

## NEW ENTOMOLOGICAL AND VIROLOGICAL DATA ON THE VECTORS OF SYLVATIC YELLOW FEVER IN BRAZIL<sup>1</sup>.

Nicolas DEGALLIER<sup>2</sup>, Amelia P. A. TRAVASSOS DA ROSA<sup>3</sup>, Pedro F. C. VASCONCELOS<sup>3</sup>, Elizabeth S. TRAVASSOS DA ROSA<sup>3</sup>, Sueli G. RODRIGUES<sup>3</sup>, Gregório C. SA Filho<sup>3</sup> & Jorge F. S. TRAVASSOS DA ROSA<sup>3</sup>

<sup>1</sup>Work done under the jointed auspices of the National Health Foundation (Ministry of Health, Brazil), CNPq and ORSTOM (France). It has been funded by these institutions and the Albras Company, Pará State, Brazil.

<sup>2</sup>ORSTOM, C.P. 75 66017-970 Belém Pará Brazil & Instituto Evandro Chagas.

<sup>3</sup>Instituto Evandro Chagas/FNS - MS, C. P. 1128, 66090-000, Belém PA Brasil.

The present report focuses on recent eco-epidemiological data on Yellow fever, obtained in two very distinct eco-epidemiological contexts: the Barcarena (PA) area (1° 31' S; 48° 40' W; alt. <100 m), situated in the dense amazonian rainforest, and the Campo Grande (MS) region, situated in the cerrado with gallery forest in central Brazil (20° 27' S; 54° 37' W; alt.: 566 m). In the first region, one strain have been isolated from a pool of 6 *Hg. janthinomys* (collecting period: June 12 to 26, 1991). In the other region, 2480 anthropophilous mosquitoes have been collected, of which near 40 % were potential YF vectors (collecting periods: January, 24 to February, 10; January, 26 to February, 5; and February 6 to 14, 1992 in three Fazendas Cabeceira do Jaraguari, Rincão and Agua Encanada, respectively). Classified by decreasing relative abundance, the latter were *Ae. scapularis*, *Sa. chloropterus*, *Hg. janthinomys*, *Hg. leucocelaenus*, *Hg. spegazzinii*, and *Sa. soperi*. Four strains of YF virus were isolated from *Hg. janthinomys*, one from *Sa. chloropterus* (first report as natural host in South America) and one from *Sa. soperi* (first report as YF natural host). The minimal infection rates varied among the three localities but were all high (table 1). The mean daily survival rate was 0.9635 for the populations of *Hg. janthinomys*, allowing to extrapolate the value of the infection rate when people was infected most recently.

Some eco-epidemiological parameters of the *Hg. janthinomys* populations (infected or not) from each of the 3 places of study in the Campo Grande region have been compared. It seems that the time lags between the last human contaminations and our collecting of infected mosquitoes would be 41 and 17 days for the Faz. Rincão and Sidrolândia, respectively. With survival rates equal to 0.9593 and 0.9684, the infected mosquitoes would represent 18.20 % and 57.93 % of those infected during the epizootics in the respective areas. Thus, the infection rates at the respective times of human contaminations would be estimated to be at least equal to 6.97 % and 7.61 %. Therefore, these are of the same order. We have obtained a similar value for the initial MIR (6.54 %) when fitting a line with the values estimated at 17, 41 and 52 days after the last human contamination. As for the MIR, the relative density index seems to decay linearly with time. On the other hand, the parity rate does not seem to vary linearly with time. No hypothesis is yet available to explain these phenomenons.

The role of *Hg. janthinomys* as the principal vector of sylvatic YF in Brazil, and actual responsible of most of human contaminations, is confirmed once more. The high densities and infection rates, together with the presence of infected *Sabethes*, may suggest that our field work in Mato Grosso do Sul have been done only a short time after an YF epizootic. However, various eco-epidemiological aspects remain to be studied in relation with the maintenance of the YF virus in its area of endemicity. In the southern part of this area, it is not known if the virus is periodically reintroduced from the north (the permanent endemic focus of the french authors) or if it is able to persist during the dry and cold season, either in the drought-resistant eggs of the *Haemagogus* species, or in the more resistant *Sabethes* adults, or in both. Whatever the case, the "purpose" may not be the same. The long-term survival of the virus in the eggs would be necessary to wait for the reconstitution of the local population of susceptible monkeys. On the other hand, a shorter-term survival in adult mosquitoes may be a possibility for initiating another epizootic in the case of new vertebrate hosts be entering into the area.

