i>B. lasus</i>	1253	72.2 (63.6-77.5)	3.4 (0.4-5.7)	24.3 (17.9-33.0)
<i>B. intermedia</i>	1300	67.5 (57.3-74.7)	9.8 (2.7-15.0)	22.8 (19.5-27.6)

<sup>a</sup>Average percentages of 5 repetitions (N = 5)

maintained in 20x20x35 cm cages with screen sides and a plexiglass front panel for access. Water and honey are provided. *G. mellonella* pupae are placed on the floor of the cage for ca 3 hr, and then removed. The cage back may be placed against a light source to facilitate handling of pupae and prevent escape of parasitoids. Pupae removed from the cage are placed in 11x11x3.5 cm plastic boxes and incubated at 29° C and ambient humidity. Parasitoids are removed upon emergence and placed in the 20x20x35 cm cages.

## RESULTS AND DISCUSSION

Table 1 provides both the average and range of percentages from the data collected. Percentages of male and female parasitoids were 9.0 (3.9-16.9) and 91.0 (83.1-96.1), respectively, for *B. lasus* and 14.7 (9.6-24.2) and 85.3 (75.8-90.4), respectively, for *B. intermedia*. Percentages of parasitoid-caused mortality and unknown mortality were 19.1 (15.0-25.6) and 5.3 (2.9-7.5), respectively for *B. lasus* and 12.4 (11.1-16.6) and 10.3 (8.4-11.0), respectively, for *B. intermedia*. These values show a high rate of parasitoid production for a minimum of labor.

Our mean times of emergence for males and females are  $12.1 \pm 0.7$  days and  $13.8 \pm 0.8$  days for *B. lasus*, and  $11.9 \pm 0.6$  days and  $13.5 \pm 0.7$  days for *B. intermedia*. Burgess and Crossman (1929) stated that developmental time of *B. intermedia* ranged from 20 to 40 days. Dowden (1935) concurred with a time span of 26 to 28 days. Minot and Leonard (1975) found that incubation of *B. intermedia* at 23° C. on *G. mellonella* gave a developmental time of 21.5 days for males and 23.8 days for females. Development on *L. dispar* at 23° C. gave emergence in 24.7 days for males and 27.1 days for females. Palmer (1985) claimed that development at 24-26° C. for *B. intermedia* was ca 25 days. Work on developmental times for *B. lasus* is sparse and sketchy. Joy et al. (1978), in India, stated that developmental time for *B. lasus* took 10 to 16 days in the summer and 11 to 18 days in the rainy season, information of marginal utility, at best. The rates of emergence for *B. lasus* (Fig. 1), and similarly for *B. intermedia* demonstrate the skewed sex ratios in these species (Mohamed and Coppel 1986).

We have used this procedure for two years without problems. The main expense (exclusive of labor) is media for the wax moths and the cost per parasitoid is 0.4-0.5 cents. Approximately 10-12 hr (labor) is required to produce 1250-1750 *Brachymeria* spp. per week.

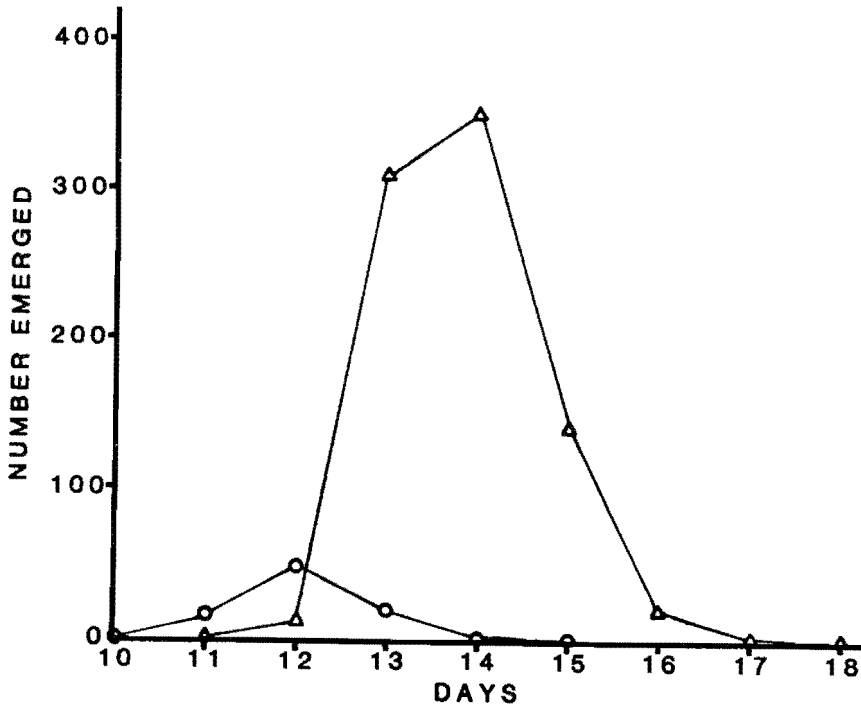


Figure 1. Emergence patterns of male (open circles) and female (open triangles) *Brachymeria lasu*.

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