DISPERSAL OF GENETICALLY MARKED FEMALE *AEDES AEGYPTI* IN MISSISSIPPI

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INTRODUCTION. Release studies carried out in the fall of 1967 in an urban area of Meridian, Mississippi, demonstrated that insectary-reared *A. aegypti* males carrying the semidominant genetic marker Silver mesonotum (*Si*) can locate and inseminate native females in the field (Fay and Craig, 1969). However, very limited information on the age and sex composition of the local *A. aegypti* population at that time prohibited definite conclusions on the mating effectiveness of the release males compared to that of the native males. To gain more specific information on the effectiveness of released males, especially in view of the sterile male technique (Knipling, 1960; Morlan *et al.*, 1962), further release experiments were conducted in 1968 (Bond, Craig and Fay, 1970).

In two study areas of about 400 x 400 yards, daily releases of approximately 3000 genetically marked males were made for periods of 22 and 25 days, respectively. In samples of males caught by the blacktrap method (Fay and Prince, 1970), ratios of up to 12 released males per 1 native male were observed at the end of the release periods. Despite the large preponderance of released males in these study areas, the highest rate of marker recovery in pooled egg collections from the same areas was only 19 percent. This unexpectedly low recovery could reflect that: (a) the proportion of virgin females produced in the release periods was very low; (b) the effectiveness of the released males in the field was largely inferior to that of the native males; or (c) the emigration of marker-mated females and the immigration of wild-mated females were considerable. None of these factors could be completely excluded. However, since females carrying other genetic markers showed a rather rapid dispersal towards the limits of the study areas when released at a central point, the two study areas apparently were too small to obtain accurate data on the full effects of released males on an established field population.

Therefore, for 1969 a study on the dispersal behavior of *A. aegypti* females under the conditions encountered in Meridian seemed to be the next logical step to evaluate the feasibility of the sterile male technique or other methods of genetic control (Knipling *et al.*, 1968). In previous years the recovery, by the ovitrap method, of genetically marked offspring (Fay and Eliason, 1966) had given very satisfactory results, and it was again decided to use genetically marked *A. aegypti* females for the dispersal studies. Releasing genetically marked adults and recovering their offspring differs fundamentally, however, from the more conventional mark-release-recapture methods, where the recapture of released individuals is attempted. Neither the positive ovitrap nor the single egg producing a marked mosquito can be related unequivocally to a release unit; therefore, the recovery data must be treated as information on egg or gene dispersal and does not permit conclusions regarding the number of females involved.

MARKER STRAINS. The marker strains selected for the release experiments are listed in Table 1. Since the observation of dispersal relies mainly on the recovery of offspring, the table also includes information on the fecundity of the strains

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TABLE 1.—The marker strains of *A. aegypti* used in the release studies.

Strain	Genetic markers: Mutant		Genetic markers: Body parts affected	Fecundity in insectary: No. ♀♀	Fecundity in insectary: Mean No. eggs	Fecundity in insectary: S.E.
MISS MARK	Silver spot	*Si* *s*	mesonotum abdomen	25	76.4	4.5
BLACK TARSI	black-tarsi	*blt*	legs	25	94.4	4.7
BLACK PALP	black-palp compressed	*blp* *co*	palps+legs antennae	25	95.0	2.7
BRONZE	bronze	*bz*	whole body			
homozygous ♀♀			non-viable bronze eggs	25	104.0	4.0
heterozygous ♀♀			viable wild type eggs	24	90.0	3.9
MERIDIAN	Females reared from field-collected eggs			14	100.1	6.4
Field population	Field-collected gravid females			25	69.2	4.8

under optimal conditions in the insectary. A general description of the genetic markers is given in Craig and Hickey (1967). With the exception of BRONZE all marker strains were constructed by crossing the mutants into the genetic background of the local Meridian population. Specific information of the marker strains and their construction is presented in Fay and Craig (1969) for MISS MARK, in Bond, Craig and Fay (1970) for BLACK TARSI and BLACK PALP, and in Bhalla and Craig (1967) for BRONZE.

REARING OF THE RELEASE STRAINS. The large numbers of eggs needed for the release experiments were produced in the insectary of the Vector Biology Laboratory at Notre Dame University just before the releases. For mass rearing of the release mosquitoes, the procedure described by Morlan, Hayes and Schoof (1963) was followed. Pupae were separated from larvae on 2 subsequent days and, where necessary, sexed by means of a mechanical separator (Fay and Morlan, 1959). The pupae were then allowed to emerge into 1-gallon cardboard cages. All pupae which failed to produce adults within 72 hours after the first emergence were discarded. To give all females sufficient time to reach the age of sexual receptivity (Gwadz and Craig, 1968), the sexes were held together for 6 days after the first adults had emerged. Following light etherization the sexes were then separated and the females released at 6 a.m. on the seventh day. Thus the age of the females, when released, was between 4 and 6 days. The insemination rates of the released females were determined on samples of 30 or more females. In all cases where mated females had to be released, the effective release figure is an estimate based on the number of females actually released and the insemination rate of the sample. A summary of the releases is given in Table 2.