Eggs of *Haemagogus* would be collected with ovitraps, and sentinel monkeys would be maintained to detect any early seasonal circulation of YF. The seasonal variations of the relative densities and survival rate of the vectors, and the reconstitution of the monkey populations would be the subjects of other very interesting studies. Finally, the survey of susceptible (non-vaccinated) people would be of prime importance in relation with the risks of sporadic cases emergences.

The data obtained in the Barcarena area were not sufficient to say if there have been an epizootic or not, previously to our collecting of infected mosquitoes (i.e. during the first half of 1991). However, the low rate of HI antibodies in the human population and the absence of recent human cases, despite a close contact of these people with the forest, suggest a non-epizootic mode of transmission.

Table 1. Minimum infection rates (%) of each positive species for YF virus, according to the place of collection in the region of Campo Grande, MS; the dates of the most recent human cases in each locality give an indication of the end of the epizootics.

Species \ Place	Jaraguari	Campo Grande	Sidrolandia	Total
Most recent human case	Dec., 20, '91	Dec., 31, '91	Feb., 3, '92	
<i>Haemagogus (Hag.) janthinomys</i>		1.27	4.41	2.17
<i>Sabethes (Sbn.) chloropterus</i>			1.67	0.48
<i>Sabethes (Sbn.) soperi</i>	5.26			5.00

Table 2: Summary of eco- epidemiological parameters for the *Haemagogus janthinomys* mosquito population, collected in the region of Campo Grande, MS, by county, January, 24 to February, 14, 1992.

	Jaraguari	Campo Grande	Sidrolandia	Estimated <sup>a</sup>
Nr. of days since the last human case	52	41	17	0
MIR (%)	0	1.27	4.41	6.54 (r <sup>2</sup> =0.99)
Relative density	0.20	0.37	0.62	0.83 (r <sup>2</sup> =0.99)
Parity rate (%)	57.5	53.62	61.81	63.45 (r <sup>2</sup> =0.48)
Daily survival rate (%) <sup>b</sup>	96.37	95.93	96.84	
Surviving infected mosquitoes (%) <sup>c</sup>	14.62	18.20	57.93	
MIR at time of epizootics	?	6.97	7.61	

<sup>a</sup> Values at origin estimated by linear regression of the known values; the values of the coefficients of regression are indicated between parenthesis.

<sup>b</sup> assuming a 15 days long gonotrophic cycle.

<sup>c</sup> this value represents the proportion of infected mosquitoes surviving at the end of the period = (daily survival rate)<sup>(Nr. of days since the last human cases)</sup>



# ARTHOPOD-BORNE VIRUS INFORMATION EXCHANGE

January, 1993

## TABLE OF CONTENTS

	Page
ANNOUNCEMENTS, COMMITTEE, SUBCOMMITTEE UPDATES	
ICTV Update	i
SEAS Update	v
Collection of Insect Cell lines at YARU	vii

(Continued on the next page)

### PURPOSE OF THE ARBOVIRUS INFORMATION EXCHANGE:

To exchange information on a timely basis. The recipients are those who study various aspects of arboviruses. The Exchange contains preliminary reports, summaries, observations, and comments submitted voluntarily by qualified agencies and individual investigators. The appearance in the Exchange of any information, data, opinions, or views does not constitute formal publication and should not be referred to in "Reference" sections of papers or included in lists of publications. The Exchange is not a "peer reviewed" publication; in fact, it is not a publication at all. Any reference to or quotation of any part of the Exchange must be authorized directly by the agency or person submitting the text.



U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES  
Public Health Service

