

## LARVAL SURVEYS COMPARED TO OVITRAP SURVEYS FOR DETECTING *Aedes aegypti* AND *Aedes triseriatus*<sup>1</sup>

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**ABSTRACT.** Routine surveys for *Aedes aegypti* during the past five years have indicated that the oviposition technique is preferable to the larval technique in surveying for *A. aegypti* and *Aedes triseriatus*. The former survey method is more

economical and specific than the latter. It is also more sensitive than larval surveys in detecting *A. aegypti* and equally as sensitive as larval surveys in detecting *A. triseriatus*. The oviposition survey detects equally well both species of mosquitoes.

**INTRODUCTION.** The successful implementation of any surveillance program for arthropods of medical importance depends not only upon the sensitivity of the sampling techniques used but also upon the most efficient use of time and money. Often it is possible to take advantage of an organism's preference for a specific habitat in order to discover the species' presence in the environment more easily. It is rare when the investigator can work with a technique that is specific, economical, and sensitive. We believe such a technique has been developed for sampling populations of *Aedes aegypti* (L.) and *Aedes triseriatus* (Say).

Many species of mosquitoes are more readily attracted to one particular sampling device than to another. Recent field and laboratory investigations have indicated that *A. aegypti* (Fay and Perry, 1965; Fay and Eliason, 1966) and *A. triseriatus* (Loor and DeFoliart, 1969) are readily attracted to artificial oviposition containers. These species are seldom collected in light traps (King, *et al.*, 1960; Newhouse, *et al.*, 1966). Because of the medical importance of *A. aegypti* as a vector of yellow fever virus and dengue virus and *A. triseriatus* as a vector of LaCrosse virus, the most efficient surveillance techniques available

need to be utilized in monitoring these species.

Previous investigations have shown that oviposition surveys afford more efficient use of personnel. Fay and Eliason (1966) reported that one inspector can cover three to five times more area per day if he makes an oviposition survey rather than a larval survey. They also reported that the oviposition survey costs one-half to one-fourth the amount spent for larval surveys. Jakob and Bevier (1969) reported a seventeen-fold reduction in man-days required to make an *A. aegypti* survey of Tampa, Florida, when an oviposition survey was compared with a larval survey.

Jakob and Bevier (1969), Tanner (1969), and Fay and Eliason (1966) considered the ovitrap a more sensitive tool with which to determine the presence or absence of *A. aegypti*. Fay and Eliason (1966) pointed out that oviposition surveys estimate the extent of potential infestation but do not detect places where larvae and pupae are growing. Tanner (1969) pointed out that larval surveys are often unreliable because of discontinuous sampling and varying skill among collectors.

**RESULTS AND DISCUSSION.** Since the inception of the *Aedes aegypti* Eradication Program in 1965 in the Third U.S. Army,<sup>4</sup> larval surveys have been conducted at military installations on a building-by-building, block-by-block basis. These surveys required the use of large

<sup>1</sup> Mention of a proprietary product does not imply indorsement by the Department of the Army. The opinions contained herein are those of the authors and should not be construed as official views of the Department of the Army.

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<sup>4</sup> The Third U.S. Army includes these states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

teams and took several weeks to complete. Often the surveys were conducted before or after that period during the summer when the target species, *A. aegypti*, was most abundant and most readily detected. During the summers of 1967 and 1968 oviposition traps were used in conjunction with larval surveys. This utilization was not extensive, temporally or spatially. Often the two techniques were not used concurrently or were concurrent for only a short period. The oviposition trap technique was the only surveillance tool during the summer of 1969. At most installations these surveys were conducted throughout the summer and into the fall of 1969. This work provides an excellent opportunity to evaluate the relative effectiveness of larval surveys as compared to oviposition surveys for detecting *A. aegypti* and *A. triseriatus*. Data taken in 1965, 1966, 1967, 1968 and 1969 using various combinations of the two sampling techniques are compared. Although comparisons are made among five years during which varying combinations of sampling techniques were used from year to year, conclusions drawn from the observations are justified by the relative consistency of larval surveys at each installation between 1965 and 1968 (Table 1, Table 2).

Oviposition surveys conducted by military organizations in the southeastern United States have given excellent results in economy and sensitivity. Larval surveys

involved the expense of providing transportation, quarters, and rations for 10-17 personnel for several weeks at each installation. Oviposition surveys required an initial visit by one or two entomologists to each installation to establish the number and location of sampling sites, and to provide local personnel with necessary training and assistance; usually this was followed by a supplementary visit to evaluate the status of the local program.

