

2 Teams Identify Chinese Bat As SARS Virus Hiding Place

By LAWRENCE K. ALTMAN

The SARS virus, which has killed 774 people worldwide, has long been known to come from an animal. Now two scientific teams have independently identified the Chinese horseshoe bat as that animal and as a hiding place for the virus in nature.

The bats apparently are healthy carriers of SARS, which caused severe economic losses, particularly in Asia, as it spread to Canada and other countries. In Asia, many people eat bats or use bat feces in traditional medicine for asthma, kidney ailments and general malaise.

The Chinese horseshoe bat does not exist in the United States.

The finding is important in preventing outbreaks of SARS and similar viruses carried by bats because it provides an opportunity for scientists to break the transmission chain.

One team from China, Australia and the United States reported its findings yesterday in the online version of *Science*. The other team, from the University of Hong Kong, reported its findings on Tuesday in *The Proceedings of the National Academy of Sciences*.

"It's pretty pleasant to see two teams that did not know each other reach similar findings," Dr. Lin-Fa Wang, a virologist at the Australian Animal Health Laboratory, said in a telephone interview. After collecting hundreds of bats from the wild and from Chinese markets, each team reported identifying different viruses from the coronavirus family that are very closely related to the SARS virus.

SARS, or sudden acute respiratory syndrome, first appeared in China in 2002. It spread widely in early 2003 to infect at least 8,098 people in 26 countries, according to the World Health Organization. The disease died out later in 2003, and no cases have been reported since.

SARS now appears to join a number of other infectious agents that bats can transmit. Over the last decade, bats have been found as the source of two newly discovered human infections caused by the Nipah and Hendra viruses that can produce encephalitis and respiratory disease. In the SARS outbreak, attention focused on the role of Himalayan palm civets in transmitting it after scientists identified the virus in this species and in a raccoon dog sold in markets in Guangdong. But W.H.O. officials and scientists elsewhere cautioned that these species were most likely only intermediaries in

the transmission, largely because no widespread infection could be found in wild or farmed civets. So, the teams assembled a variety of specialists, including veterinarians, zoologists, virologists and ecologists.

Dr. Wang said his group focused on bats largely because of the team members' earlier pioneering work on the Hendra and Nipah viruses. One member, Dr. Jonathan H. Epstein, a veterinary epidemiologist at the Consortium for Conservation Medicine in Manhattan, led the scientists in gathering bats from the wild and market places.

After obtaining fecal and blood samples, the scientists released the bats into the wild or returned them to the markets. The specimens were tested for a variety of viruses that infect animals.

Laboratory analysis of the coronaviruses' makeup provided strong genetic evidence of the close relationship between those found in the bats and the SARS virus.

Although it is logical to assume that the bat viruses infected the animals in the live markets to cause the outbreak, the studies were not planned to prove that point.

"The genetic relationships do not tell you anything mechanically about if or how the virus moved from the bats to civets and from the civets to the humans," said Dr. Donald S. Burke, a virologist and professor at Johns Hopkins. "It's not a perfect story yet. But until I see otherwise, the working assumption will be that this is the reservoir species."

Dr. Wang said that "there is no rule" to establish proof that a certain species is the reservoir, or hiding place, of a virus, but that scientists make the judgment based on criteria like how widely the infectious agent is distributed in a species, the absence of symptoms among the animals and finding high levels of antibody but low amounts of virus in the animal.

The Chinese horseshoe bat fits those criteria and the civets do not, Dr. Wang said. The bat feeds on moths and other insects and generally does not bite animals. It was highly unlikely that insects transmitted the SARS viruses to bats, because the viruses do not grow in insect cells in the laboratory, Dr. Wang said.

Most civets that are sold in China as a delicacy are farmed, Dr. Wang said, and the government should ensure civet farms are distant from bat colonies, monitor farmed civets for SARS-like viruses and allow just non-infected animals to go to market.