The low proportion of mated MISS MARK females in the second release served a special purpose. The fact that an adult *A. aegypti* heterozygous for the marker Silver mesonotum (*Si* +) can be distinguished from either homozygous adult was used to give information on

TABLE 2.—List of the releases made in Meridian and Hickory.

Meridian					
Strain	Release date	Sex	Total No.	% insem-inated	Effective No. Estimate
BLACK TARSI	VII/8	♀	1700	100	1700
BLACK PALP	VII/8	♀	1800	91	1650
MISS MARK	VII/11	♀	4800	35*	1700
		♀		virgins	3100
BRONZE					
homozygous	VII/22	♀	2400	virgins	2400
heterozygous		♀		95	2300

Hickory					
Strain	Release date	Sex	Total No.	% insem-inated	Effective Estimate No.
MISS MARK	VII/9	♂	3750		3750
BLACK TARSI	VII/14	♀	3500	97	3400
BLACK PALP	VII/14	♀	3750	94	3500

*It was intended to release equal numbers of inseminated and virgin MISS MARK females, however, only about 70 percent of the 2,400 females set up for mating in the laboratory were actually inseminated at the time of release. The insemination rate among the total MISS MARK release was thus only 35 percent.

the time needed by a female to find a male. If virgin and mated MISS MARK females are released simultaneously, any delay in the recovery of heterozygous as compared to homozygous offspring would indicate that finding a mate is on the average more time-consuming than finding a bloodmeal and developing the eggs. The males saved in this way were released in a second release area as a repetition of the 1967 experiment (Fay and Craig, 1969).

REARING OF ADULTS FROM FIELD-COLLECTED EGGS. All *A. aegypti* eggs collected in the release areas by the ovitrap method were conditioned for 3 days and then shipped to the Vector Biology Laboratory at the University of Notre Dame, Notre Dame, Indiana. There they were stored at 60° F and 85 percent relative humidity until the adults could be reared and examined for the presence of genetic markers. Hatching of the eggs followed in the same sequence as collecting, and the last eggs, collected on August 1, were reared by the end of October.

RELEASE AREAS AND EXPERIMENTAL DESIGN. Two different areas were selected for the release experiments: one was in a suburban sector of Meridian (population 50,000) and one was in the small country town of Hickory (population 600), about 20 miles west of Meridian along U.S. Highway 80.

THE MERIDIAN EXPERIMENT. The Meridian experiment was designed to measure the dispersion of eggs laid by the marked females at given intervals after the release. The experiment was also expected to show the influence of socio-economic and topographic factors on dispersal.

Since it was intended to observe maximum dispersal distances, a circular study area adequate in size to observe maximum distances in all directions was impracticable because of the labor required. One person can service only about 80 ovitraps in a day. It was therefore decided to observe the dispersal along one axis only, which had to extend over an expected maximum dispersal range of 1,000 yards. A valley in suburban Meridian, which

descends gently from north to south, was selected as the study area, and a grid of 160 ovitraps was adapted to it.

The area of approximately 160 acres comprised 60 city blocks, with a total of 621 premises, and was bisected by a creek into an eastern and a western half. From a socio-economic point of view, the area could be divided into nearly equal northern and southern halves. The southern half—369 premises—was rather densely populated, predominantly by poor to middle class Negroes. The northern half—252 premises—was inhabited mainly by middle class Caucasians. The distribution of outdoor larval habitats and the ovitrap grid are shown on Figure 1. The ovitrap grid consisted of 20 rows of eight ovitraps each. The distances between ovitrap rows were 320 feet, and, within a row, the ovitraps were 125 feet apart. The ovitraps were placed at the most suitable location, whenever possible within 20 feet of the ideal grid point. The rectangular area covered by the ovitrap grid extended over 6,300 feet from north to south and 1,000 feet from east to west.

Equal numbers of females were released (Table 2) at eight points on the street which separated the area into a northern and southern half. During the prerelease period, the egg paddles in the ovitraps were collected twice a week, i.e., at 3- and 4-day intervals. After the releases, egg collections were made daily or at 2-day intervals.

In July air temperature and humidity fluctuated between daily averages of 71°–85° F and 68–96 percent relative humidity. The lowest daily minima in this period were 68° F and 42 percent relative humidity. The highest daily maxima were 102° F and 100 percent relative humidity. There was no prevailing wind direction, and the rainfall measured at three different spots in the release area averaged 6.74 inches.

THE HICKORY EXPERIMENT. In the Hickory experiment dispersion of the released adults was still the essential problem. Since maximum dispersal distances were not considered, however, the area could be kept smaller and the deposition of marked eggs could be observed in all directions.

