CONTAGION

Hordes of deadly diseases are lurking in bats and sometimes jumping to people. Can we prevent a major pandemic, asks Carrie Arnold

TRENT PARKE/MAGNUM

PATIENT Zero was a 60-year-old man in Saudi Arabia. He developed a mysterious illness in June 2012 and died 11 days later. His doctor sent off samples for testing, which revealed a new virus related to the one that caused the SARS outbreak a decade ago.

More people soon fell ill with the disease – now called Middle East respiratory syndrome, or MERS – and so far half of all those infected have died. The crucial question is, where is the virus coming from? The pattern of infections suggested it is harboured by some animal living on the Arabian Peninsula, where all the cases to date have originated or been traced to, and occasionally jumps to people. But which animal is it?

Twenty years ago, bats would have been one of the last on the list of suspects. The only serious human disease they were known to carry was rabies. But since then, a whole host of deadly diseases has been linked to bats, from Ebola and hepatitis C to SARS – and now, perhaps, MERS. The MERS virus may have jumped to camels first and then people, but all the evidence so far suggests it is the latest bat virus to infect people. It won't be the last.

"Bats will most likely be the source of another new disease outbreak in the next five years," says Lin-Fa Wang, who helped identify the animals as the source of the 2003 SARS outbreak. "Although bats are obviously not the only source of new viruses, they have been shown again and again in recent times to be one of the most important reservoirs. So we have to be prepared for another potential pandemic of bat origin."

Concern about the spread of viruses from bats to people first arose in 1994 in Australia, after a mysterious virus killed 15 horses in Hendra, a suburb of Brisbane. Two people caught the virus from the horses, possibly through scratches exposed to infected blood, and both eventually died rather horrible deaths. Some animal must have infected the horses, but tests on hundreds of species revealed nothing.

The team widened their search to include bats, just to be sure they weren't missing anything. Over a period of several years, Hume Field, a veterinarian who now works for the non-profit organisation EcoHealth Alliance, trapped and took blood from more than 5000 bats. Antibodies to the Hendra virus were found in the large fruit-eating bats known as flying foxes, making them the prime suspects. In 2000, Field and his colleagues found the virus itself in some individuals, confirming that these bats are the natural reservoir for the disease.

"Hendra virus was the first of the new generation of zoonotic viruses associated with bats," Field says. Several more were soon discovered in Australia, including a close relative of the rabies virus now called Australian lyssavirus. In 1996, it killed a woman who was bitten by a bat.

Human cases of Hendra and Australian lyssavirus remain very rare. In 1998, however, 229 people in Nipah, Malaysia, fell ill with fever, headache and brain swelling caused by another unheard-of virus. Half of them died.

The Nipah virus turned out to be closely related to Hendra, so it was quickly traced to two species of flying fox found throughout South-east Asia. The virus is present in the saliva of infected bats, so it can spread via partially eaten fruit.

Deadly outbreak

In the 1998 outbreak, pigs had become infected after eating saliva-covered fruit dropped by bats, and then passed the disease to people. In most later outbreaks, which have typically involved dozens of cases, people have been infected directly by, say, drinking juice from date palms contaminated by bats. What's more, in some cases the virus has spread from people who were ill with the virus to those in close physical contact with them.

Nipah remains a bat virus that cannot spread readily between people. But as with bird viruses such as H5N1 flu, the big fear is that a bat virus that is deadly to people will mutate into a still-deadly form that jumps easily from person to person. That's what happened sometime around 2002 in China.

In November that year, people in Guangdong province began dying of a severe form of pneumonia. The outbreak hit the headlines in February 2003 when an American businessman flying from China fell ill. The plane landed in Vietnam, where the man died in hospital, as did several of the health workers who treated him. Within weeks the disease, dubbed severe acute respiratory syndrome or SARS, was spreading in nearly 20 countries.

Governments were forced to take drastic action. People with SARS were isolated and all their contacts traced. Take-your-temperature campaigns were launched in affected cities to detect the high fever characteristic of SARS, and passengers were screened before flights. Beijing built a 1000-bed hospital in a week. Fortunately, because the symptoms of SARS ›