EFFECT OF AGE ON MATING OF *CULEX PIPIENS QUINQUEFASCIATUS*[1]

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ABSTRACT

Studies were conducted to determine the age at which adults of *Culex pipiens quinquefasciatus* Say mate. Most males did not actively seek females until they were 72-96 hr old. In all tests 70 to 100% of the females were mated by the time they were 6 days old.

The sterility technique as a possible alternative to pesticides for controlling certain insects has shown much promise. The technique has been used to eradicate the screwworm from Curacao and Southeastern United States, the melon fly from Rota, Mariana Islands, the oriental fruit fly from Guam, and the Mexican fruit fly along the California border of the United States and Mexico. In addition, insects such as the housefly, codling moth, boll weevil, and certain species of mosquitoes are currently being investigated as possible candidates to be controlled by this technique (LaBrecque and Smith 1968). Since the success of this method of control is dependent on the survival, dispersal, and sexual aggressiveness of the sterile males, much biological information is needed on the normal behavior of these candidate species. The present study to determine the age at which the adults of the mosquito *Culex pipiens quinquefasciatus* Say mate was initiated to provide part of the thorough knowledge required for practical use of the sterile release method of control.

METHODS AND MATERIALS

Mosquitoes from the Insects Affecting Man and Animals Laboratory, USDA, Gainesville, Florida, were used in the following work. Male and female pupae were placed in separate cages and left for 24 hr for emergence. The newly emerging adults were fed 2% sugar water. Any pupae that did not emerge during this period were discarded; those that did emerge were considered to be 1 day old although their actual age may have varied from 1 to 24 hr; however, most of the adults were of a similar age. A series of mating crosses was made combining these virgin males and females in various age combinations of 1 to 5 days. Twenty-five males and 25 females were used per test. The mating cages were 6 by 10 by 10 inches, constructed of aluminum, with the sides covered with screen and one end with a cloth sleeve. Sugar water (2%) was available for the adults. Each cross was run in triplicate. Ten females were taken from each cage after 24 and 48 hr and their spermathecae removed and observed under a phase microscope for the presence of sperm.

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[1]Florida Agricultural Experiment Stations Journal Series No. 3347.

In tests conducted in March and April 1968, the cages were kept in a laboratory room with temperature and humidity controlled at 82° F and 80%, respectively. Lights in the laboratory room were on a 12 hr day and 12 hr night schedule except for a dim amber electric bulb which remained on at night to provide suitable light for mating. In May and June tests were run outdoors at ambient temperature and humidity, while those in August were conducted both indoors and outdoors.

Results and Discussion

The results of this study are presented in Table 1. The data of the laboratory tests conducted in March and April and the outdoor cage tests conducted in May and June were very similar. No females were inseminated by males less than 24 hr old. This is in agreement with Clements (1963) who stated that male mosquitoes cannot copulate successfully until

TABLE. 1.—Effect of Age on Mating of *Culex pipiens quinquefasiatus.*

Date of Test and Cage Location	Age of Males at end of test (days)	Percent Insemination of Females After					
		2 days	3 days	4 days	5 days	6 days	7 days
			24-Hr Mating Period				
March-April, Laboratory	2	0	0	17			
	3	0	3	47	73		
	4	6	3	45	73	70	
	5	5	13	38	100	90	
			48-Hr Mating Period				
	3		17	55	80		
	4		20	37	77	73	
	5		20	45	80	93	97
	6		28	55	64		
			24-Hr Mating Period				
May-June, Outdoors	2	3	0	0	31		
	3	0	0	43	83	83	
	4		20	57	53		
	5		10		67		
			48-Hr Mating Period				
	3		3	43	43	93	
	4	17	17	33	87	83	
	5			43	77	100	
	6			70		83	
			24-Hr Mating Period				
August, Laboratory	2	0					
	3		75				
	4			90			
Outdoors	2	0					
	3		66				
	4			80			

their terminal segments have rotated through approximately 180°, a process which takes place during the first day or two of adult life. Under laboratory conditions DeMeillon et al. (1967) reported that the rotation of the male terminalia of *C. p. quinquefasciatus* was complete within 19 hr after emergence. However, Sebastian and DeMeillon (1967) found 1 inseminated out of twenty-five 72-hr-old females of this species placed with males 10.5 hr old. They also reported that 39% of the 72-hr-old females were inseminated after being placed with 18-hr-old males whose terminalia had not yet completely rotated.

We found males 24-48 hr old capable of inseminating a few females 96 hr old. One female only 24-48 hr old was found to be inseminated by a young male of the same age. Most males, however, were not actively seeking females until they were 72-96 hr old. Thus, the majority of the mating occurred at that time. Where the mosquitoes were caged together for 48 hr, mating appeared to begin a little sooner. As shown in the table, males which were 3 days old at the end of the 48 hr holding period had mated 17% of the 3-day-old females, compared to the 3% for the same age group in the 24 hr mating period. It would appear that it takes the insects about 24 hr to become accustomed to the cage before mating becomes efficient. In all tests 70 to 100% of the females were mated by the time they were 6 days old.

In similar studies conducted during the latter part of August the younger mosquitoes mated when held 24 hr in the first two tests; 66% of the females outdoors and 75% of those in the laboratory were mated by the time they were 3 days old. This is more in agreement with the data obtained by Sebastian and DeMeillon (1967) in which they found 96% of 72-hr-old females inseminated when caged with a similar aged group of males. No explanation can be given for the differences in the two studies.

Assuming that the optimum mating age in nature is the same as that which has been found in the lab, practically all of the female mosquitoes will have been inseminated 4 to 5 days after emergence in a given generation. Of course, consideration has to be given to the fact that in nature the adults are not confined to a given space and therefore the probability of contact is lessened.

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