The available time restricted the number of ovitraps which could be serviced to about 50. The completely flat area covered by the ovitrap grid (Figure 5) comprised

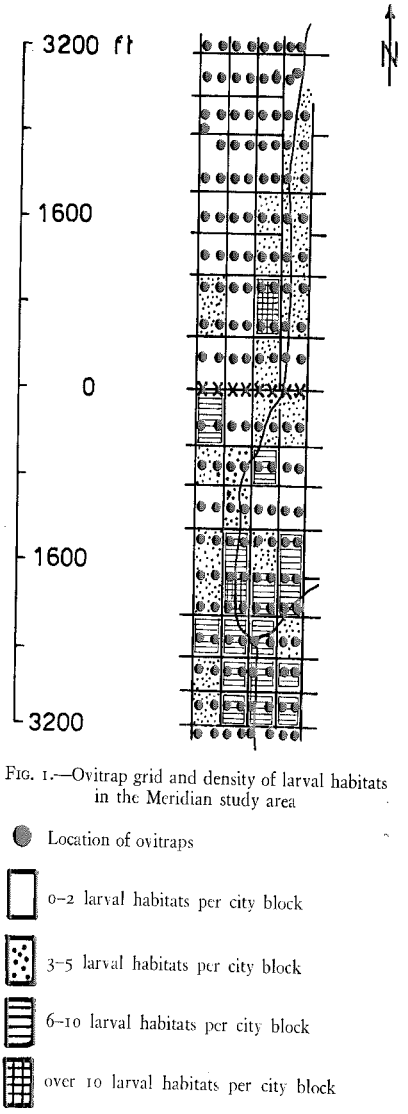

FIG. 1.—Ovitrap grid and density of larval habitats in the Meridian study area

46 acres and 64 premises with an estimated population of 180 persons. The wide spaces between the houses were covered by vegetable gardens, grass, weeds, shrubs and occasional shade trees. The releases (Table 2) were made at a road intersection, and the ovitraps were placed in circular patterns at 200, 400, 600, and 800 feet from the release point.

RESULTS. *The Meridian experiment.* The Meridian experiment was started on June 20 and ended on August 1. The total collection, including marker eggs, during this period amounted to 24,739 *A. aegypti* eggs or 3.68 eggs per trap and day. The weekly egg production, as measured by the ovitrap method, increased in this period about 10 times, with a slight recession in the second week of July (Figure 2). This recession was probably due to intense rainfall which interfered with flight activity and egg laying. Ovitraps in neighborhoods with many larval habitats showed a significantly higher egg yield per trap. This finding indicates that the adult *A. aegypti* population had a clumped distribution.

Since the genetic markers *Si, blt,* and *blp* had been introduced in some other areas of Meridian in the previous year, six prerelease egg collections were carried out between June 20 and July 10. A total of 7,497 eggs (2.34 eggs per trap and day) were collected. No marked individuals

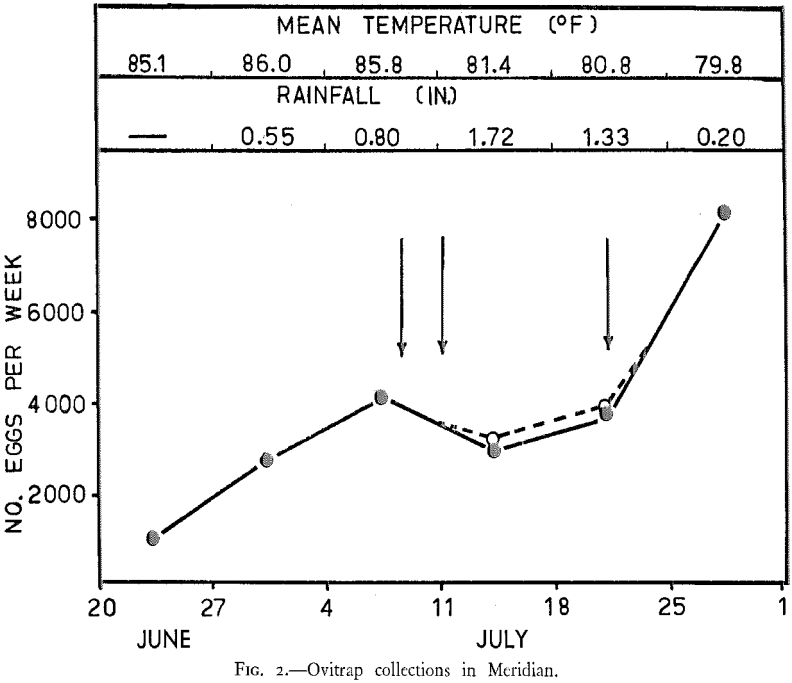

FIG. 2.—Ovitrap collections in Meridian.

Oviposition of native population

Increase in oviposition due to release of genetically marked females

Release dates

were found among the 3,811 adults that were reared successfully.

