

RECORDS OF *Aedes albopictus*, *Ae. aegypti* AND *Ae. triseriatus* FROM THE U.S. AIR FORCE OVITRAPPING PROGRAM—1988

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United States Air Force (USAF) installations in the southern and southeastern United States routinely use oviposition traps to detect and monitor infestations of *Aedes aegypti* (Linn.) and *Aedes triseriatus* (Say). The discovery of *Aedes albopictus* (Skuse) in Houston, TX, and its rapid spread have led to an expansion of the USAF ovitrapping program to include bases in, or near, the known and potential distribution of this species. The following note summarizes the results of the USAF ovitrapping program during 1988.

The ovitrapping protocol was similar to that of Sweeney et al. (1988) with one ovipaddle per jar and red velour strips or paper toweling used as an oviposition substrate. A minimum of 10 ovitraps placed in shaded areas on the ground near tire- and equipment-storage yards, housing areas or other potential breeding sites and collected once weekly was recommended to environmental health personnel who conducted the surveys at each base. Ovipaddles were mailed to the Epidemiology Division of the USAF School of Aerospace Medicine at Brooks AFB, San Antonio, TX, for processing by the Medical Entomology Section. Eggs were tentatively identified as *Ae. triseriatus* or *Aedes (Stegomyia)* spp. based on egg morphology. Eggs were held at 26°C for 5–7 days post-receipt for aging. Specimens were reared in a mixture of 1:1 tap:distilled water and fed liver powder. Voucher specimens were deposited with the U.S. National Museum.

The data from the 1988 ovitrapping program were interpreted as a qualitative indication of which species were present at a base. While positive paddles were taken as an indication that a species was present, the absence of positive paddles was not interpreted as proof that a particular species was absent. Differences in site selection, number of ovitraps used, and length of surveillance program at different installations make it difficult to make reliable interbase comparisons or statements about seasonal activity of mosquitoes.

During 1988, 2,045 ovipaddles from 37 organizations were processed (Table 1). In addition to USAF and Air National Guard installations, ovipaddles were also received from the San Antonio Metropolitan Health District and the Preventive Medicine Service of Brooke Army Med-

ical Center at Ft. Sam Houston, Texas. The number of ovipaddles submitted by individual agencies was highly variable. Seven organizations submitted over 100 ovipaddles; 23 submitted less than 50.

Ten organizations (27%) submitted paddles positive for *Ae. albopictus* (Table 1, Fig. 1). Five of these—Brooks AFB, Lackland AFB, Randolph AFB, Ft. Sam Houston, and the Metropolitan Health District—are located in Bexar County, TX, in which *Ae. albopictus* was collected as early as 1986 (Moore et al. 1988). Keesler AFB, MS, and Scott AFB, IL, are also located in counties from which *Ae. albopictus* has been collected previously (Moore et al. 1988). *Aedes albopictus*-positive paddles from Barksdale AFB, LA (June 28), Little Rock AFB, AR (August 3) and Maxwell AFB, AL (September 1) represent new records for their respective counties. The first *Ae. albopictus*-positive paddle for the year was collected at Ft. Sam Houston, TX, on May 24. The last *Ae. albopictus*-positive paddle was collected by the San Antonio Metropolitan Health District on December 27. The 44 paddles from which only *Ae. albopictus* were reared averaged 34.7 eggs per paddle.

Twelve organizations (32%) submitted *Ae. aegypti*-positive paddles (Table 1, Fig. 1). These 12 installations are all within the known range of *Ae. aegypti* (Fig. 1), but Tinker AFB, OK, at which one *Ae. aegypti*-positive paddle was collected is near the edge of the extreme range for this species (Darsie and Ward 1981). The first *Ae. aegypti*-positive paddle was collected at England AFB, LA, on May 2. The last *Ae. aegypti*-positive paddle was collected by the San Antonio Metropolitan Health District on November 29. The 78 ovipaddles from which only *Ae. aegypti* were reared averaged 27.3 eggs per paddle.

