



Bloody battle: the mosquito *Aedes aegypti* remains a scourge of health officials fighting dengue fever.

Mosquito researchers deny plotting secret biowarfare test

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A recent admission by the United States that it conducted a biological-warfare test using mosquitoes in 1965 has reopened old wounds over a much larger, but aborted, mosquito research project in India.

The Indian project was run by the World Health Organization (WHO) and the Indian Council of Medical Research (ICMR), but received funding from the US government. Researchers involved had planned to release hundreds of thousands of sterile male *Aedes aegypti* mosquitoes in the town of Sonipat, 100 kilometres north of New Delhi. But the project was cancelled by the Indian government in 1975 after Indian researchers claimed that its real purpose was to study the logistics of using yellow fever as a biowarfare agent (see *Nature* 251, 177–178; 1974). The disease does not exist in India, but is transmitted by *A. aegypti* and was considered at the time to be a potential biowarfare agent.

The allegations have always been strenuously denied by the European and US researchers involved. They insist that their aim was to eradicate the mosquito population, which transmits dangerous diseases such as dengue fever. But Indian scientists say that new documents released by the US Department of Defense show that the United States was conducting similar biowarfare experiments elsewhere. The documents, released on 9 October, list 27 secret chemical and biological tests conducted at the height of the Cold War. One of the tests involved releasing *A. aegypti* mosquitoes off the coast of the uninhabited Baker Island in the South Pacific to track the logistics of a mosquito-borne viral attack.

“The latest revelation that the Baker Island release was indeed a biowarfare experiment vindicates the closure of the US project in India,” says N. P. Gupta, an ICMR member who was director of the National Institute of

Virology in Pune when the project was cancelled. P. K. Rajagopalan, a retired entomologist who worked on the Sonipat project for the ICMR, points out that both programmes aimed to track the dispersal patterns of marked mosquitoes, and are similar enough to confirm government suspicions.

But researchers outside India vehemently deny that the Sonipat project was anything other than a legitimate public-health research project. “It was a very important species of mosquito to try to get rid of,” says Scott Halstead, a dengue expert who served as a WHO consultant for the project. “Dengue and dengue haemorrhagic fever are much more of a problem in India now. Here we are 30 years later and we still don’t have a way of dealing with the mosquito — the mosquito is winning.”

Others say that the only similarity between the two projects was the species of mosquito used, and that the data gathered in Sonipat would not have been useful for biowarfare purposes. In the Baker Island test, which involved female mosquitoes only, researchers tracked how many mosquitoes reached traps on the island, and recorded the number of bites volunteers on the island received. “We went to a lot of trouble to make sure that we were releasing 99% sterile males,” points out Chris Curtis, a WHO medical entomologist on the project who is now at the London School of Hygiene and Tropical Medicine. Unlike female mosquitoes, males do not bite or transmit viruses, he explains. “We couldn’t have possibly produced useful data for biowarfare.”

“Just because the words mosquito and United States can be threaded into one sentence does not implicate the project in India,” adds Halstead, now at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. “That project was only biological warfare from the perspective of the mosquito.”

Penicillin paper restores Fleming’s healthy reputation

Tom Clarke, London

Inspired by musicologists’ use of fragmented scores to complete the unfinished works of great composers, a British researcher has pieced together Alexander Fleming’s laboratory scribbles to recreate a paper that he says restores the reputation of the much-maligned discoverer of penicillin.

Fleming published details of the antibiotic effects of a mould that had killed off bacterial cultures in his poorly sterilized petri dishes, but never isolated penicillin from the mould or published work on its potential as a drug. Many of Fleming’s contemporaries and biographers have accused him of being messy and lazy, and of losing interest in his chance 1928 discovery, even though he went on to take much of the credit for discovering the first antibiotic drug.

“I hope my version of this paper will once and for all scotch the idea that Fleming was some idle dilettante who did little to develop what is arguably the most important drug in medicine,” says Milton Wainwright, the University of Sheffield microbiologist who has written the paper that Fleming could have produced, but didn’t (*M. Wainwright Perspectives in Biology and Medicine*, in the press).

The posthumous paper, which is based on Wainwright’s studies of Fleming’s lab notes and personal communications, describes the antibacterial properties of other airborne moulds. Wainwright emulated Fleming’s writing style and prepared the paper in a format suitable for the now defunct *British Journal of Experimental Pathology*, where Fleming published his first work on penicillin.

Wainwright also argues that Fleming fully realized penicillin’s potential prior to 1940. It was around this time that biochemists Howard Florey and Ernst Chain at the University of Oxford first isolated penicillin and demonstrated its potential as a drug. Fleming perhaps delayed publication while he gathered data for a *magnum opus* on penicillin, argues Wainwright.

Composer and musicologist Anthony Payne, who has used the records kept by Edward Elgar to complete the British composer’s *Symphony No. 3*, says that there are parallels between the two works — before the third symphony was performed, scholars regarded Elgar as an artist in decline. “My work proved that what people had been saying about him was completely wrong,” says Payne.