In 15 postrelease collections from July 10 to August 1, 17,098 eggs (4.86 eggs per trap and day) were secured from which 11,613 adults were reared. Of these, 175, i.e. 1.5 percent, were offspring of 7,650 released females of the strains MISS MARK, BLACK TARSI and BLACK PALP; 33 were bronze adults and, thus, the offspring of 2,300 heterozygous bronze females mated to homozygous bronze males; and 44 bronze eggs from one ovitrap were the only recovery of the 2,400 released homozygous bronze virgins. Assuming that the mortality of the marker eggs was the same as for the native population, the contribution of the released females to the egg production in the study area can be estimated as a modest 2.5 percent (Figure 2). The recovery of marker eggs, however, was attempted only along one axis, whereas the released females dispersed in all directions.

The recovery of the different markers on a time basis (Table 3) or on a location basis (Figure 3) gives no indication of differential dispersal into the northern or southern half of the study area. Though less fertile in the laboratory, the MISS MARK strain gave the best recovery results. No relevant time difference between the recovery of homozygous and heterozygous MISS MARK eggs was observed. This means that the successfully reproducing MISS MARK females, which had been released as virgins, lost no time in their first gonotrophic cycle though they had to find a bloodmeal and a mate, whereas the mated females needed a bloodmeal only. About 76 hours after the release—this corresponds to the average time for egg development in the laboratory at 77° F (Christophers, 1960)—

TABLE 3.—Timing of recoveries of genetic markers in the release area of Meridian.

Strain and No. Individuals Released	Release date	No. of eggs giving rise to marked adults * Days after release 2	3	4	5	6	7	8	9	10	Total
BLACK TARSI 1700	VII/8	..	/	/	/	18 (3)	..	..	..	..	18 (3)
BLACK PALP 1650	VII/8	..	/	/	/	..	2 (1)	..	..	..	2 (1)
MISS MARK mated ♀♀ 1700	VII/11	..	3 (1)	44 (4)	..	..	..	..	/	..	47 (5)
MISS MARK virgin ♀♀ 3100	VII/11	..	12 (1)	56 (8)	..	..	9 (1)	19 (1)	/	10 (1)	106 (12)
BRONZE heterozygous ♀♀ mated to homozygous ♂♂ 2300	VII/22	..	33 (2)	..	..	..	..	..	/	..	33 (2)
BRONZE homozygous virgins 2400	VII/22	..	44 (1)	..	..	..	..	..	/	..	44 (1)
Total		..	92 (5)	100 (12)	..	18 (3)	11 (2)	19 (1)	..	10 (1)	250 (24)

* Number in parentheses = No. of ovitraps containing marker.
.. .. = collection negative for marker
/ / = No collection made.

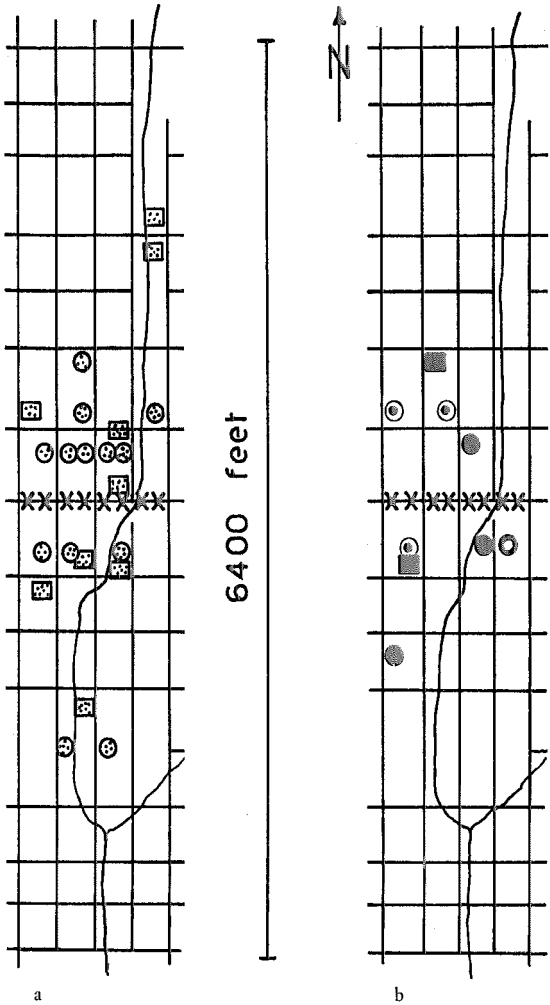

FIG. 3.—Dispersion of the released marker strains in Meridian.
(a) Recovery of MISS MARK.
(b) Recovery of BLACK TARSI, BLACK PALP, and BRONZE.

