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MODIFICATIONS OF ARBOVIRUSES' ECO-EPIDEMIOLOGY IN TUCURUI, PARA, BRAZILIAN AMAZONIA, RELATED TO THE CONSTRUCTION OF AN HYDROELECTRIC DAM[1, 2].

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Physical, ecological, and climatic data about the Amazonian Basin may be summarized as follows: the Amazon River and its tributaries hydrographic basin covers 3,984,467 km^2; Approximately 3,373,000 km^2 (84 %) of Brazilian Amazonia are covered by dense equatorial forest; this region is yet sparsely inhabited, with less than 10 % of the total brazilian population and, excluding the state capital cities, it has one of the world's lowest population densities, less than to 2 inhabitants /km^2; with its equatorial or humid tropical climate and potential of natural resources and the resultant employment, Amazonia is very attractive to people from regions which suffer from severe droughts like the Northeast.

The Amazonian region of Brazil seems to be the world's richest reservoir of arboviruses. At this time, 173 different types of arboviruses have been detected in the Amazonian region, accounting for one third of the 532 world arboviruses. Of these, 146 (84 %) are endemics.

This presentation concerns the preliminary results of a 6-years-duration project, which was initiated in 1982.

The main objective of the project was to evaluate what would be the effects of the construction and flooding of a dam on the transmission and epidemiology of sylvatic arboviruses, in order to define the potential health hazards to which the human population would be subjected.

Comparisons were made between a number of surveys, done: 1) inside the dam region, before, during and after the flooding period; 2) outside the dam region, but in an area with a similar climate, landscape and vegetation, during the total time of the studies.

The two chosen areas, namely Altamira and Tucurui, Para, were studied since 1974, and since September, 1982, respectively. The former, and the latter before the outset of flooding (september, 6, 1984) were considered as a control or reference for comparisons with data obtained in Tucurui during flooding and thereafter.

The surveys consisted of sampling as many wild vertebrate and hematophagous Diptera as possible. Human sera were collected from febril cases and random serological surveys. Field collecting and conservation, inoculation, serological testing and identification procedures were as routinely done in arbovirus laboratories.

The geology, climate and vegetation of the two areas are very similar.

As regard to the evolution of human serology, very few variations seem to have occurred between the three phases of the study, with a maximum of positive serologies during the flooding period, but the differences were not statistically significant. Similarly, in the reference region, the prevalence of antibodies against the four more important arboviruses' groups have not varied significantly.

Some eco-epidemiological topics have been selected, allowing the grouping of the different arboviruses under somewhat arbitrary but convenient categories, for a more detailed analysis: 1) new or already known arboviruses which caused epizootics, 2) transmission of arboviruses from possible exogenous origin, 3) epizootics caused by endemic arboviruses, 4) arboviruses whose transmission has shown a slight enhancement, whether or not caused by the new ecological conditions, and 5) those which showed no apparent modification in their transmission patterns (referring to the control area).

The main results are the following:

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[1] presentation made at the Fifth Australian Arbovirus Symposium, 28th August - 1st September, 1989, Brisbane, Queensland, Australia, and at the Symposium "Forest 90", Manaus, Brazil, 7th - 13th October, 1990.

[2] The present work has beneficiated of financial and/or logistic help of Eletronorte (Eletrobras), SUDAM (Polos Agropecuarios da Amazonia), CNPq, ORSTOM and Fundation SESP.

1) Three new and three already known types in the Anopheles A group of Bunyavirus were favoured by the great proliferation of Anopheles nuneztovari and An. triannulatus which accompagned the flooding of the dam.

2) An epizootic of the Gamboa Bunyavirus, newly registered for Brazil, one year after the outset of flooding, when the mosquito Aedeomyia squamipennis showed very large populations.

3) Guaroa (Bunyavirus, group California), an endemic arbovirus showed an epizootic probably as a consequence of the proliferation of anopheline mosquitoes.

4) A temporary proliferation of Culex spp. mosquitoes and the presence of a rich avifauna in the dam area during flooding are probable causes of the enhanced circulation of Turlock (Bunyavirus, group Turlock) and Kwatta-like (Rhabdoviridae, group Kwatta) viruses. Oropouche (Bunyavirus: group Simbu), Saint Louis Encephalitis (Flavivirus, group B), Maguari/Xingu (two jointly studied Bunyavirus: group Bunyamwera), and Triniti (ungrouped Togaviridae) arboviruses showed at least patterns of enhanced circulation but probably for diverse reasons, not all due to the dam flooding. The last two types showed a possible shift of mosquito vectors, from diurnal ones to the nocturnal above cited anopheline.

5) Eight arboviruses showed no clear-cut difference between their transmission patterns in the reference region and the ecologically modified dam area. They are: Yellow Fever (Flavivirus: group B), Mayaro (Alphavirus: group A), Ilheus (Flavivirus: group B), Tucunduba (Bunyavirus: group Bunyamwera), Eastern (and Western) Equine Encephalitis (Alphavirus: group A), Icoaraci (Phlebovirus: group Phlebotomus), and Itaporanga (Phlebovirus : group Phlebotomus) viruses. The first six are pathogenic for man.

Occasionally collected data are summarized for Bush Bush (Bunyavirus: group Capim), Aruac (unclassified Rhabdoviridae), Munguba (Phlebovirus, Phlebotomus group), Santarem (ungrouped Bunyaviridae), and Acado-like (Orbivirus: group Corriparta) arboviruses.

52 probably new types of arboviruses were classified in the Changuinola group of the genus Orbivirus (Reoviridae), the Phlebotomus, Anopheles A, and Simbu groups of Bunyaviridae (genera Phlebovirus and Bunyavirus). Seven remained neither classified nor grouped.

The usefulness of classifying ecologically the arboviruses is highlighted, when studying or forecasting possible impacts of dam impoundment on the human health hazards due to these agents. The scarcity of such studies does not allow comparisons but for future studies, it would be most important a) to define the ecological characteristics of the new equilibrium which becomes established in modified regions, and b) to adopt a more previsional attitude (hypothesis testing) during project planning.