

## Medicine by Carol Hugunin

### Can dengue hemorrhagic return?

*A child-killer that is easily destroyed by mosquito control is beginning to make epidemic appearances in the Americas.*

**D**uring a roughly ten-week period, from the end of November 1989 to the end of January 1990, an epidemic of dengue hemorrhagic fever (DHF) struck 5,416 victims, killing at least 51 in Venezuela. The victims were children, 15 and younger, whom the disease struck with no regard for race or social status. Four different serotypes of the dengue virus exist, any or all of which can infect those who live in the areas where the serotypes are found.

Classical dengue infection is very severe, but rarely fatal. Dengue hemorrhagic fever, with its accompanying dengue shock syndrome (DSS), is lethal in 30-40% of cases, if undiagnosed or untreated.

Like many killers, DHF can be deceptive. Initially, a child will have a fever and flu-like symptoms for 2 to 7 days. The fever may subside and temperature even drop below normal, followed by sudden collapse, with symptoms of internal bleeding, and easy bruising of the skin. In some cases, bleeding in the gastrointestinal tract will cause the child to vomit blood. The child may show signs of shock and circulatory failure. Hospitalization is urgent.

The dengue virus is a good example of how pandemics evolve from a low-density, infrequent, and relatively benign disease—classical dengue—to an explosive epidemic killer—DHF and DSS. Today, 2 billion people live in areas where the disease vector mosquitoes—*Aedes aegypti*, *Aedes albopictus*, and *Aedes mediovittatus* are common.

In the 1940s and 1950s, *Aedes ae-*

*gypti*, which lives in and around houses, spread throughout Southeast Asia in the wake of the rapid postwar urbanization. Unfortunately, this urbanization, as in most non-industrialized countries, was accompanied by little in the way of proper infrastructure: Few houses had inside plumbing, running water, or window screens. Communities lacked sewage and waste water removal, medical and education infrastructure, and pest control programs. Much of the postwar urban growth actually occurred in huge shantytowns, surrounding older, decaying cities.

By the 1950s and 1960s, Southeast Asian nations were experiencing increased incidence of classical dengue, and ultimately epidemics of dengue, in which several of the disease's serotypes were identified. Mixing of different virus strains is believed to play a major role in the development of DHF, by a mechanism known as immunologic enhancement of infection, in which persons with low levels of immunity to one strain of a virus develop severe disease when exposed to a different strain of the same virus.

Slowly at first, dengue hemorrhagic cases occurred, then in 1954 the first epidemic of DHF exploded. In Thailand, which maintains a fair statistical account of the growing dimensions of the problem, the density of dengue hemorrhagic cases rose from 21.4 per 100,000 population in 1976, to 168.2 cases per 100,000 in 1985.

Over the last two decades, dengue became a jet traveler and spread to Africa, where lack of medical infra-

structure makes its deadly progress impossible to document, to Pacific Island nations, and to the Americas. In the 1950s and 1960s, DDT had eliminated *Aedes aegypti* in Mexico, Panama, Costa Rica, Colombia, Ecuador, Peru, Bolivia, Paraguay, Argentina, Chile, Uruguay, Brazil, the Cayman Islands, and Bermuda. However, penny-wise and pound-foolish budget cutters decided to virtually eliminate the expensive mosquito surveillance and control programs that had functioned so well. Consequently the disease-carrying mosquito has returned in the last 20 years, attended by both increased transmission of classical dengue and epidemics. In the last decade, multiple dengue serotypes have been documented, along with sporadic cases of DHF throughout the Americas. In 1981, Cuba suffered the first big epidemic of DHF in the Western Hemisphere.

In the United States, the southern Gulf states, from Texas through Florida and Georgia, are plagued by *Aedes aegypti*. The U.S. also now has the infamous Tiger mosquito—*Aedes albopictus*—imported from Asia inside tires. The Tiger mosquito has spread to 17 states, and unlike *Aedes aegypti*, its eggs are resistant to freezing, allowing it to spread as far north as Ohio. Also unlike *Aedes aegypti*, which is found primarily in urban settings, *Aedes albopictus* inhabits urban, suburban, and rural areas.

Because, in the U.S., air-conditioning allows people to stay indoors during the dawn and dusk hours when these two mosquitoes like to feed, and since most mosquito control programs remain intact, epidemic dengue hemorrhagic fever is not expected in the U.S. However, if shrinking budgets eliminate mosquito control, then epidemic dengue hemorrhagic fever could become a major killer of our children.