Marker recoveries from ovitraps

Marker recoveries from larval habitats

MISS MARK

BLACK PALP

BLACK TARSI

BRONZE

the first eggs with the marker *Si* were recovered in the first ovitrap rows 320 feet north and south of the release street. The farthest recoveries of *Si,* up to the third row in the north (960 feet) and to the fifth row in the south (1,600 feet), were obtained by the fourth day after the release and thus within the time span of the first gonotrohic cycle. The last collections of eggs with the mutant *Si,* made between the seventh and tenth day after the release could represent eggs produced in the first as well as in the second gonotrophic cycle. Egg collections continued to the 20th day after the release.

In collections of larvae from larval habitats, heterozygous and homozygous offspring of MISS MARK females were found between days 5 and 13 after the release. The farthest collection, about 1,900 feet north of the release street, was made on July 24, 13 days after the release and contained homozygous as well as heterozygous offspring. The first adults of the F_1 were caught in blacktraps 17 days after the release. This time span is only slightly longer than the shortest generation time in the laboratory.

Single observations of released MISS MARK females showed a rather rapid dispersal from the release street. Only 1.5 hours after the release, one MISS MARK female was caught with a handnet approximately 900 feet to the south of the release street, and between 2–4 hours after the release, a second female was caught in a blacktrap 700 feet away in the same direction.

The recovery of offspring from the other strains was less rewarding (Table 3, Figure 3). The eggs of the BRONZE releases appeared also on the third day ($\sim$ 76 hours) after the release, but, unlike the situation with MISS MARK, no positive collections occurred later. In collections from larval habitats, only BLACK TARSI offspring were recovered.

One of the objectives of the Meridian release study was to obtain information on the range within which any given proportion of the eggs are laid when the females producing these eggs are released from one site. Only in the MISS MARK release were the recoveries sufficient that such estimates could be attempted. Based on the recovery of MISS MARK from ovitraps and from larval habitats (Table 4 a and b, column 6) about 70 percent of all MISS MARK eggs were deposited within 600 feet and 99 percent within 1,900 feet from the release street. Since no ovitraps were placed on the release street itself and since the nearest larval habitat sampled was about 100 feet from the release street, the dispersal estimates should be conservative.

THE HICKORY EXPERIMENT. In the Hickory experiment, June 25 to July 30, the total egg collection amounted to 2,869 or 1.71 eggs per trap and day. The ovitrap egg collection in the area showed a peak in the first week of July, a decline in the second week which was as in Meridian related to the rainfall, and an increase in the following 2 weeks (Figure 4). The contribution of the marker females accounted for most of the oviposition in the first week after the release, but it was small in the last week of the experiment. The oviposition of the native population in the ovitraps showed, as in Meridian, a clumped distribution of the adult *A. aegypti* population. In the two northern sectors of the ovitrap grid, significantly more eggs were collected per ovitrap than in the southern sectors, and within the northern sectors the highest egg yields per trap were obtained in the third trap circle.

From the prerelease collections, 334 adults were raised. None of these showed a color mutant which could interfere with the recognition of the released markers.

On July 9, 3,750 homozygous MISS MARK males were released. In the following week only eight traps were positive, with a total of 246 *A. aegypti* eggs. Seventy-five adults could be raised, and 44—all from two traps—were heterozygous for *Si.* None of the later egg collections produced further offspring of the MISS MARK male release.

TABLE 4.—Recovery of MISS MARK offspring in relation to the distance from the release point in Meridian.

a. Collections from ovitraps

Distance (feet)	No. eggs collected in post-release period	No. offspring reared	No. ovitraps pos. for MISS MARK	No. MISS MARK offspring	% MISS MARK offspring cumulative
320	1506	914	12	109	71.2
640	1375	959	2	13	79.7
960	1915	1257	1	6	83.7
1280	2622	1914	/	/	83.7
1600	2405	1717	2	25	100.0
1920	1901	1306	/	/	
2240	2216	1361	/	/	
2560	1678	1184	/	/	
2880	800	566	/	/	
3200	690	435	/	/	
Total	17108	11613		153	

b. Collections from larval habitats

Distance (feet)	No. larval habitats sampled	No. larvae reared to adults	No. larval habitats pos. for MISS MARK	No. MISS MARK offspring	% MISS MARK offspring cumulative
100	1	15	1	1	1.6
300	3	118	1	8	14.1
400	2	119	1	6	23.4
500	1	65	1	2	26.6
600	5	167	2	37	84.4
700–1200	6	95	/	/	
1300	4	160	1	1	85.9
1400–1700	4	257	/	/	
1800	3	256	1	3	90.6
1900	1	136	1	6	100.0
2000–3000	17	824	/	/	
Total	47	2212	9	64	

On July 14, 3,400 BLACK TARSI and 3,500 BLACK PALP females were released. The recovery of the two markers in relation to time is shown in Table 5 and in relation to distance in Figures 5 and 7.

Since significantly more marked offspring were recovered in the northern sectors, where more offspring of the native population had been collected in the ovitraps, non-randomness of marker dispersal must be assumed in the Hickory releases.

