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APR 21 1982  
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Approx. 950 words

IDRC-F204e

### DEADLINE FOR AN EPIDEMIC

by Lennox Grant

TRINIDAD, IDRC -- At some time near the turn of the century, yellow fever will strike again in the Caribbean island of Trinidad. In the forests, monkeys will fall dead from the trees. In nearby villages, human victims will suffer kidney and liver damage, and show the yellowing skin and eyes that give the fever its name.

Reports of these events will throw a scare into the population. But the outbreak, if it really occurs, will have been expected. Public health officials know that yellow fever reappears, as if from nowhere, every 20 years. They also recognize the ominous stages of the dreaded "cycle" of infection: dying, virus-ridden monkeys infect jungle mosquitoes: jungle mosquitoes infect bush-roaming humans; these in turn infect household mosquitoes whose bite then makes more people feverish and yellow. Thus, a "jungle cycle" connects with an "urban cycle." But where does it all begin? From what "reservoir" of infection do the monkeys pick up the virus?

At the Caribbean Epidemiology Centre (CAREC), an internationally supported complex in Port of Spain, a team of investigators are working to track the virus to its "reservoir" or source.

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"The virus emanates every 20 years from nobody quite knows where," says virologist Barbara Hull, leader of the team. "We know it appears in monkeys because they die from it. If monkeys tolerated the infection, we'd probably never know even that much."

In November 1978, dead monkeys were found in the forests of Guayaguayare, South Trinidad. The yellow fever epizootic among the monkeys soon became an epidemic among Trinadadians. There were only 18 diagnosed cases, including seven deaths, mostly people who had been in the forests. But in towns far from Guayaguayare, crowds rushed to health centres to be vaccinated. "Everything else took a back seat," Miss Hull recalls.

In neighbouring Caribbean islands more heavily dependent on tourism, the news out of Trinidad was only slightly less alarming. Yellow fever's reputation, going back nearly 200 years, is one to be feared. According to Dr. Elisha Tikasingh, an entomologist and parasitologist who runs the project's field operations: "Yellow fever was generally known as a seaport disease, carried on ships from port to port in the Caribbean." The bad publicity from only one case among, say, North American and European cruise ship visitors could mean disaster for a vital industry.

The need to respond to such a threat underscores the importance of CAREC, the Caribbean's link with an international network of centres for disease surveillance and control. CAREC is supported by 19 Caribbean governments and by the PanAmerican Health Organization (PAHO), which also runs the Centre. Working closely with Ministries of Health, CAREC provides backup laboratory facilities for disease prevention and diagnosis, training, and research. Three years before the November 1978 outbreak, CAREC scientists had joined with Trinidad's Ministry of Health personnel to prepare for the epidemic. "We tried hard to get people immunized, but people don't bother until it really happens," says Miss Hull. By the time the epidemic was over, however, some 98 percent of the population had been vaccinated against yellow fever.

By then, too, the vector control division had all but eliminated the *Aedes aegypti*, the household mosquito that spreads the disease in urban areas.

The scare was over, but health officials knew the disease was only gone for a time. Unless they could discover where the virus resides and abort the cycle of infection, yellow fever was sure to return on schedule, a generation away. There thus remained a job of scientific detective work to uncover the habitat of the virus between the times when it surfaces in monkeys and humans.

A research project with that main objective began at CAREC in March 1980, after the last epidemic ended. The project, supported by the United Kingdom's Medical Research Council, the Trinidad and Tobago government, and Canada's International Development Research Centre (IDRC), also aims to find the reservoir of the virus that causes dengue, a disease also spread by the *Aedes aegypti* and whose symptoms resemble those of a mild yellow fever attack. A dengue (pronounced den-gay) epidemic hit Trinidad in 1977.

Of Trinidad's 150 mosquito species, two are known transmitters of yellow fever and dengue. In the forest, *Haemagogus* picks up the yellow fever virus when it bites infected monkeys in the trees, and injects it into humans working in the forest. When the humans return home, they become prey for the "domesticated" *Aedes aegypti* mosquito that collects the virus with each bite and passes it on to its next victims. The dengue virus, however, has no forest cycle. It is simply passed on from infected person to susceptible person by the *Aedes* as it bites.

But for the CAREC researchers now searching for the mystery reservoir, no species of mosquito or forest animal is above suspicion. At selected spots in the nearby Changuaramas forest, the field team sets traps for mosquitoes and animals. All animals caught are brought in for examination and autopsy to find traces of the virus. At CAREC, mosquitoes are classified according to "pools", that is, by species and time and place caught.

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In July 1980, the yellow fever virus showed up in two *Haemagogus* pools. By then, all the infected monkeys had died, and the epidemic had been over for five months. This led the researchers to new lines of inquiry. Did the virus come from a rare mosquito that could have been living five, six months before? "We don't know how long the *Haemagogus* live, or how far they fly, and we need to know it," says Dr Tikasingh. Again, had the virus been transmitted through the egg from mother to young insect? The field team began collecting *Haemagogus* eggs that were bred to adulthood in the laboratory. A third possibility was that some other animal, carrying the virus but resistant to the disease, had transmitted it to the mosquito. But no virus was found in the animals taken from the bush.

Everything points to the need for a study that is wider in scope and longer in term than the present two-year project.

But, as Miss Hull notes, "We're doing what we can with present facilities. With the field team we have, we can only sample some areas. We've just started what must be a long-term study in an area of public health that assumes great importance when there's an epidemic."

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April 1982