achieved. Then the crystal oscillator is set to the 20 mph position and another potentiometer is adjusted for the correct 20 mph rate. Once the two extremes (5 and 20 mph) are set, all rates between the extremes are proportionally set. Following calibration the switch is returned to the transducer position. There are a pair of potentiometers for calibrating each of the three channels.

Vehicle speed is indicated by a series of Light Emitting Diodes (LED's) on the front panel of the control box. The pump automatically shuts off at a speed below 3 mph and above 20 mph. At speeds above 20 mph, an audible alarm sounds, indicating to the driver that the pump has shut off. Pumping resumes when vehicle speed drops below 20 mph. The control box also has provisions for spraying while the vehicle is stopped. A red button on the front of the control box automatically starts the pump to deliver chemical at the 10 mph rate as long as it is depressed. The same button is used for flushing, if flushing is done, while the vehicle is stationary.

Since the transducer used in this system is identical to the one used with the Sangamo electronic tachograph, the tachograph can be used with the system. Provisions are made in the control box to pick up the transducer pulses for the tachograph. The tachograph we are using in our system was purchased from Biomeasurement Systems, Inc. (P.O. Box 150, Ambler, PA 19002) and was modified to record only sprayed mileage rather than total vehicle mileage.

A variable flow unit calibrated to pump 3 oz. of malathion per min, at the 10 mph rate, will deliver a total of 18 oz. per linear mile regardless of vehicle speed within the cut-off limits. Use of the tachograph with the system provides an excellent tool for monitoring accuracy of the chemical delivery system. For example, a vehicle accumulating 50 sprayed miles in one evening calibrated to give 18 oz. per sprayed mile should have sprayed 900 oz. of chemical in total. Dividing 900 by 128 (oz./gal) gives the number of gallons, namely, 7.03 gal. Measuring the chemical left in the tank on a daily basis provides an accurate check of system calibration.

Since installation, our Beecomist Servoflo System has logged over 128 hr of usage (almost 2,000 sprayed miles) with no downtime. Much more time would have been logged, however; a shortage of pesticide in August prevented additional hours of spraying. Operator reaction to the new pumping system was extremely favorable. Pump accuracy remained better than 98%. After initial calibration, no further calibration was necessary during the remainder of the season. We plan to install additional units including tachographs as funds become available.

GONOTROPHIC AGE, INSEMINATION, AND *ASCOGREGARINA* INFECTION IN A SOUTHERN WISCONSIN POPULATION OF *AEDES TRISERIATUS*

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During the summer and early fall of 1977, human bait catches of *Aedes triseriatus* (Say) were made in an area of southern Wisconsin endemic for La Crosse (LAC) encephalitis virus. The study was designed to characterize the host-seeking component of the *Ae. triseriatus* population with regard to gonotrophic age, proportion of mated nulliparous females and the percentage infected with the gregarine parasite, *Ascogregarina barretti* (Vavra). The data presented here were derived from dissection of 557 of 826 specimens captured. Some of the results have been cited (as unpublished data) in a number of previous papers, i.e., Miller et al. (1979), Miller and DeFoliart (1979), Scholl et al. (1979a, 1979b); Burkot and DeFoliart (1982), Mather and DeFoliart (1983), and DeFoliart (1983).

The series of catches was made in a forested area on the M.G. and R.P. Hanson farm 35 miles west of Madison. The catches were made at 2 sites within the forest and 2 at its edge. A 6 m wide mowed grass strip separated the forest edge from an abandoned field. The 2 edge sites were 73 m apart; the 2 sites within the forest were 78 and 120 m from the forest margin, and were 42 m apart.

In sampling, the time between sunrise and sunset was divided into 12 equal intervals, and the first 6 and the last 6 intervals were sampled on alternate days. All 4 sites were sampled for a 12-min period during each interval, thus, although the 12 intervals varied in length as the time from sunrise to sunset changed throughout the summer and fall, the sample periods were of constant duration. The order of sampling was determined using a random numbers table.

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Attracted mosquitoes were collected individually in test tubes, labeled according to site and time of capture, and transported to the laboratory in a cooler containing ice. In the laboratory, the mosquitoes were kept under refrigeration and moist paper towelling was placed over the cotton plugs of the test tubes. During the succeeding 3–5 days as many specimens were dissected as time permitted. The presence or absence of sperm in the spermatheca was recorded. The occurrence of the gregarine, *A. barretti,* was determined by examining the Malpighian tubules for oocysts. Nulliparous and parous females were distinguished according to the tracheal method of Detinova (1962) and on the basis of dilatations on the pedicel of the ovariole as described by Polovodova (in Detinova 1962). In a preliminary laboratory study, the ovarioles of several biparous females (4/23) appeared to have only one follicular dilatation. This indicates that some errors may have occurred in age-grading field-collected specimens, and that the percentages of uniparous and biparous females (Table 1) may be overestimated and underestimated, respectively, by 2–3%.

Of the 557 host-seeking *Ae. triseriatus* females dissected, 47% were parous (Table 1). In June all females were nulliparous. The percentage of parous females increased to around 50% during July and this level was maintained through early September, after which the proportion of parous females increased slightly. Biparous females were not encountered until the latter half of July. Overall, 40% of the biting females were uniparous, 7% biparous and less than 1% triparous.