Though about the same numbers of both strains were released, nearly three times more offspring from the BLACK PALP females were recovered. Obviously, the two marker populations differed considerably regarding their preoviposition losses because of death or emigration. The recovery rates of marked offspring in relation to time do not suggest different mortality after oviposition has started (Figure 6). The dispersion of the offspring of the two strains from the release point differs (Figure 7), however, and this in turn suggests that the BLACK TARSI females dispersed more rapidly than the BLACK PALP females. Of the 325 BLACK PALP eggs recovered, 70 percent were found in traps of the 200

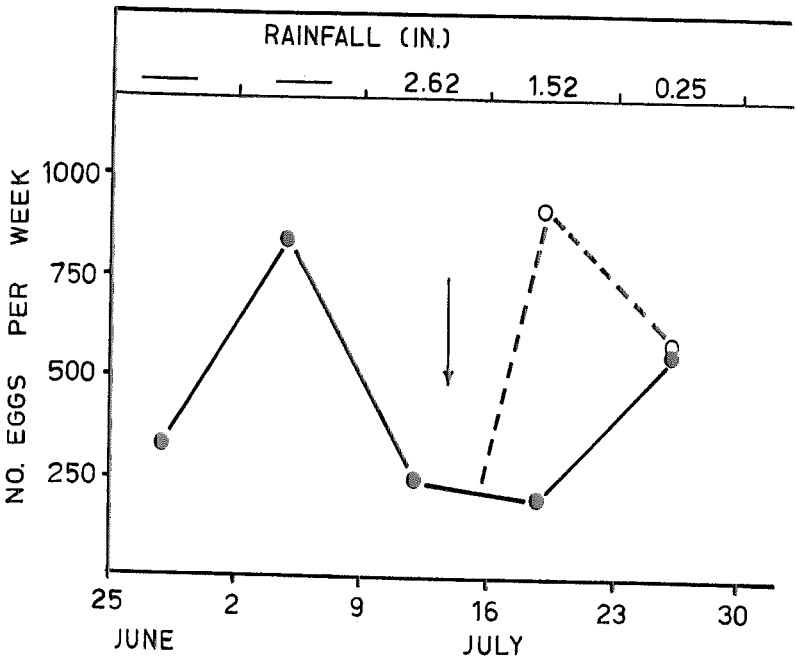

FIG. 4.—Ovitrap collections in Hickory.

Oviposition of native population

Increase in oviposition due to release of genetically marked females

Release date

TABLE 5.—Timing of recoveries of genetic markers in the release area Hickory.

Strain and No. individuals released	Release date	No. of eggs giving rise to marked adults * Days after release 2	4	7	9	11	14	Total
MISS MARK 3750 ♂♂	VII/9	/	/	44 (2)	..	..	..	44 (2)
BLACK TARSI 3400 ♀♀	VII/14	..	19 (2)	76 (3)	22 (2)	..	..	117 (7)
BLACK PALP 3500 ♀♀	VII/14	..	16 (2)	286 (14)	17 (2)	..	6 (1)	325 (19)
			35 (4)	362 (17)	39 (4)		6 (1)	442 (26)

* Number in parentheses = No. of ovitraps containing marker.
.. .. = collection negative for marker.
/ / = No collection made.

and 400 feet radii, whereas 76 percent of all 117 BLACK TARSI eggs were collected in the 600 and 800 feet radii. The mutant *co* in the strain BLACK PALP, which is closely linked to *blp*, affects the normal structure of the apical and subapical segments of the antenna. This minor abnormality may reduce the reception of flight stimuli and thus explain the reduced dispersal.

DISCUSSION. For quick reference, some results of the releases and other essential information on the two study areas are given in Table 6. The table shows that the recoveries can, in no case, be called rich. Considering, however, that all the field work and the rearing of some 23,000 female mosquitoes was handled routinely by three persons and the occasional help of a fourth person, the method presented

