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Studies on mosquitoes (Diptera: Culicidae) and anthropic environment. 9- Synanthropy and epidemiological vector role of *Aedes scapularis* in South-Eastern Brazil*

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Behaviour comparisons of *Aedes scapularis* and *Ae. serratus* are presented. Results were obtained by sampling *Aedes* adult mosquitoes at several places in the rural anthropic environment in the Ribeira Valley region of S. Paulo State, Brazil. *Aedes dominance* was shared by those two species, but *Ae. scapularis* showed a clear tendency to frequent the modified environment, while *Ae. serratus* was to be found in the more preserved ones, here represented by the vestigial patchy forests. Regarding the open cultivated land and the dwelling environments, *Ae. scapularis* preponderates. Considering the regional developmental phases, this mosquito showed a remarkable increase in the modified environment differently from *Ae. serratus* that underwent a considerable decrease in migrating from the forest to the anthropic environment. As a consequence of these results it is reasonable to conclude that *Ae. scapularis* may be considered as an epidemiologically efficient vector and that it quite probably played this role in the Rocio encephalitis and other arbovirus epidemics.

Aedes. *Ecology, vectors. Arbovirus infections, transmission.*

Introduction

Among the Culicidae associated with the man-made environment, *Aedes scapularis* has lately called for particular attention since it has frequently been observed visiting human dwellings in an unusual manner (Forattini[4], 1961). As it is a widespread mosquito, many other observers have reported this kind of behaviour at different places in the neotropical region. Its epidemiological competence and capacity to transmit various agents of human and animal diseases have long been recognized (Forattini[5], 1965; Arnell[3], 1976; Lhuillier et al.[21], 1981; Grimstad[19], 1988; Walton and Grayson[30], 1988).

In the Ribeira Valley region of S. Paulo State, Brazil, an encephalitis epidemic started in at 1975-1976 and thereafter decreased until 1983 (Iversson[20], 1988). A virus recovered from human cases was recognized as an etiological agent and named the Rocio virus (Lopes et al.[22], 1978). As the evidence indicated that culicids were involved as vectors, the abundance and feeding habits of *Ae. scapularis* in the epidemic areas led to the hypothesis that this mosquito was involved in the transmission of that encephalitis (Forattini et al.[6,7,8], 1978, 1978a, 1981). Its vector competence for Rocio virus transmission was tested under laboratory conditions (Mitchell and Forattini[25], 1984; Mitchell et al.[27], 1986). Though showing some degree of variation in "per os" infection rates, the competence was demonstrated. Some hypotheses were raised to explain those variations, among them that related to

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the occurrence of mosquito populations with different behaviour patterns. In any case, *Ae. scapularis* involvement and the hypothesis regarding its role in encephalitis transmission remained.

Ae. scapularis's behaviour was the object of special investigation during the course of a research project in the Ribeira Valley region. Its biting activities and occurrence at several different places in the human dominated environment deserved special attention. Thus, during 1992-1993, adults were collected through the use of human bait and Shannon traps. The results of the present research will be here presented as providing epidemiological evidence for the testing of the above mentioned hypothesis of transmission.

Study Areas and Methods

Adult sampling was performed at the same sites and under the same circumstances, by the same methods already described elsewhere (Forattini et al.[17], 1995). Nevertheless, to make understanding easier, the sampling sites are here related again as follows:

Shannon traps (Shan)

Period	Site	Place	Shannon trap
January - December 1993	ES	remnant forest A	Shan 1
		remnant forest B	Shan 2
		rice-paddy edge (open land)	Shan E
August 1992 - December 1993	GA	margin of Pariquera-Açu river	Shan GA

As Shan 1 and Shan 2 traps operated alternately once a week, the total number of mosquitoes caught corresponded to the fortnightly rhythm.

Human bait (BC):

Period	Site	Place
August 1992 - December 1993	BC	dwelling in the ES area

BC - "Sítio Barra do Capinzal"; ES - Experimental Station; GA - "Galiléia Farm"

As previously stated, biting activity was estimated by Williams' mean ($\bar{x}_w$), the domiciliation degree by use of the synanthropic index (s) and comparisons by means of the synanthropic ratios (sr).

