OPERATIONAL AND SCIENTIFIC NOTES

AEDES (STEGOMYIA) SPP. UTILIZING *EUPHORBIA KAMERUNICA* AS LARVAL HABITAT IN NIGERIA[1]

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The ready adaptation of some *Aedes (Stegomyia)* spp. to various natural and man-manipulated habitats for oviposition and larval development is well known, but each newly discovered site remains a unique experience to investigators concerned with this group of mosquitoes. The new habitat described here was encountered during investigations of possible vectors of yellow fever virus on the Jos Plateau, Nigeria, in 1970.

In 1969, an epidemic of yellow fever occurred on the 4090 ft. high Jos Plateau. This plateau, almost in the exact center of Nigeria, has scant indigenous arboreal vegetation which is confined to small areas on rock-strewn hillsides and along some streams. The widespread rural epidemic indicated wide distribution of the arthropod vector(s) as well, but suitable forest habitat for development of sylvan vectors was too restricted to account for the nature of the epidemic. For a description of the area involved and results of epidemiological and entomological studies carried out at the time, see Lee (1972), Carey *et al.* (1972), and Lee and Moore (1972).

The newly observed oviposition-larval habitat for three important *Aedes (Stegomyia)* spp. is provided by depressions or holes in the stems of the cactus-like *Euphorbia kamerunica,* which is utilized as a living hedge around rural family compounds and farm plots on the plateau. Characterized by spiny, four-winged stems, this plant is grown in thick array, and is propagated by cutting off younger stems and placing the cut ends into the soil where new hedges or repairs of older hedges are required. General trimming of stems also is done. Both procedures leave a cut surface to heal, with rebranching eventually taking place from around the edges of the wound. Meanwhile, the central pulpy core of the cut stump may either heal over smoothly or instead, depending on various factors, allow the formation of a hole. Such cutting usually is done during the dry season so that the new plant has time to establish itself before the rains begin; otherwise, the cut stem may merely rot in the moist soil. The cut stump also has the chance to heal in the dry atmosphere, and thus a larval habitat may be ready for use by mosquitoes at the start of the rainy season.

The size of the depression or hole that develops is governed by the age and size of the plant, the nature of the cut, and the weathering process. Generally, the hole is square, from 0.75 to 1.5 inches across, with depth being variable (Figs. 1 and 2). The majority of holes seen measured 1 inch across and 1-3" deep and contained 10-30 ml of water.

In August 1970, samples were taken from 154 sites in euphorbia hedges in 5 localities on the plateau (Table 1). Sampling for larvae was done with a pipette, and the collections retained to allow development to the adult stage for easy identification. From these collections, 195 adults were reared and identified in 7 species, 4 of which were not commonly encountered. The samples also included 22 adults that drowned and could not be identified, and 182 immatures that died during transport; some of the latter could be identified and were found to be representative in proportion to the adults reared.

Sampling techniques and the nature of the sites precluded determination of the total population per site, but it was noted that holes with larvae contained from 1 to 20 larvae - or a rough average of 7 immatures per site.

As shown in Table 1, the mosquito species most common in larval collections were *Aedes luteocephalus,* 82 samples (53%); *A. aegypti,* 17 samples (11%); and *A. africanus,* 13 samples (8%). The four rarely encountered species were *A. simpsoni, A. stokesi, Culex nebulosus,* and *Eretmapodites* sp.

A. luteocephalus predominated in larval collections in each of the five areas, as well as in biting collections of adults. This species also was found cohabiting with *aegypti* 9 times, with *africanus* 3 times, with *simpsoni* and *stokesi* once each, and with *C. nebulosus* twice.

