ingredients had any repellent effect. Similarly, the alcohol base solutions of the above three mosquito repellent materials, at any of the three concentrations, failed to provide protection for over 5–10 minutes after application.

A formulation developed by McLaughlin Gormley King Company of Minneapolis, Minnesota, Intermediate 5734, however, was found to be effective in preventing the gnat from landing on treated surfaces for periods of two hours and longer. The formulation contains the active ingredients Deet and other isomers, N-octyl bicycloheptene dicarboximide, 2,3:4,5-bis (2-butylene) tetrahydro-2-furaldehyde and di-n-propyl isocinchomeronate. The repellent is marketed by the Canaan Products Division of Colgate Palmolive Company under the name, Wash 'n Dri® "Insect Repellent Towelette," and by the Fuller Brush Company as "Insect Repellent Gel."[2] The former product, an alcohol base towelette, has been used for the last two years when working near the breeding grounds and has proven effective and comfortable in routine use.

Due to the close taxonomic association between *L. kerteszi*, *L. torrens* (Townsend), *L. bequaerti* (Kieffer), and *L. nipponensis* Tokunaga, the same repellent formulation may also be useful against these species. No published records of repellents effective against the latter three species have been found.

The wide distribution of *L. kerteszi* in western United States, its persistent attack behavior, and the difficulty in obtaining control of the immature and adult stages of this insect, make the availability of an effective repellent noteworthy.

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[2] Mention of these commercial products does not imply endorsement.

A PROCEDURE FOR DETERMINING THE ONSET OF DIAPAUSE IN *Aedes vexans* (MEIGEN)

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Diapause, that unique mechanism for survival, is displayed in the eggs of *Aedes vexans*. Whether the initiating stimulus for this species is reduction of temperature, photoperiod, or a combination of both has not been fully established. We do know that embryonic development stops just short of hatching in the fall, and the eggs will not hatch no matter how favorable environmental conditions may be. This reduction in hatchability is a gradual and somewhat labile phenomenon, beginning as early as the middle of August at 45° north latitude, and diapause is not completely established until the middle of October (Table 1).

TABLE 1.—Percent hatch of *Aedes vexans* eggs in relation to date.

Date	1966	1967	1968	1969	1970
18 Aug.	79.8	....	....	94.2	93
25 Aug.	36.7	47.3	64.3	88.0	84
1 Sept.	54.3	35.9	58.5	83.0	28
8 Sept.	39.2	25.7	29.9	53.3	25
15 Sept.	26.9	26.8	24.3	61.3	11
22 Sept.	5.6	31.7	31.6	54.9	18.7
29 Sept.	4.0	0	17.2	12.5	9.0
3 Oct.	2.7	0	11.8	24.1	1.9
13 Oct.	0.5	0	0	2.0	0

[1] Entomologist and Director-Entomologist respectively.

To our mosquito control district it is a matter of great interest to be able to monitor the progress of diapause in this particular mosquito because it is our most abundant and troublesome pest. We have devised the following procedure to do this.

From a *vexans* breeding site known to be very productive of large populations we first take a series of soil samples to determine the area of greatest egg deposition. These soil samples are 3 inches square by ½-inch deep. When the deposition area has been established, standardized samples are taken from it on a weekly basis starting the middle of August and extending through the first week in October. The samples are brought into the laboratory and processed as follows.

The 3-inch squares of soil are first immersed in 8 x 12 inch white enamel pans in plain tap water. Quicker hatch is obtained if the water is about 78F. The larvae are pipetted off and counted as they hatch. The warmth provided by a 100-watt gooseneck lamp placed about 2 ft. above the surface keeps the water temperature at an optimum level. After 24 hours the remaining larvae are removed and the final larval count made. Normally there is sufficient microbiological activity in the soil to create a reduced oxygen tension, thereby providing the hatching stimulus for the eggs.

The following series of procedures are to find the number of eggs remaining in the soil and thereby determine the percent of hatch. After removing as much of the floating debris (grass, leaves, twigs, etc) as possible, the water is decanted off through a 100-mesh bronze screen to catch any larvae which might have been overlooked. The eggs sink to the bottom in tap water. The soil is then scraped (a rubber kitchen spatula works very well) into a dish-pan containing about a gallon of 95 percent salt (NaCl) solution. Ordinary commercial flake salt such as is used in water softeners is adequate for this purpose. The soil-salt solution is stirred vigorously and then allowed to settle for a few minutes. The specific gravity of the mosquito eggs being less than that of the salt solution, the eggs float to the surface where they can be skimmed off, again using the 100-mesh bronze screen.

Of course there will be some debris as well as eggs on the screen. In order to remove as much of the debris as possible, wash the contents of the screen into a beaker. Then pour this through a double set of screens, the upper one being ordinary, coarse 30-mesh window screen, the lower one being 100-mesh. Run a rapid stream of water through these screens for a couple of minutes. This washes out the eggs from most of the debris. The eggs are caught by the 100-mesh screen while the largest pieces of debris are screened out by the coarse screen. Several stirrings, scrapings, and screenings are necessary to obtain all the eggs. When no more can be obtained by scraping, the remaining liquid is decanted through the 100-mesh screen to catch any eggs that may have been missed.

The rinsed scrapings from the 100-mesh screen are then washed into a beaker. This liquid is poured through a glass funnel lined with #8 ruled, 9 cm filter paper and then the filter paper is removed and examined for eggs. The lines greatly facilitate the counting of the eggs when the filter paper is spread out in a petri dish. Of course, only plump embryonated eggs are counted. The total unhatched egg as well as the larval population of the soil sample has then been obtained, and the percent of hatch can be calculated.

Through weekly sampling we are able to observe the extent to which diapause has been established. By correlating this information with our rainfall data, we know what to expect by the way of potential *Aedes vexans* production and can direct our early fall control operations accordingly.