In addition, succession analysis was here included by the use of a method to estimate the mosquito density according to the developmental changes in the environment. The relative abundance of the species was estimated at the several sites sampled, considered as representative of the various developmental phases. Thus, regarding the ES anthropic site, the remnant forest patches were regarded as vestiges of the primitive natural vegetation that formerly covered the entire area. The open land and the domiciliary site were jointly considered as a later phase corresponding to the man-made environment there installed. For comparison between these two phases the "index of change"was used as described by Ameransighe and Ariyasena[1,2] (1990, 1991). The relative abundance of the species at each site during each development phase represented, was computed as the geometrical mean of the number of females mosquitoes caught per sampling occasion. So the overall abundance (a) in a particular phase was calculated as the product of the overall relative density (s) and the percentage occurrence (o) in that phase, thus $a = d \times o$. For the comparison, overall means were computed from the values obtained with the catches performed in the vestigial forests (Shan 1 + Shan 2) and on the open land and in the domiciliary environment (Shan E + BC). Thus the "index of change" (IC) was calculated as follows:

$$IC = \frac{a_2 - a_1}{a_2 + a_1}$$

where a_1 and a_2 represent the overall abundance of the species in phases 1 and 2. The IC range is from +1 to -1, representing the maximum increase and decrease, each corresponding to the invasion by or elimination, respectively, of the species. Values $\geq \pm 0.33$, (100.0% difference between a_1 and a_2) were indications of a significant change in abundance, and values of $\geq \pm 0.71$ (500.0% or greater difference) indicated still greater change.

Results

A total number of 12,040 adult *Aedes* mosquitoes (11,928 females and 112 males) belonging to the subgenera *Ochlerotatus*, *Protomacleaya* and *Stegomyia*, were collected. Of that number 11,199 (93.0%) were caught with the Shannon traps whereas 841 (7.0%) by the use of human bait. The species found were distributed as follows:

Species	N	%
Ae. (Och) albifasciatus	1	...(*)
Ae. (Stg) albopictus	2	...(*)
Ae. (Pro) argyrothorax	10	...(*)
Ae. (Och) crinifer	151	1.3
Ae. (Och) fulvus	480	4.0
Ae. (Och) hastatus + *Ae. (Och) oligopistus*	37	0.3
Ae. (Och) nubilus + *Ae. (Och) serratus*	2,449	20.3
Ae. (Och) patersoni (near)	1	...(*)
Ae. (Och) phaeonotus (near)	1	...(*)
Ae. (Och) scapularis	3,427	28.5
Ae. (Och) serratus	5,479	45.5
Ae. (Pro) terrens	2	...(*)
Total	12,040	99.9

(*) less than 0.1

According to the several samples obtained at the ES and GA sites, and the collection methods, the results are presented in Table 1. Thus *Ae. scapularis* and *Ae. serratus* jointly accounted for 74.0% of the total *Aedes* specimens collected, perhaps even more than that, because many specimens of *serratus* were not distinguished from those of *Ae. nubilus*. The behaviour of these two mosquitoes has deserved particular attention in this paper. As females of *Ae. scapularis* and *Ae. serratus* represented 99.5% of the total adults of these species caught, obviously the data reported as follows will relate to them.

Shannon traps- The monthly distributions of *Ae. scapularis* and *Ae. serratus* are presented in Tables 2 and 3. Regarding the first of these mosquitoes, its occurrence throughout the year on the rice paddy banks (Shan E) of the open land in the anthropic environment (ES) showed two peaks. One of them occurred during the October-November period, when the transient flooding stage of rice paddies started (Forattini[16] et al., 1994). The other highest peak of that mosquito's incidence occurred during the months of March and April, when the preceding cycle of rice cultivation came to an end and with the harvesting of the crop. Thus in that agricultural anthropic environment of the ES area, 69.1% of the *Ae. scapularis* females were caught in the March-April (42.9%) and October-November (26.2%) periods. Concerning *Ae. serratus*, there was only an October-November (26.2%) period. Concerning *Ae. serratus*, only an October-November peak was observed when a total of 453 (98.3%) mosquitoes were caught. Notwithstanding, the remnant forest patches (Shan 1 and Shan 2) produced 72.6% of the total number of adults collected, in comparison

Table 1 - Number of adult *Aedes* mosquitoes collected in the anthropic (ES) and partially disturbed environments (GA) August 1992 through December 1993.