Larvae of *A. aegypti* likewise were collected in all five areas, whereas *A. africanus* was encountered only in two areas; these data correspond with information obtained on biting adults. Larvae and adults of *africanus* were both common in one area, but both were rare in the other. The distribution of *africanus* on the plateau appears to

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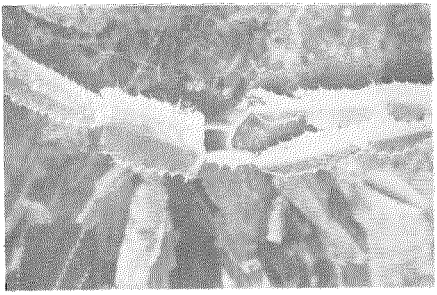
TABLE 1. Larval mosquito collections from *Euphorbia kamerunica*, Jos Plateau, Nigeria, August 1970.

Area	No. samples	Species collected	No. times collected	No. adults reared	Mixed populations – no. times		Others collected
Du	23	*A. aegypti*	2 x	11	*aegypti* × *luteocephalus*	2 x	4 adults,
		A. luteocephalus	16 x	22			35 larvae
Vom	52	*A. aegypti*	4 x	6	*africanus* × *luteocephalus*	2 x	16 adults,
		A. africanus	12 x	14	*aegypti* × *luteocephalus*	1 x	70 larvae
		A. luteocephalus	18 x	28	*nebulosus* × *luteocephalus*	2 x	
		C. nebulosus	2 x	4			
Tagwe	51	*A. aegypti*	5 x	7	*aegypti* × *luteocephalus*	4 x	1 adult,
		A. africanus	1 x	1	*africanus* × *luteocephalus*	1 x	41 larvae
		A. luteocephalus	32 x	54			
		A. stokesi	1 x	1			
		Eretmapodites sp.	1 x	3			
Forom	17	*A. aegypti*	3 x	4	*aegypti* × *luteocephalus*	2 x	33 larvae
		A. luteocephalus	9 x	16	*simpsoni* × *luteocephalus*	1 x	
		A. simpsoni	1 x	1			
Chigi	11	*A. aegypti*	3 x	6	*stokesi* × *luteocephalus*	1 x	1 adult, 3
		A. luteocephalus	7 x	16			larvae
		A. stokesi	1 x	1			
Totals	154	*A. aegypti*	17 x	195	*aegypti* × *luteocephalus*	9 x	22 adults,
		A. africanus	13 x		*africanus* × *luteocephalus*	3 x	182 larvae
		A. luteocephalus	82 x		*simpsoni* × *luteocephalus*	1 x	
		A. simpsoni	1 x		*stokesi* × *luteocephalus*	1 x	
		A. stokesi	2 x		*nebulosus* × *luteocephalus*	2 x	
		C. nebulosus	2 x				
		Eretmapodites	1 x				



FIGS. 1 and 2. Larval habitats in *Euphorbia kamerunica* stems. Fig. 1 shows a close-up view of one site. Fig. 2 shows several such sites in a mature hedge.

be quite restricted, even though potential sites in euphorbia hedges are widespread.

In an attempt to determine the minimum number of potential sites per linear yard of hedge, counts were made independently by 2 persons of all holes visible from ground level to eye level (range of 6 feet) on one side of a given distance of hedge in three areas of study. In the 593 yards of hedge thus examined, 670 potential sites were counted, or 113 per 100 yards. If this figure is doubled to include the other side of the hedge, the total becomes 266 potential sites per 100 yards of hedge. Obviously, tall, mature hedges would offer still more sites.

Although the average number of larvae per collection from such sites was relatively low, the number of sites available must be satisfactory to produce substantial adult populations of the three species of *Stegomyia* during the rainy season. That this was so in 1969 seems indicated by the nature of the epidemic and the rapid decline of cases at the end of the rains. The small quantities of water in euphorbia stems dry up quickly when the rains stop. Furthermore, this euphorbia is not commonly used as hedges in the towns, which, in the apparent absence of populations of a domestic vector, were not involved in the epidemic.

The ecological picture that emerges is a nearly ideal situation for development of a rural epidemic with the *Stegomyia* species present. The mosquitoes are reared in close proximity to the rural human population, and there is ample opportunity for contact without extensive movement of either the mosquitoes or their human hosts.

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