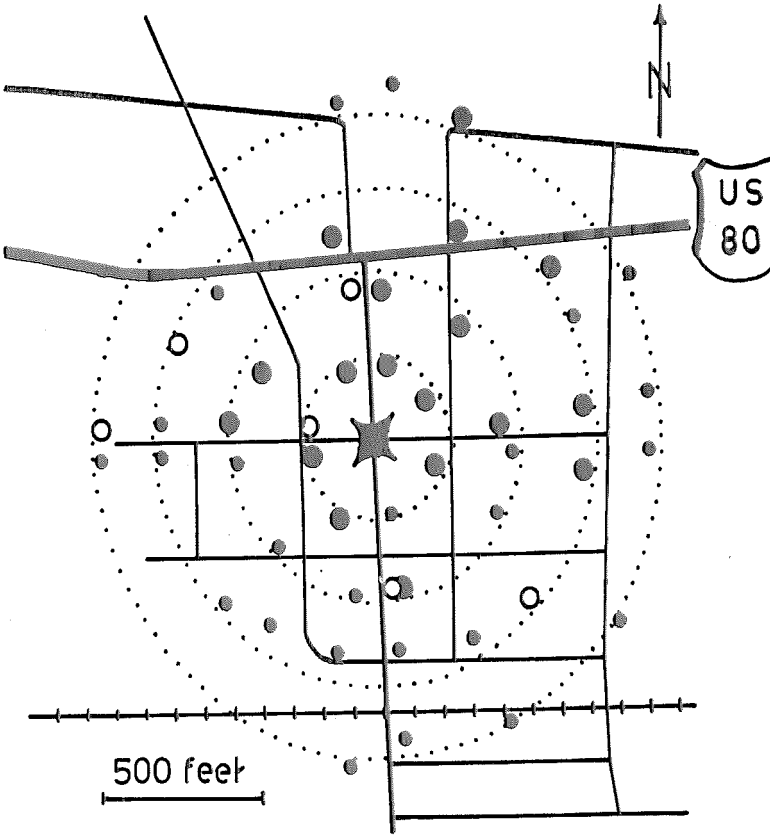

FIG. 5.—Ovitrap grid in Hickory and dispersion of the released marker strains.

Location of ovitrap

Ovitraps positive for BLACK TARSI

Ovitraps positive for BLACK PALP

TABLE 6.—Synopsis of release experiments, vicinity of Meridian, Mississippi, 1969.

Characteristic	Release Area					
	Meridian				Hickory	
1. Release area	Rectangular strip, 6300 x 1100 ft. (160 acres) Long axis north-south oriented				Circle with radius of 800 ft. (46 acres)	
2. Ovitrap grid	160 ovitraps in 20 rows of 8 traps, 10 rows each in northern and southern half of release area				4 circles of 200, 400, 600 and 800 ft. radius with 8, 12, 16, 12 ovitraps respectively	
3. Population estimates, based on ovitrap method; in eggs/trap/day						
Prerelease period	VI/20–VII/9: 2.34				VI/25–VII/15: 1.44	
Postrelease period	VII/10–VIII/1: 4.86				VII/16–VII/30: 2.04	
4. Contribution of release females to field population						
Total no. released	12,950				6,900	
Contribution to egg production	2.5%				46.6%	
5. Recovery of marked offspring	MISS MARK	BLACK TARSI	BLACK PALP	BRONZE	BLACK TARSI	BLACK PALP
No. positive ovitraps	17	3	1	3	7	19
No. marked offspring from ovitraps	153	18	2	77	117	325
No. positive larval habitats	9	2	..	..	..	..
No. marked offspring from larval habitats	64	2	..	..	..	..
Farthest distance of recovery (feet)	1900	960	320	640	800	800
Last day of recovery after release	10	6	7	3	9	14

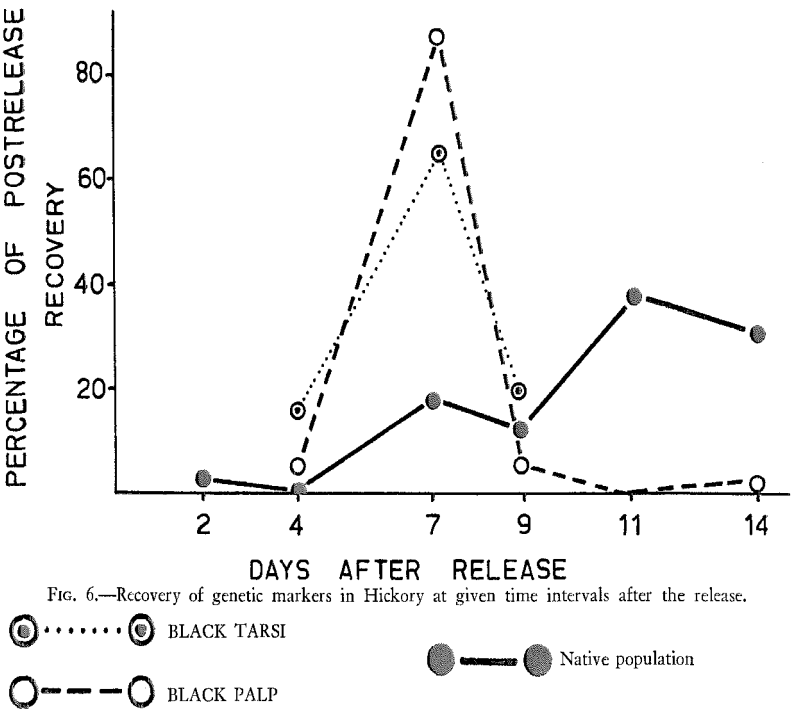

FIG. 6.—Recovery of genetic markers in Hickory at given time intervals after the release.

here compares very favorably with the conventional mark-release-recapture methods used in dispersal studies of mosquito populations. A higher density of ovitraps in the study area and release numbers adjusted to the size of the field population under observation would certainly produce better recovery rates.