Species	ES vestigial forest				ES open land		BC dwellings (hb)				GA		Total		
	Shan 1		Shan 2		Shan E		Outdoor		Indoor		Shan GA				
	f	m	f	m	f	m	f	m	f	m	f	m	f	m	T
Ae. albifasciatus	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1
Ae. albopictus	1	-	-	-	-	-	-	1	-	-	-	-	2	-	2
Ae. argyrothorax	-	-	-	-	-	-	-	-	-	-	8	2	8	2	10
Ae. crinifer	4	-	-	147	-	-	-	-	-	-	-	-	151	-	151
Ae. fulvus	87	48	-	18	-	5	-	-	-	-	2	-	432	48	480
Ae. hastatus/oligopistus	27	-	1(**)	-	-	-	-	-	-	-	5	-	36	1	37
Ae. nubilus/serratus	787	16(*)	1(*)	362	1(*)	15	-	23	-	-	59	-	2,431	18	2,449
Ae. patersoni (near)	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1
Ae. phaeonotus (near)	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
Ae. scapularis	281	-	6	1,552	-	445	-	277	-	-	316	8	3,413	14	3,427
Ae. serratus	2,055	6	20	481	1	52	-	22	-	-	345	1	5,451	28	5,479
Ae. terrens	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2
Total	3242	70	29	2,561	2	518	-	323	-	-	737	11	11,928	112	12,040

f- female
hb - human bait
m - male
BC - "Barra do Capinzal" Farm
ES - Experimental Station
GA - "Galiléia Farm"
(*) *Aedes nubilus*
(**) *Ae. oligopistus*
Shan - Shannon trap

with the 27.4% obtained on the open land (Shan E). The graph presented in Figure 1 shows the monthly incidence and the monthly proportion of both species at the ES site.

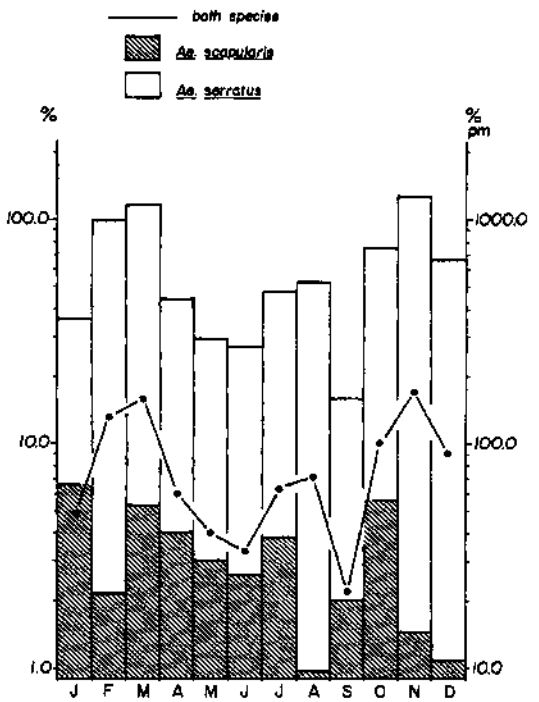

Figure 1 - Monthly distribution of *Aedes females* caught in Shannon traps (Shan 1, Shan 2 and Shan E) in the anthropic environment.
% - percent of the total caught
% pm - monthly percent of each species

Regarding the statistical analysis, it was carried out by means of the comparison of the data obtained in the forests (Shan 1 and Shan 2) with those obtained on the open land (Shan E) (Table 2). The Mann-Whitney test resulted in *p* values of 0.5637 and 0.0003 for *Aedes scapularis* and *Ae. serratus*, respectively. Thus a high significance level was found for the latter species.

At the partially disturbed environment of the GA site, as a general feature, the monthly incidence of both species followed the seasonal variation, with larger production in the hot and rainy months corresponding to the November-December period. In that particular matter no difference was observed between those two mosquitoes (Table 3).

Domiciliary environment - Through the use of human bait, a total of 796 females of the two *Aedes* species were caught. Of these specimens 722 (90.7%) belonged to *Ae. scapularis* and 74 (9.3%) to *Ae. serratus*. Regarding the sampling sites, results were as follows (Table 1 and 4):

	Indoor	Outdoor	Total
Ae. scapularis	277(92.6%)	445(89.5%)	722(90.7%)
Ae. serratus	22(7.4%)	52(10.5%)	74(9.3%)
Total	299	497	796

The Williams' general mean values were as follows:

Table 2 - Monthly distribution of *Aedes scapularis* and *Ae. serratus* females collected in Shannon traps in the anthropic environment area (ES), January through De cember 1993.