*Aedes aegypti* was detected each year of survey at Fort Benning, Fort Gordon, and Fort Rucker by either one or both survey techniques (Table 1). The species was detected only once at Fort Bragg and Fort Stewart; in each case the detection was made by the oviposition trap. *Aedes aegypti* was not detected at Charleston Army Depot throughout the survey period by either survey technique. Fort Bragg, Fort Jackson, and Fort Stewart were negative for *A. aegypti* prior to an oviposition survey at each installation. Four installations negative for *A. aegypti* in the 1968 larval survey were found positive by the oviposition survey. These were Fort Bragg, Fort Gordon, Fort Jackson, and Fort Rucker. Three other installations negative in 1968 by both larval and oviposition survey were positive for *A. aegypti* when the 1969 oviposition survey was complete. These three were Hunter Army Airfield, Fort McPherson, and Fort Stewart.

*Aedes triseriatus* was detected at all in-

TABLE 1.—*Aedes aegypti* at military installations in the southeastern United States since 1965.<sup>1</sup>

INSTALLATION	1965	1966	1967	1968	1969
Ft. Benning, Ga.	+	+	+(-)	+(+)	(+)
Ft. Bragg, N.C.	NS	-	-(-)	-(+)	(-)
Charleston Army Depot, S.C.	NS	-	-	-(-)	(-)
Ft. Gordon, Ga.	NS	+	+(-)	-(+)	(+)
Hunter Army Airfield, Ga.	NS	NS	-(+)	-(-)	(+)
Ft. Jackson, S.C.	NS	-	-(-)	-(+)	(+)
Ft. McClellan, Ala.	+	+	-(-)	+	(+)
Ft. McPherson, Ga.	NS	+	-(+)	-(-)	(+)
Ft. Rucker, Ala.	+	+	+(+)	-(+)	(+)
Ft. Stewart, Ga.	NS	-	-(-) <sup>2</sup>	-(-)	(+)

<sup>1</sup> A + indicates the presence of *A. aegypti*; a - means the species was not detected. Parentheses around the + or - denote the results of an oviposition survey; no parentheses, a larval survey. NS No survey of either type was made.

<sup>2</sup> Oviposition survey was conducted during December '67 and January '68.

TABLE 2.—*Aedes triseriatus* at military installations in the Southeastern United States since 1965.<sup>1</sup>

INSTALLATION	1965	1966	1967	1968	1969
Ft. Benning, Ga.	+	+	+(+)	+(+)	(+)
Ft. Bragg, N.C.	NS	+	+(+)	+(+)	(+)
Charleston Army Depot, S.C.	NS	+	+	-(+)	(+)
Ft. Gordon, Ga.	NS	+	+(+)	+(+)	(+)
Hunter Army Airfield, Ga.	NS	NS	+(-)	+(+)	(+)
Ft. Jackson, S.C.	NS	+	+(+)	+(+)	(+)
Ft. McClellan, Ala.	+	+	+(+)	+	(+)
Ft. McPherson, Ga.	NS	+	-(+)	+(+)	(+)
Ft. Rucker, Ala.	+	+	+(+)	+(+)	(+)
Ft. Stewart, Ga.	NS	+	-(-) <sup>2</sup>	+(+)	(+)

<sup>1</sup> A + indicates the presence of *A. triseriatus*; a - means the species was not detected. Parentheses around the + or - denote the results of an oviposition survey; no parentheses, a larval survey. NS No survey of either type was made.

<sup>2</sup> Oviposition survey was conducted during December '67 and January '68.

stallations each year by either one or both survey techniques except Fort Stewart in 1967 (Table 2). This species was detected at Fort Benning, Fort Bragg, Fort Gordon, Fort Jackson, Fort McClellan, and Fort Rucker by each larval and oviposition survey that was conducted. All oviposition surveys in 1968 and 1969 were positive for *Aedes triseriatus*. In 1967 the oviposition survey at Hunter Army Airfield lasted only two weeks and at Fort Stewart was conducted from December through January. The short period of survey at Hunter Army Airfield and the time of the year at Fort Stewart probably accounted for the negative results at both installations by the ovitrap technique that year.

**SUMMARY.** Alone or in conjunction with larval collections, the oviposition survey provided adequate surveillance for *A. aegypti* and *A. triseriatus*. It was more sensitive than larval surveys in detecting *A. aegypti* and as sensitive as larval surveys in detecting *A. triseriatus*. These data indicated that the oviposition survey was sensitive in detecting both species, whereas the larval survey more readily detected *A. triseriatus* than *A. aegypti*. Negative

results for *A. aegypti* and *A. triseriatus* using the ovitrap technique generally precluded positive results by larval surveys, provided the ovitraps are operated during the entire breeding season of the species concerned.

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