The observed dispersal distances for the released marker strains are within the range of maximum dispersal distances (328–8,200 feet) obtained in other dispersal studies on *A. aegypti* as summarized in Morlan and Hayes, 1958, and Christophers, 1960. The observed maximum dispersal distance of 1900 feet for MISS MARK females suggests that this strain's capability for dispersal flight is not grossly different from that of wild type *A. aegypti*. The difference in dispersal shown by the BLACK PALP and BLACK TARSI females in Hickory demonstrates, on the other hand, that strains performing equally well in the laboratory may behave quite differently in the field.

Since all females were released 4–6 days after eclosion, this study gives no information on dispersal during the first period of adult life in which *A. aegypti* females are refractory to insemination (Gwadz and Craig, 1968). Therefore, it has to be kept in mind that sexually immature females might disperse more actively or less actively than mature ones. In sexually mature females on the other hand, no difference in dispersal behavior could be observed in relation to their insemination status.

In several instances, the difference in the number of eggs collected in ovitraps in adjacent blocks is more than 50 percent. Assuming a mostly random dispersal and 70 percent dispersal range of 300–600

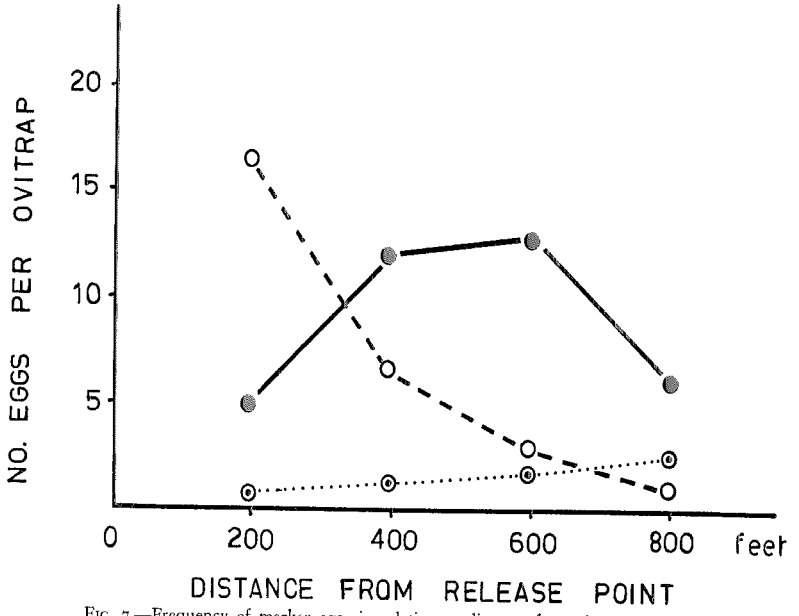

FIG. 7.—Frequency of marker eggs in relation to distance from the release point.

feet, a more homogeneous distribution should be expected. The dispersal range of the field population is therefore either less than that observed for the MISS MARK females or the movements of the native females are essentially non-random. Gillies (1961) demonstrated non-random dispersal for *Anopheles gambiae,* and Sheppard *et al.* (1969) suspected non-randomness of movement for *A. aegypti*. Non-randomness of movement implies that the dispersal range is the result of the capability for sustained flight and of the distribution of sites satisfying the requirements for shelter, food, mating and oviposition. In this case, dispersal range and rates would vary with location and season. The maximum dispersal range of 2.5 km (8,200 feet) observed by Wolfinsohn and Galun (1953) is thus of special interest. Environmental conditions related to high or low egg yields in some blocks are only partially known. One seems to be the presence of larval habitats; others might be the human population density and factors affecting the attractiveness of a particular trap. For this reason, again, a density of more than one trap per acre would have been desirable.

SUMMARY. Release experiments with genetically marked *A. aegypti* females were conducted to investigate if the ovitrap method gives sufficient recovery data to permit an estimate of the dispersal of these females.

In some releases, recoveries of marked offspring were scarce. In two releases, however, the recovery data are sufficient to draw the following conclusions:

1. Dispersal distances of up to 1,900 feet demonstrate for the females of the MISS

MARK strain a capability for flight similar to that observed in conventional mark-release-recapture experiments on *A. aegypti* elsewhere.

2. A simultaneous release of two strains in the same area showed that *A. aegypti* strains may differ in their dispersal behavior as assessed by recovery of their eggs. Therefore, marker releases should be made concurrently with conventional mark-release-recapture experiments with the native population to avoid errors due to grossly different dispersal behavior of the released marker strains.
3. The dispersion of eggs laid by MISS MARK females along the north-south axis of the Meridian release area can be described by an estimated 90 percent dispersal range of 1,500–1,700 feet and a 99 percent dispersal range of 1,600–1,900 feet.

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