		Ae. scapularis		*Ae. serratus*		Total	
Months	Shan	n	%	n	%	n	%
January	1	-	-	24	0.5	24	0.3
	2	41	1.7	92	1.8	133	1.8
	E	201	8.5	6	0.1	207	2.8
February	1	42	1.8	504	10.0	546	7.4
	2	167	7.0	259	5.1	426	5.7
	E	2	0.1	8	0.6	10	0.1
March	1	61	2.6	382	7.6	443	6.0
	2	57	2.4	167	3.3	224	3.0
	E	519	21.5	-	-	519	7.0
April	1	11	0.5	140	2.8	151	2.0
	2	21	0.9	122	2.4	143	1.9
	E	147	6.2	4	...	151	2.0
May	1	25	1.0	109	2.2	134	1.8
	2	14	0.6	97	1.9	111	1.5
	E	50	2.1	2	...	52	0.7
June	1	15	0.6	19	0.4	34	0.4
	2	23	1.0	183	3.6	206	2.8
	E	34	1.4	1	...	35	0.5
July	1	42	1.8	123	2.4	165	2.2
	2	7	0.3	162	3.2	169	2.3
	E	134	5.6	7	0.1	141	1.9
August	1	18	0.7	78	1.5	96	1.3
	2	17	0.7	402	8.0	419	5.6
	E	17	0.7	-	-	17	0.2
September	1	5	0.2	20	0.4	25	0.3
	2	6	0.2	108	2.1	114	1.5
	E	21	0.9	-	-	21	0.3
October	1	60	2.5	73	1.4	133	1.8
	2	136	5.7	92	1.8	228	3.0
	E	223	9.4	164	3.2	387	5.2
November	1	-	-	285	5.7	285	3.8
	2	4	0.2	510	10.1	514	6.9
	E	183	7.7	289	5.7	472	6.4
December	1	2	0.1	298	5.9	300	4.0
	2	49	2.1	302	6.0	351	4.7
	E	21	0.9	-	-	21	0.3
Total	1	281	11.8	2,055	40.8	2,336	31.5
	2	542	22.8	2,496	49.6	3,038	41.0
	E	1,552	65.3	481	9.6	2,033	27.4
T		2,375	99.9	5,032	100.0	7,407	99.9

ES - Experimental Station Shan - Shannon trap

	Indoor	Outdoor
Ae. scapularis	0.56	0.67
Ae. serratus	0.39	0.44

Comparing the sites sampled, for both species by means of the Mann-Whitney test, the *p* values were found to be 0.0654 for *Ae. scapularis* and 0.1683 for *Ae. serratus*, thus showing no significant differences. Nevertheless, in the comparison between the two mosquitoes, the *p* values found were 0.0015 and 0.0004 for indoor and outdoor collections, respectively. Thus a high level of significance was found as between the domiciliary frequency of both mosquitoes (Table 4).

Synanthropy - For both mosquitoes the three environments sampled were compared by means of synanthropic indices (s). The results obtained were as follows:

	a(%)	b(%)	c(%)	s
Ae. scapularis	21.2	54.7	24.1	+24.5
Ae. serratus	1.4	15.2	83.5	-74.5

Table 3 - Monthly distribution of *Aedes scapularis* and *Ae. serratus* females collected in Shannon trap in the partially disturbed environment (GA), August 1992 through December 1993.

	Ae. scapularis		*Ae. serratus*		Total	
Monthsn.	%	n.	%	n.	n.	%
1992						
August	9	2.8	2	0.6	11	1.7
September	28	8.9	1	0.3	29	4.4
October	17	5.4	6	1.7	23	3.5
November	16	5.1	10	2.9	26	3.9
December	111	35.1	71	20.6	182	27.5
1993						
January	9	2.8	26	7.5	35	5.3
February	22	7.0	42	12.2	64	9.7
March	58	18.4	66	19.1	124	18.8
April	2	0.6	1	0.3	3	0.5
May	4	1.3	-	-	4	0.6
June	-	-	1	0.3	1	0.1
July	2	0.6	-	-	2	0.3
August	2	0.6	17	4.9	19	2.9
September	1	0.3	-	-	1	0.1
October	-	-	3	0.9	3	0.5
November	32	10.1	86	24.9	118	17.8
December	3	0.9	13	3.8	16	2.4
Total	316	99.9	345	100.0	661	100.0

GA - "Galiléia Farm"

Table 4 - Monthly distribution of *Aedes scapularis* and *Ae. serratus* females collected on human bait in the domiciliary environment (BC), August 1992 through December 1993.