Eleven paddles were positive for both *Ae. aegypti* and *Ae. albopictus*. Ten of the paddles with both species were from Bexar County, TX, and the remaining paddle was from Maxwell AFB, AL. Based on random chance, only 2–3 ($2,045 \times 0.044 \times 0.027$) of the total number of ovipaddles would be expected to have eggs of both *Ae. albopictus* and *Ae. aegypti*. With 6.8% *albopictus*-positive and 8.4% *aegypti*-positive, only 4 of the 658 ovipaddles collected in Bexar County, TX, theoretically should contain both species. But

Table 1. Summary of ovipaddles processed at the Epidemiology Division, USAF School of Aerospace Medicine, during 1988.

Organization and state	County	Total ovipaddles	Positive ovitraps							
			<i>Aedes albopictus</i>		<i>Aedes aegypti</i>		<i>Aedes (Stegomyia)</i>		<i>Aedes triseriatus</i>	
			N	%	N	%	N	%	N	%
Maxwell AFB, AL	Montgomery	12	2	16.7	3	25.0	1	8.3	3	25.0
Eaker, AFB, AR	Mississippi	91	0	0.0	0	0.0	0	0.0	0	0.0
Little Rock AFB, AR	Pulaski	124	4	3.2	0	0.0	2	1.6	10	8.1
Ft. Smith, AR	Sebastian	12	0	0.0	0	0.0	0	0.0	0	0.0
Travis AFB, CA	Solano	16	0	0.0	0	0.0	0	0.0	0	0.0
Dover AFB, DE	Kent	77	0	0.0	0	0.0	0	0.0	0	0.0
Tyndall AFB, FL	Bay	12	0	0.0	0	0.0	0	0.0	1	8.3
Homestead AFB, FL	Dade	49	0	0.0	0	0.0	0	0.0	0	0.0
MacDill AFB, FL	Hillsborough	35	0	0.0	14	40.0	14	40.0	0	0.0
Moody AFB, GA	Lowndes	12	0	0.0	0	0.0	0	0.0	0	0.0
McConnell AFB, KS	Sedgwich	27	0	0.0	0	0.0	0	0.0	0	0.0
Scott AFB, IL	St. Clair	55	1	1.8	0	0.0	0	0.0	7	12.7
Barksdale AFB, LA	Bossier	50	3	6.0	3	6.0	0	0.0	8	16.0
England AFB, LA	Rapides	72	0	0.0	4	5.6	0	0.0	9	12.5
Whiteman AFB, MO	Johnson	37	0	0.0	0	0.0	0	0.0	5	13.5
Keesler AFB, MS	Harrison	3	1	33.3	0	0.0	2	66.7	0	0.0
Offutt AFB, NE	Sarpy	29	0	0.0	0	0.0	0	0.0	0	0.0
Pope AFB, NC	Cumberland	20	0	0.0	0	0.0	0	0.0	0	0.0
Seymour Johnson AFB, NC	Wayne	171	0	0.0	11	6.4	5	2.9	3	1.8
Vance AFB, OK	Garfield	8	0	0.0	0	0.0	0	0.0	0	0.0
Altus AFB, OK	Jackson	29	0	0.0	0	0.0	0	0.0	0	0.0
Tinker AFB, OK	Oklahoma	109	0	0.0	1	0.9	0	0.0	9	8.3
Pittsburgh Intl Airport, PA	Allegheny	6	0	0.0	0	0.0	0	0.0	3	50.0
Charleston AFB, SC	Berkeley	143	0	0.0	0	0.0	0	0.0	5	3.5
Shaw AFB, SC	Sumter	5	0	0.0	0	0.0	0	0.0	0	0.0
Arnold AFB, TN	Coffee	32	0	0.0	0	0.0	1	3.1	22	68.8
San Antonio Metro Health Dist, TX	Bexar	180	19	10.6	28	15.6	35	19.4	0	0.0
Brooks AFB, TX	Bexar	62	10	16.1	5	8.1	4	6.5	0	0.0
Ft. Sam Houston, TX	Bexar	22	14	63.6	3	13.6	5	22.7	0	0.0
Lackland AFB, TX	Bexar	249	1	0.4	13	5.2	7	2.8	6	2.4
Kelly AFB, TX	Bexar	30	0	0.0	4	13.3	0	0.0	0	0.0
Randolph AFB, TX	Bexar	115	1	0.9	2	1.7	3	2.6	0	0.0
Sheppard AFB, TX	Clay	53	0	0.0	0	0.0	0	0.0	0	0.0
Reese AFB, TX	Lubbock	32	0	0.0	0	0.0	0	0.0	0	0.0
Carswell AFB, TX	Tarrant	28	0	0.0	0	0.0	0	0.0	0	0.0
Bergstrom AFB, TX	Travis	29	0	0.0	0	0.0	0	0.0	0	0.0
Laughlin AFB, TX	Val Verde	9	0	0.0	0	0.0	0	0.0	0	0.0
Total		2,045	56	2.7	91	4.4	79	3.9	91	4.4

