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Mating, Resting Habits and Dispersal of *Aedes aegypti*

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Adult *Aedes aegypti* can mate within 24 hours after emergence, even though such early mating has been considered unlikely by different workers, principally because of the position of the genitalia during this period. Roth (1948) indicated that females were incapable, less than 2.5 hours from emergence, of producing a wing-pitch beat that is attractive to the male. Various workers indicate that copulation may take place with the female at rest or in flight, particularly with caged adults. While differences of opinion on this point are prevalent among workers, there is ample evidence to show that both types of copulation do occur. The copulation itself is brief, normally lasting less than a minute (Roth, 1948).

The swarming of males characteristic of other Diptera and certain mosquitos is not conspicuous with this species. However, Christophers (1960) indicates that a modified form of male swarming can occur in the laboratory, and this type of behaviour has been observed in studies at the Communicable Disease Center laboratory at Savannah, Ga.

Both mating and fertilization can take place without the female having a blood meal (Macfie, 1915). One mating is adequate for oviposition; however, males mate frequently, sometimes 10 to 15 times. With repeated copulations, a male may not always inseminate the female. Thus, Roth (1948) found that, in 17 copulations, 1 male transferred sperm in only 6 instances. He also reported that females might copulate numerous times. Studies with sterilized males (Weidhaas & Schmidt, 1963) suggested that multiple matings may not have a critical effect, the initial insemination being the source of the sperm.

Temperature affects the activity of *A. aegypti*, both as to movement and as to mating. McCray [2] indicates that below 50°F (10°C) activity is confined to sluggish leg movements. At 57°F (13.9°C) short flights can occur and at 60°F (15.6°C) the flights are more frequent but still clumsy. At 62°F (16.7°C) mating is attempted, and at 70°F (21.1°C) the activity occurs frequently.

Mating influences the survival of the species and certain of its activities. It prolongs the life of the females, mated females living slightly longer than unmated females under the same conditions. However, non-mated males show a higher potential for survival than do those that have mated. Virgin females may lay eggs, but these eggs are non-viable, and their number is much smaller than for mated females. The reproductive condition of the female may also affect its biting activity. Mated females aged more than three days are more avid in seeking a blood meal than virgin females. Females less than three days old show no difference in biting intensity (Fay, 1964).

The outdoor habits of *A. aegypti* are relatively unknown compared with the wealth of information on the species under laboratory conditions. Under the latter, it has been shown that adults can survive as long as 131 to 225 days when held under optimum conditions (Christophers, 1960). Without question, survival under natural conditions is of much shorter duration. Korovitskii & Artemenko (1933) gave an average of 15 days (maximum 42 days) for females out-of-doors. In basements, the maximum was 62 days.

The resting habits of this elusive mosquito are somewhat obscure. The adults are found beneath and inside dwellings and in and around other shelters. They also rest in close proximity to their breeding-sites, e.g., inside drums, tires and cisterns as well as other adjacent surfaces. How significant adult resting is in rubbish or on plant surfaces in relation to the use of residual applications is largely conjectural. None the less, the practices of perifocal and encompassment spraying indicate that such treatments are expected to act against both adults and larvae.

Indoors, *A. aegypti* frequents darkened areas of a room, resting on available surfaces and biting whenever the host is available. Although chiefly diurnal

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[2] Unpublished studies.

in its biting activity, the species also is reported to be quite active at night (Lumsden, 1957). Detection of the adult is difficult, particularly in a furnished room, where it can rest undisturbed in the seclusion of clothes, furniture and other hiding places.

The flight habits of *A. aegypti* are a prime consideration in its control. Dunn (1927) in Nigeria detected *A. aegypti* approximately 500 feet (150 m) from the nearest dwellings, while Shannon & Davis (1930), in 3 releases in Brazil, showed 2 recaptures at a maximum distance of about 1000 feet (305 m) from the point of release. Of 4850, 5500 and 12 000 specimens released, 38%, 56% and 23%, respectively, were taken within 330 feet (100 m). Bugher & Taylor (1949) reported maximum dispersal of 3800 feet (1160 m) in 4 releases in Nigeria. Wolfinsohn & Galun (1953), in desert studies in Israel, recorded movement of 8200 feet (2500 m) by gravid females in 24 hours. In Kenya, Teesdale (1955) collected mosquitos approximately half a mile (800 m) from an established release focus. The maximal distance travelled portrays the flight potential of the species, but such data do not reflect the significance of mosquito movement to control operations. Major emphasis must be given to the movement of greater proportion of the population that emanates from any breeding-site. The occasional specimen that may move to an unusual distance should be considered more as an exception rather than as a guide on which to base control activities.

In 1958, a series of 5 releases of *A. aegypti* involving a total of 5115 females was made in the centre of one urban block at Savannah, Ga. (Morlan & Hayes, 1958). Collections by carbon-dioxide traps at 3 distance intervals up to 275 feet (185 m) showed that, in the first 24 hours, 93% of the recaptures were within 75 feet (23 m) of the point of release; only 1% was found in the range of 176 to 275 feet (54 to 87 m).

A single release of 1200 females in one block indicated dispersal up to 575 feet (175 m). Within 2 hours, mosquitos were found up to 375 feet (114 m) from the release point; 63% of the captured mosquitos were captured in the release block, and the remainder occurred in 5 of the 8 surrounding blocks.

In multiple-release tests within an urban block, 5-hour observations beginning 30 minutes after release showed that approximately 60% of the females were taken outdoors. Of the outdoor capture, 75% of the females were biting; indoors, 94% were found to be biting.

The bulk of data on movement, together with general observations on mosquito activity, gives this species a limited range of dispersal. This characteristic is of prime importance to the success of control operations, since complaints of annoyance by *A. aegypti* in a block generally indicate that the breeding source is relatively close by, normally within the same block. Consequently, surveillance and chemical and sanitation measures can be directed to the premises within that block and the contiguous ones. In addition, successful eradication in an area leaves it with only a token threat of reinvasion by adult mosquitos from other areas.

The limited dispersal of the species also creates a disadvantage as to the possible use of a sterile-male technique. To compensate for the lack of movement of the released sterile adults, specimens must be seeded at shorter time-intervals than would be true of a wider-ranging species. Nevertheless, from the over-all standpoint of eradication, knowledge of the flight habits of the species is a distinct asset.

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