			Ae. scapularis				*Ae. serratus*				Total				
	Months	N	Indoor		Outdoor		Indoor		Outdoor		Indoor		Outdoor		T
			n	%	n	%	n	%	n	%	n	%	n	%	
1992															
	August	2	2	0.7	27	6.1	-	-	-	-	2	0.7	27	5.4	29
	September	2	2	0.7	16	3.6	-	-	-	-	2	0.7	16	3.2	18
	October	2	5	1.8	40	9.0	-	-	-	-	5	1.7	40	8.0	45
	November	2	21	7.6	24	5.4	-	-	-	-	21	7.0	24	4.8	45
	December	3	16	5.8	27	6.1	-	-	17	32.7	16	5.3	44	8.8	60
1993															
	January	2	42	15.2	21	4.7	-	-	8	15.4	42	14.0	29	5.8	71
	February	2	108	38.9	71	15.9	1	4.5	5	9.6	109	36.4	76	15.3	185
	March	2	41	14.8	60	13.5	2	9.0	4	7.7	43	14.4	64	12.9	107
	April	2	10	3.6	33	7.4	18	81.8	6	11.5	28	9.4	39	7.8	67
	May	2	7	2.5	4	0.9	-	-	6	11.5	7	2.3	10	2.0	17
	June	3	12	4.3	17	3.8	-	-	1	1.9	12	4.0	18	3.8	30
	July	2	-	-	23	5.2	-	-	-	-	-	-	23	4.6	23
	August	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	September	1	-	-	-	-	-	-	-	-		-	-	-	-
	October	2	9	3.2	68	15.3	-	-	-	-	9	3.0	68	13.7	77
	November	3	-	-	13	2.9	-	-	-	-	-	-	13	2.6	13
	December	2	2	0.7	1	0.2	1	4.5	5	9.6	3	1.0	6	1.2	9
Total		34	277	99.8	445	100.0	22	99.8	52	99.9	299	99.9	497	99.9	796

BC= "Sítio Barra do Capinzal"
N= number of catches

Thus, considering the general over-view of this man-made environment it seems that *Ae. scapularis* is developing a significant synanthropic level while *Ae. serratus* seems to retain its sylvatic habits.

Regarding the synanthropic ratios (sr) the overall value in the ES area, on the basis of the total number of females caught on the open land (Shan E) and in the domiciliary environment (BC), as compared with that obtained in the vestigial forests (Shan 1+ Shan 2), was 0.53 for the two species taken together. However, it was 2.76 for *Ae. scapularis* and 0.12 for *Ae. serratus* when considered separately. These results suggest strongly that the residual forest patches retain a greater number of *Ae. serratus* than they do of *Ae. scapularis*. Besides, when relating the open land (Shan E) results, with those obtained in the domiciliary environment (BC), the overall ratio was of 2.6 for both mosquitoes together, showing a greater occurrence outside than inside the domiciliary environment. Nevertheless, the specific values of these ratios were 2.1 for *Ae. scapularis* and 6.5 for *Ae. serratus*, showing greater frequency of this latter species outside the domiciliary environment. Thus, considering these two mosquitoes separately, the ratios obtained were as follows:

Ae. scapularis

$$sr = \frac{Shan\ E}{Shan\ 1 + Shan\ 2} = 1.9$$

$$sr = \frac{BC}{Shan\ E} = 0.46$$

Ae. serratus

$$sr = \frac{Shan\ E}{Shan\ 1 + Shan\ 2} = 0.11$$

$$sr = \frac{BC}{Shan\ E} = 0.15$$

So, in the domiciliary environment (BC) *Ae. scapularis* showed a higher synanthropy level than *Ae. serratus* when compared with the open land (Shan E) samples. According to the results obtained, *Ae. scapularis* revealed a clear tendency to frequent the anthropic environment and affected the domiciliary one significantly (Fig. 2).