the selection of oviposition sites is not a random event, and the observed pattern of multiple-species paddles probably results from differences in ovitrap attractiveness. Other than the fact that both *Ae. albopictus* and *Ae. aegypti* will use the same oviposition site, it is difficult to interpret the frequency of multiple-species paddles. Paddles with both *Ae. albopictus* and *Ae. aegypti* averaged 61.7 eggs per paddle, almost the exact sum of the *Ae. albopictus*- (34.7 eggs/paddle) and *Ae. aegypti*-only (27.3 eggs/paddle) paddles. In this field study it was impossible to

determine which species oviposited first, but it appears that oviposition by the first female(s) neither reduced nor enhanced the number of eggs laid by the subsequent female(s). These data suggest that if competition or interference is occurring between *Ae. albopictus* and *Ae. aegypti*, it is probably not occurring at the level of oviposition site selection, at least in Bexar County, TX.

Seventy-nine paddles held eggs tentatively identified as *Ae. (Stegomyia)* spp., but from which specimens could not be reared for specific



Fig. 1. Records of *Aedes albopictus* and *Ae. aegypti* from the USAF ovitrapping program—1988. Boundaries for the usual and extreme ranges of *Ae. aegypti* redrawn from Darsie and Ward (1981).

determination. The 11 bases from which these paddles were submitted are all within the geographic ranges of both *Ae. aegypti* and *Ae. albopictus*. Failure to rear specimens was usually attributable to excess water in shipment containers which stimulated hatching prior to receipt at the Medical Entomology Section or to desiccation which caused egg collapse.

A total of 91 *Aedes triseriatus*-positive paddles from 13 (35%) bases were submitted. The first positive paddle was collected at England AFB, LA, on April 27. The last *triseriatus*-positive paddle was collected at Maxwell AFB, AL, on October 27. The 88 paddles on which only *Ae. triseriatus* were present averaged 108.3 eggs per paddle.

One paddle from Tinker AFB, OK, held eggs of *Aedes epactius* Dyar and Knab. Hatched *Culex*

spp. eggs were occasionally present on ovipaddles, but only Brooks AFB, TX, submitted larvae (*Cx. quinquefaciatus* Say) for identification. No *Aedes hendersoni* Cockerell were identified during the study.

Only 2 bases, Lackland AFB, TX, and Maxwell AFB, AL, were positive for *Ae. albopictus*, *Ae. aegypti* and *Ae. triseriatus*. All the paddles submitted by 17 (46%) bases were devoid of eggs. In general, these were bases with small ovitrapping programs (mean number of 31 ovipaddles submitted).

The presence of *Ae. albopictus* in Bossier Co., LA (Barksdale AFB), Pulaski Co., AR (Little Rock AFB), and Montgomery Co., AL (Maxwell AFB) is not surprising given the known U.S. distribution of this species. The presence of *Ae. aegypti* at Tinker AFB, OK, is noteworthy given

that this is near the edge of the extreme range for this species (Darsie and Ward 1981). The presence of paddles positive for both *Ae. albopictus* and *Ae. aegypti* and the number of eggs on those paddles do not support the hypothesis that competition or interference is occurring between the 2 species, at least for oviposition sites in the San Antonio area.

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