Transovarial transmission of yellow fever virus by a sylvatic vector, *Haemagogus equinus*

MADAM—Transovarial transmission of a flavivirus was first demonstrated in 1976 when workers from Senegal (COZ *et al.*, 1976) reported the isolation of Koutango virus from male *Aedes aegypti*. Inheritance of Japanese encephalitis and Dengue viruses was demonstrated shortly thereafter (ROSEN *et al.*, 1978) in *Ae. albopictus* and Ae. *togoi* and AITKEN *et al.* (1979) recently demonstrated transovarial transmission of yellow fever (YF) virus by the urban vector *Ae. aegypti*. The obvious question is whether sylvatic vectors of YF virus can also transovarially transmit YF virus. We designed experiments to determine if transovarial transmission of YF virus occurs in *Haemagogus equinus*, a known sylvatic vector of YF in tropical America. In this communication we reported the first evidence of transovarial transmission of YF virus by this sylvatic vector.

The *Hg. equinus* used in our experiments were from a colony started by Galindo in 1975 from mosquitoes obtained in Maje Island, Panama. The YF virus used was a low passage local YF isolate from a fatal human infection, passed once in an *Aotus* monkey and once in Vero cell culture.

We inoculated parenterally 322 female *Hg. equinus* with Y.F. virus; these infected mosquitoes oviposited 4,804 eggs, of which 1,727 hatched to yield 1,621 adults. Freshly emerged adults were sonicated in pools of 10 or fewer individuals and inoculated intrathoracically into groups of five *Toxorhynchites amboinensis*. These *Toxorhynchites* were kept 8 to 10 days at 28°C, 80% relative humidity, sonicated, and the suspensions diluted 10^{-1} to 10^{-5} and inoculated on to Vero cells grown in panels and observed for plaque development. Of 177 *Toxorhynchites* suspensions tested one showed plaques with a titre $10^{7.7}$ pfu/ml. Virus was re-isolated from the original positive *Haemagogus* suspension on Vero cells, *Aedes albopictus* cell line (C-36), and by inoculation into *Toxorhynchites* and *Haemagogus* mosquitoes. The isolate has been identified as YF virus by both plaque reduction neutralization and fluorescent antibody tests using reference reagents.

This is the first time transovarial transmission of YF virus has been demonstrated in a New World sylvatic vector. We concentrated on *Hg. equinus* initially because YF virus has been isolated many times from this species of mosquito in Panama and because it was the only sylvatic YF vector abundantly present during the 1954-55 Honduras-Guatemala jungle YF epidemic in which the virus persisted for almost a year and a half (TRAPIDO & GALINDO, 1956) in the absence of evidence for vertebrate mediated transmission.

Demonstration of transovarial transmission of YF virus by parenterally infected *Hg. equinus* suggests that this mechanism may contribute to virus maintenance during adverse environmental conditions. Additional studies are now in progress to demonstrate vertical transmission following oral rather than parenteral infection, to further quantify the rate at which transovarial transmission occurs, and to demonstrate virus transmission following feeding by vertically infected F_1 progeny.

We are, etc.

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Measles vaccination in Zaïre—when and how?

MADAM—WOOD *et al.* argues for two policies with which we disagree: providing measles immunization as an intradermal dose of 0·2 ml (with a dermoject) rather than as a subcutaneous dose of 0·5 ml (with a syringe and needle), and, in countries similar to Zaïre with high measles morbidity and mortality in young children, initiating measles immunization at six months.

Concerning the first point, persons with different value judgements may certainly come to different conclusions. We believe it poor public health to try to stretch vaccine by reducing the dose administered and thereby reducing the efficacy of the vaccine. Although according to the authors' data a few more children would be protected using the reduced dose, but it is at a cost of half of the total vaccinees *not* being protected, and being recorded as "vaccine failures", to the detriment of public trust. We are not comfortable with the data itself, however, as an 80% seroconversion rate among children given 0·5 ml of potent vaccine subcutaneously, which they cite, is extremely low. (Criteria for seroconversion are not clear in the article: if the authors accepted a change of at least one dilution, it does not mean at least a 10-fold rise in antibody level, but rather at least a two-fold rise.)

Concerning the second point there need be no disagreement: given seroconversion rates following measles immunization at various ages and measles attack and fatality rates at those same ages, one can compute the expected reduction in mortality for