As regards the behavioural sequence, estimated by means of the index of change (IC) for each species, the computed data resulting from the comparison of phase 1 (=Shan 1+Shan 2) with phase 2(=Shan E+BC), are presented in Table 5. Thus

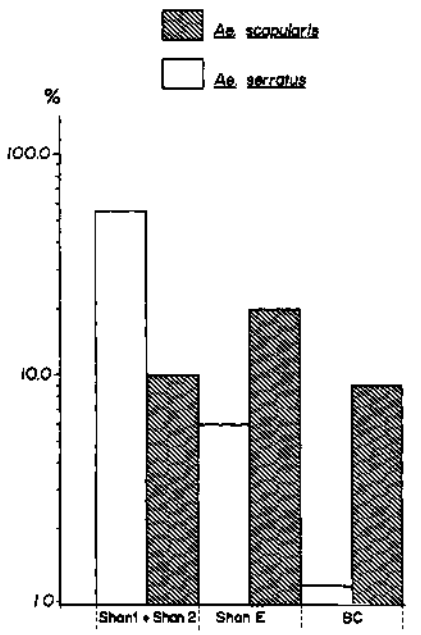

Figure 2 - Distribution of *Aedes* females rates (%) caught at three different places in the ES anthropic (human dominated) environment.
BX - domiciliary environment ("Sitio Barra do Capinzal")
ES - anthropic environment (Experimental Station)
Shan E - open land (rice-paddy bank)
Shan 1 + Shan 2 - vestigial forests.
% - percentage rates of the total number of females caught at ES.

Table 5 -Index of change (IC) and abundance (a) ratios of *Ae. scapularis* and *Ae. serratus* females in two environment developmental phases.

Species	Phase 1 (Shan 1 + Shan 2)			Phase 2 (Shan E + BC)			IC	a_2/a_1
	d	o	a_1	d	o	a_2		
Ae. scapularis	0,273167	0,038295	0,010461	4,2316	0,040657	0,17088	0,8846	16,33
Ae. serratus	8,423102	0,211763	1,783702	0,601178	0,010446	0,00628	-0,9930	0,0035

a_1 - overall abundance in phase 1.
a_2 - overall abundance in phase 2.
d - relative density.
o - percentage occurrence.
Shan 1 + Shan 2 - vestigial forests
Shan E + BC - open cultivated land and dwelling.

these indices were computed as 0,8846 for *Ae. scapularis* and -0,9930 for *Ae. serratus*, so indicating major changes for both mosquitoes. Comparing these changes, as from phase 1 to phase 2, the first of those species increased 16.33 times while the second decreased 284.0 times.

Discussion

First attention must be drawn to the predominance of *Ae. scapularis* and *Ae. serratus* among the *Aedes* species sampled during the collection undertaken. However, this dominance related to these two mosquitoes differently. According to previously published data obtained in the same general Ribeira Valley region, *Ae. scapularis* was particularly frequent outside the forest environment while *Ae. serratus* was frequent inside it (Forattini et al.[9,10], 1986, 1986a). The prefered behavior pattern of the former, i.e. to frequent the modified environments represented by secondary vegetation, was recorded even in other regions (Lourenço-de-Oliveira[23], 1984; Roberts et al.[29], 1985; Mitchell et al.[26], 1985; Forattini and Gomes[12], 1988).

The main objective of the present research was to compare this prevalence of the *Aedes* species at the various sites studied. Even though employing different sampling techniques, Shannon traps in the outside environments and human bait in the domiciliary one, comparison of the results was considered appropriate to the local circumstances. Anyway, some attention needs to be given to the presence of *Ae. albopictus*, an exotic recently introduced species which, notwithstanding this, was found (only two specimens) in the remnant forest (Shan 1) and indoor environments (BC) (Table 1).

The two forest remnant (Shan 1 and Shan 2) held the greater number of the specimens of these two species caught. Jointly they accounted for 73.3% of the *Aedes* females collected in the ES area. Beside the two peaks, occurring in the hottest-rainy season, another was recorded during the cold (June through August) season. Probably this last one was related to *Ae. scapularis* breeding in the empty conditions of the local rice fields (Forattini et al.[16], 1994). Anyway, comparing the results obtained in the remnant forests (Shan 1 and Shan 2) with those of the open land (Shan E) represented by the rice cultivation area, it was clear that in these places *Ae. scapularis* predominated over *Ae. serratus*. So, it seems that this last mosquito has a little propensity to migrate from the forest environment to the open land. No differences were found in the results obtained in the partially disturbed environment of the "Galiléia Farm"(GA).

