

Further observations made from the use of these screen traps throughout the spring and summer showed that the insect migrates from corn bins to the fields during the warmer part of the day. Single specimens of the weevil were caught during warm weather as early as April 6, and occasionally thereafter through May, on low-level screens that were some distance from corn bins. No specimens were caught on a series of screens from 12–65 ft above the ground, $\frac{1}{4}$ mile from the bins, even during the peak of migration.

A few weevils left the bins during June and early July, but about mid-July the grand exodus got underway. Flights increased through July, remained high during August, and dropped off by mid-September. During this period in 1961, 23,589 weevils were trapped by these screens with 1372 of them caught July 25–26, the peak of migration.

The increase in weevil flights in 1961 and 1962 occurred about the time the corn reached 65% moisture (dough stage), when the silks turned brown and dry. Powell and Floyd (1960), working in Louisiana, found that oviposition can occur in such corn.

General observations indicated that once weevils find corn that is susceptible to their invasion, further migration ceases. To check this, about 700,000 weevils were distributed uniformly over a 4-acre field of corn on August 3, 1960. When harvested during the last week of October corn in this field was heavily infested, while similar corn growing about 100 yards away had only an occasional weevil present. This was additional indication that the insects remain where there is available food. Observations in 1961 and 1962 confirmed this detail.

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Control of *Histiostoma laboratorium* in *Drosophila* Cultures¹

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An almost universally used animal in genetic research and teaching is the vinegar fly, *Drosophila melanogaster* (L.). Media and culture conditions used for *Drosophila* are ideal for reproduction of several kinds of mites. Some mites are able to feed on pupal cases. One mite is so common in genetics laboratories that it was given the name *Histiostoma genetica* (Stolpe 1938). It is now known as *H. laboratorium* Hughes (1950). Strickberger (1962) recommends that, once infestation of *Drosophila* stocks has been discovered, all such stocks should be autoclaved. He suggests that valuable stocks may be saved by starting new cultures with flies that have been carefully examined and found free of mites. However, even with extreme caution it is extremely difficult to eliminate mites from *Drosophila* cultures. The reproductive potential of mites is much greater than *Drosophila* and the reproductive cycle is much shorter. Thus *Drosophila* cultures rapidly become overrun with mites.

METHODS AND MATERIALS.—This study reports the use of Kelthane® (1,1-bis(*p*-chlorophenyl) 2,2,2-trichloroethanol) to control mite infestations in cultures of *D. melanogaster*. Source of Kelthane for this study was Spider Smite (Destruxol Corp. Ltd., Pasadena, Calif.) containing 18.5% Kelthane as the only active ingredient. This was diluted

Table 1.—Mean number of mites per fly.

ppm Kelthane	Treated bottles		Treated bottles and media		Treated media	
	14 days	21 days	14 days	21 days	14 days	21 days
925	0.01	0.76 ^a	b	b	0.07	1.01
463	.01	.05	b	b	.10	.67
231	.04	.20	b	b	.13	1.87
115	.04	.42	.00 ^a	2.12 ^a	.08	1.66
57	.04	2.07	.33	.77	.46	1.82
0	1.00	2.54	1.00	2.54	1.00	2.54

^a Less than 40 flies per bottle.

^b No flies recovered.

in water before use. Insolubility in water necessitated shaking before use.

Three methods of Kelthane application were used: (1) clean $\frac{1}{2}$ -pt milk bottles were rinsed in various solutions of Kelthane and air dried before adding media; (2) milk bottles already containing media were rinsed with Kelthane solutions and sealed without drying; (3) 1 part Kelthane solutions were added to 9 parts media as it was being prepared and added to clean, nontreated bottles. Media used consisted of 8 g agar, 75 g cornmeal, 15 g brewer's yeast, 150 ml unsulphured molasses, and 1 liter of water. Five concentrations of Kelthane were used in each experiment. Each treatment was replicated 3 times. Flies used were *D. melanogaster* stocks heavily contaminated with mites. Additional mites were added to each bottle. Examination of mites indicated they were *Histiostoma laboratorium* Hughes. Seven days after flies and mites were added, the flies were removed. At this time the bottles were coated with *Drosophila* pupae and many larvae were present. On the 14th day of the study, 40 flies were removed from each bottle and examined for mites. On the 21st day of the study 40 more flies from each bottle were examined. A few bottles failed to produce the needed number of flies (Table 1).

RESULTS AND DISCUSSION.—It is evident from the results presented in Table 1 that Kelthane was an effective means of controlling the mites in this study. All Kelthane-treated bottles and media produced fewer mites than the untreated controls. These differences were all statistically significant. In preparing the bottles coated with Kelthane after the media was already in the bottles, it was not practical to air dry these bottles, as open bottles containing media are likely to be contaminated with flies, yeasts, and molds. In these cases the *Drosophila* either became stuck in the moist bottles or were killed by the Kelthane in higher concentrations. It appears that Kelthane is lethal to *Drosophila* in liquid form at concentrations that are not lethal in dry form.

Adding Kelthane to the food partially controlled mites. However, these mites were able to feed on pupal cases on nontreated walls and not come in contact with the Kelthane. With this type of treatment, mite reproduction would be expected to be better than with the 2 others. Differences in number of mites did not vary significantly according to the Kelthane concentration in the food.

Pretreatment of bottles and drying before adding media seems to be a practical and efficient means of controlling mites. While mites are not entirely absent from these bottles, their numbers are quite low; enough so that rearing several generations in treated bottles would likely eliminate the mites. Pretreatment of bottles could be used to prevent contamination of *Drosophila* stocks. In the pretreated bottles, the flies in bottles treated with solutions of 925 ppm Kelthane were not so productive as with lesser amounts. It would appear that this concentration is a semilethal dose. The most effective nonlethal dose would be in the range of 230 to 463 ppm.