Follicular sacs and retained eggs were observed in 17% and 5%, respectively, of the parous females. Previous partial blood meals were encountered in 9% and 11%, respectively, of parous and nulliparous females.

Age structure of host-seeking *Ae. triseriatus* apparently varies not only through the course of the summer but also from year to year. Scholl et al. (1979b) studied the population at the same site a year later and the overall proportion of nulliparous to parous host-seeking mosquitoes was greater in 1977 than in 1978 (53% nulliparous in 1977 vs 34% in 1978). This difference was most pronounced in the latter half of August when less than 25% of host-seeking females were nulliparous in 1978 (Scholl et al. 1979b). The comparatively high proportion of nulliparous females in August 1977 may be at least partially attributable to unusually heavy rainfall during July and August which insured the continued production of adult *Ae. triseriatus* from many tree holes.

Miller et al. (1979) demonstrated that *Ae. triseriatus* becoming orally infected with La Crosse virus do not produce infected eggs until their second oviposition following the infective blood meal. They concluded, on the basis of the data presented here that only a small proportion of mosquitoes becoming orally infected in nature survive long enough to produce infected egg masses and thereby contribute to winter survival of the virus.

Of the nulliparous females dissected, 33%

Table 1. Seasonal pattern of parity, insemination, and *Ascogregarina* infection in host-seeking *Ae. triseriatus* captured in a southern Wisconsin forest.

Date captured	No. dissected	Nulli-parous (%)	Uni-parous (%)	Bi parous (%)	Nullipars inseminated (%)	% infected with *A. barretti*
6/14	14	100	0	0	29	43
6/16	8	100	0	0	0	75
7/7	38	79	21	0	60	32
7/13	40	68	33	0	42[a]	41[a]
7/18	24	67	25	8	47[a]	41[b]
7/27	31	48	45	6	20	32
8/1	64	53	38	9	18	44
8/7	65	46	46	8	43	31
8/25	51	59	33	8	13	51
9/4	74	51	42	5[c]	39	41
9/13	84	38	56	5[c]	28	41[a]
9/25	53	30	57	13	38	32
10/4	11	27	45	27	33	27
Total and means	557	53%	40%	7%	33%	39%

[a] Number examined 1 less than shown in Column 2.
[b] Number examined 2 less than shown in Column 2.
[c] In addition, 1 triparous specimen was collected.

were inseminated (Table 1). This is lower than the 55% found during the following year in the same forest by Scholl et al. (1979b). As Thompson (1979) has shown that venereal transmission of LAC virus occurs at a significantly higher rate in females that have taken a blood meal before mating with infected males, the high proportion of uninseminated nulliparous females in biting collections is of epidemiological relevance.

Examination of Malpighian tubules revealed that 39% of females were infected with *Ascogregarina barretti* (Table 1). The gregarine was more prevalent, however, in nulliparous than in parous females, this being especially so in the case of virgin females. Fifty percent of 191 virgin nulliparous females contained oocysts compared to 36% of 96 inseminated nulliparous females and 32% of 264 parous females. Some oocysts persist in infected females of *Ae. triseriatus* after their first and even after their second oviposition (30%, n = 37). On the basis of the high natural incidence of *A. barretti* found in this study, Miller and DeFoliart (1979) restudied *Ae. triseriatus* larval susceptibility to infection from ingested LAC virus (Miller et al. 1978) and found that *A. barretti* infection does not increase larval susceptibility, nor do the spores serve as a vehicle for the virus.

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EFFICACY OF THREE INSECT GROWTH REGULATORS ON THE DEVELOPMENT OF *AEDES AEGYPTI*

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The basic strategy in utilizing insect growth regulators (IGRs) is to interrupt the development and growth processes of the target organism and thus inhibit emergence of an adult population. A number of IGRs such as methoprene (Altosid) (Mulla and Darwazeh 1975), diflubenzuron (Mulla et al. 1974) and Mon-585 (Jakob 1972) have shown exceptional high levels of activity against mosquitoes or chironomid midges. The growth regulating activities of benzyl, 1,3, benzodioxole derivatives and benzylphenols were reported by Nelson and Tehrani (1982) on the yellow fever mosquito, *Aedes aegypti* (L.), and Dame and Jurd (1983) on three mosquito species, *Anopheles quadrimaculatus* Say, *An. albimanus* (Wied.) and *Ae. taeniorhynchus* (Wied.). This study reports the inhibitory or ovicidal activities of J2532, J2645 and J2644 on *Aedes aegypti.*

The *Aedes aegypti* stock used was from an established laboratory colony. Adults were maintained on 10% sucrose solution supplemented with a blood meal for the females from a restrained mouse. Larval diet consisted of finely ground Purina dog chow. The technical grade compounds J2532 (2, 4-bis [1,1-dimethylethyl]-6-[4-methoxyphenylmethyl]-methoxybenzene), J2645 (2, 6-bis [1,1-dimethylethyl]-4-[4-methoxyphenylmethyl] phenol), and J2644 (2, 4-bis [1,1-dimethylethyl]-6-[4-methoxyphenylmethyl] phenol), were supplied by Dr. Leonard Jurd, Western Regional Research Center, ARS, USDA, and Dr.