Regarding the frequency in the domiciliary environment, the general values of the Williams' means showed no difference when outdoor and indoor catches for each of those species were compared. Nevertheless, *Ae. scapularis* was significantly more frequent in that environment than *Ae. serratus*. This finding agrees with the general observations reported from several regions that mention the occurrence of *Ae. scapularis* in dwellings (Roberts et al.[28,29], 1981, 1985; Lourenço-de-Oliveira[23], 1984; Gonzalez et al.[18], 1984; Lourenço-de-Oliveira & Heyden[24], 1986; Forattini et al.[11,13], 1987, 1990). Thus, regarding the synanthropy of these two culicids, the estimation based on the *s* indices showed a positive value for *Ae. scapularis* and a negative one for *Ae. serratus*. These results seem to disagree with those previously obtained from a comparison with those of the primitive environment, when positive values were computed for both species (Forattini et al.[14,15], 1993, 1993a). Despite this, in that estimate the anthropic environment was considered as a whole and compared with that of the primitive forest. Indeed, the ES area included several features, each one with its peculiar characteristics such as the vestigial forests, the cultivated open area and the dwellings and each of them representing quite distinct consequences of the human activity. So it is understandable that the mosquitoes' behavior in these three different situations represents details of the overall degree of synanthropy computed when this human environment is regarded as a whole. The synanthropic ratios (*sr*) clearly showed a higher tendency of *Ae. scapularis* towards endophily, so the mosquito population in that region may be considered eusynanthropic.

Finally, the changing pattern as estimated by the indices of change (IC) clearly showed that *Ae. scapularis* was greatly favoured by its installation in the anthropic environment differently from *Ae. serratus* that underawent a significant decrease when the natural habitat was modified (Fig. 2).

In conclusion, the present research reported supports the hypothesis that *Ae. scapularis*, in the region studied, constitutes a population which is developing a high level of synanthropy as well as a strategy of adaptation to eusynanthropy. In the light of the fact that an encephalitis epidemic occurred in this region in the recent past, i.e. less than twenty years ago, the data here reported may be assumed to justify the incriminations *Ae. scapularis* as a vector of the Rocio encephalitis, as well as of other, arbovirus in the Ribeira Valley of South-Eastern Brazil.

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Resumo

Relatam-se os resultados de coletas regulares de adultos de culicídeos Aedes, *levadas a efeito em ambiente antrópico do Vale do Ribeira, SP, Brasil, ao longo do período de agosto de 1992 a dezembro de 1993. As coletas foram realizadas em várias áreas correspondentes a matas residuais, a ambiente aberto cultivado e a meio domiciliar. A dominância dividiu-se entre* Ae. scapularis *e* Ae. serratus, *porém não de maneira equivalente para as diversas áreas pesquisadas. O primeiro revelou nítida tendência ao predomínio no ambiente artificial representado pela área aberta cultivada e pelo domicílio humano. Quanto ao segundo, evidenciou-se nítida preferência pelo meio das matas residuais. Considerando este como remanescente da primitiva cobertura florestal da área, os outros foram tidos como fase posteriormente desenvolvida em virtude da atividade humana. Assim procedendo, compararam-se as duas fases em relação as duas espécies. Como resultado do cálculo dos índices de mudança, pode-se estimar que a população de* Ae. scapularis *cresceu mais de 16 vezes com a transformação do ambiente natural enquanto que a de* Ae. serratus, *nas mesmas cirunstâncias, sofreu decréscimo de 284 vezes. Tais dados, aliados ao predomínio de* Ae. scapularis *na isca humana do ambiente domiciliar, tornam lícita a conclusão deste culicídeo ser encarado como vetor biológico epidemiologicamente importante de doenças ao homem e animais. Assim sendo, é de se admitir ter desempenhado esse papel transmissor quando da epidemia de encefalite por vírus Rocio, além de outras arboviroses, que ocorreu na região do Vale do Ribeira.*

Aedes. *Ecologia de vetores. Infecções por arbovírus, transmissão.*