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Effects of Apholate on a Restricted Population of House Flies¹

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Laboratory studies (LaBrecque 1961) and field investigations (Gouck et al. 1963) have indicated that apholate can greatly affect fly populations but these tests left unanswered some questions and practical problems.

Accordingly, studies were conducted in 1963 with caged populations of susceptible (Wilson strain) house flies, *Musca domestica* L., to determine the effect on several successive generations of a restricted population with and without apholate bait and to study reaction of flies to location and kinds of bait.

MATERIALS AND METHODS.—For these tests, cages were constructed 6X6X7 ft high with 16-mesh aluminum screen on the inside of the wooden frame and with a Pliofilm plastic floor. The cages were housed in the cattle barn at the College of Agriculture.

Reconstituted dry skim milk was used as the standard food media for all flies. In the treatment cage apholate was fed as a 2% dry sugar bait in 2 dishes on the floor, each Monday and Thursday. In the comparison unexposed cage sugar was fed instead of the bait.

Standard breeding medium (Chemical Specialties Manufacturers Association) was placed initially in jars and later in a large box for egg deposition and for maggot development.

Data were taken 3 times a day by counting the number of flies resting on six 1-ft² areas, 2 each on the floor, on the walls, and on the ceiling. A second measure of fly population was obtained daily by collecting and counting the dead flies in each cage.

From time to time viability of eggs was determined by isolating eggs and after 24 hours recording the numbers hatched.

A third cage was used for comparison of effectiveness of different baits and bait effectiveness when placed on the floor and at 2.5- and 5-ft levels.

RESULTS.—Test 1.—This test was begun June 12 with 1-day-old flies (1000 of each sex) and was terminated July 5, at which time the flies were in the third generation. In the cage without apholate 13,984 flies were produced and where apholate was fed only 324 were produced or a reduction of 97% attributable to the chemosterilant. On June 18 viability of eggs was determined as 8% with flies where apholate was fed and 40% in the cage where no apholate was available.

Test 2.—An attempt was made to more nearly simulate field conditions which might occur at the beginning of a control program by using a mixture of equal numbers of 1- and 3-day-old flies (1000 of each sex) in each of 2 cages. This test was begun July 7 and terminated August 30. Apholate was fed as a 2% sugar bait on the floor and at

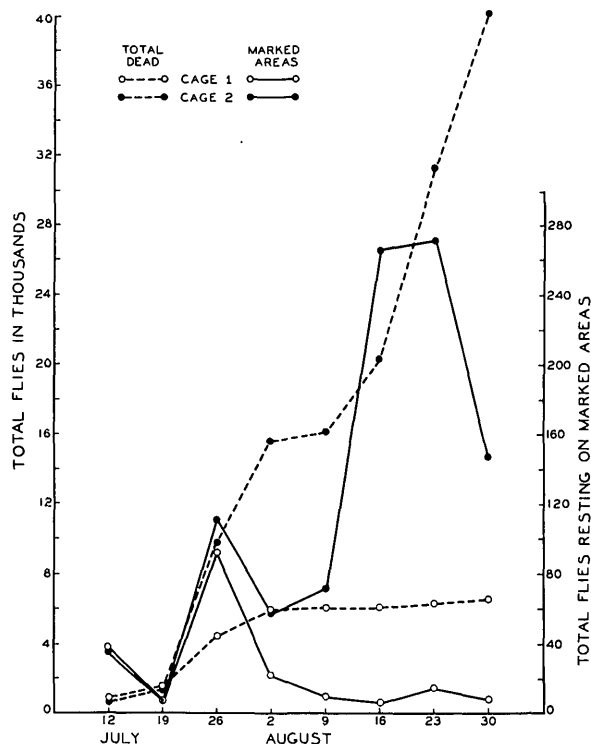


FIG. 1.—Comparison of fly populations with continuous exposure to apholate bait (Cage 1) and unexposed (Cage 2) measured as dead flies and live flies on marked areas.

3 ft from the floor in Cage 1 and sugar alone was fed in a similar fashion in Cage 2.

Data are presented graphically in Fig. 1, which show the weekly average of flies resting on six 1-ft² areas (2 each on ceiling, walls, and floor) and the cumulative number of dead flies collected from each of the cages. For the first 2 weeks the populations in the 2 cages were similar but with a slightly greater mortality in the apholate-treated population. At that point there was a large increase in population in both cages, but less where apholate was used. The rest of the season the population declined with the apholate treatment but increased rapidly without apholate. If the initial population is subtracted and if the number of adult flies emerging after termination of the test on August 30 is added to the totals shown in Fig. 1 we have a total of 4977 for Cage 1 where apholate was fed and 49,979 in Cage 2, or 90.9% reduction from apholate. The marked areas gave more variable results because of temperature and weather fluctuations but show that the actual population declined to a very low number with apholate but increased to a peak and then dropped suddenly with no chemosterilant. This sudden decline was caused by death of the very small flies resulting from the excessive larval populations in the available medium.

In Test 2, females were isolated periodically from each cage and all eggs produced by each fly were checked for viability. Males were paired with laboratory-reared virgin females and eggs from these flies were used to check the effect of apholate on males.

When exposed to apholate bait only 38% of the 193 ♀ isolated laid eggs and each female laid an average of 55 eggs whereas without apholate 49% of 173 ♀ oviposited an average of 66 eggs. When 64 ♂ exposed to apholate were mated with virgin females, 18% of these females oviposited an average of 57 eggs compared with no apholate where, of 74 ♂ similarly mated, 28% of the females laid an average of 59 eggs. In these tests females that had an opportunity to feed on apholate laid fewer eggs, fewer

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