Bio Terror Bible

EXPOSING THE COMING BIO-TERROR PANDEMIC

BIOTERRORBIBLE.COM: In the aftermath of man-made bio-terror generated pandemic, the government and media will be feeding the public any number of different scapegoats allegedly responsible for the pandemic that will likely kill millions.

While some scapegoats (see below) are indeed plausible, it is much more likely that the live pathogens or agents responsible for the pandemic will likely be dispersed via A) chemtrails by government airplanes or drones, B) by the U.S. Postal Service via Tide detergent samples, C) by the government and medical establishment via tainted vaccines, or by D) the portable petri dish commonly known as the Trojan condom.

Bio-Terror Scapegoats: Africa, Agriculture (Food & Animals), Airports & Air Travel, Al Qaeda, Bio Labs, Bio-Terrorism Is Easy, Bio-Terrorists (Bio-Hackers), Black Market, Bugs & Insects, Censorship / Lack Thereof, Domestic Terrorists, Exotic Animals (Zoonosis), Government Ineptitude, Mail-Order DNA, Mexico, Missile Shield Failure, Mutation, Natural Disaster, No Clinical Trials (Vaccines), and The Monkeys.

Title: Leap From Animals To Humans: Pets From The Wild Can Pose Health Risks
Date: June 15, 2003
Source: UCLA

Abstract: It appeared at first we'd dodged the bullet. Now it's not so clear. Monkeypox, a close cousin to the smallpox virus, unexpectedly appeared this month in the Midwest, far from its natural home in the rain forests of Congo, Liberia and Sierra Leone. For the last couple of decades, monkeypox in Africa has been an elusive threat. It has erupted in Congolese villages after someone has become infected through killing, skinning and eating a rat, squirrel or monkey. Sometimes the disease has been passed on to the victim's family or fellow villagers and sometimes it hasn't. Experts from the Centers for Disease Control and Prevention and other health officials have been telling us that monkeypox isn't a very infectious disease. The truth, however, is a bit more complicated.

To understand why, we have to look at the biology of the disease. Unlike smallpox, monkeypox isn't a human specialist. It's an animal disease, and no one is sure what range of animals it infects. It kills monkeys, hence the name. Someone once found a dead squirrel on a Congo highway with suspicious-looking lesions on its skin. It turned out to have died of monkeypox, so some scientists decided that the disease is more a rodent disease than a primate disease. Apparently the disease infects giant Gambian rats, and now we know that prairie dogs, frequent victims of plague and tularemia, also can die from African monkeypox.

What has emerged from the remarkably rapid and effective investigation into the Midwest monkeypox outbreak is that African rodents, unsurprisingly, are the source of the disease. It appears that one giant Gambian rat, infected with monkeypox and housed with prairie dogs in a pet store, transmitted the disease to the prairie dogs, which were sold and swapped across several states.

Up to 68 people as of Friday had been infected. In the great bulk of those cases, the affected people appeared to have had direct contact with a sick pet. What doctors are more concerned about is person-to-person transmission, which indicates a more virulent strain, one better adapted to humans. At least

three possible cases of monkeypox have now been found in people not exposed to animals. In Congo, where the death rate is up to 10%, monkeypox often spreads from person to person — in part, public health officials say, because of primitive conditions.

But there's more to it than that. In the Congo province of Kasai-Oriental, where monkeypox occasionally breaks out, people inhabit fairly large, airy huts within a family compound, which is usually some distance from other compounds. These are not such terrible conditions for keeping the disease in check. We can't automatically assume, as some health experts contend, that it is better sanitation and living conditions in America that are keeping monkeypox from being so deadly here. Several other factors, hidden and not so hidden, are also at work.

As Peter Jahrling, the army's chief virologist, explains it, monkeypox, like other diseases, is not a single strain; there are lots of variants. Like all forms of life composed of DNA or RNA, the monkeypox virus is subject to evolution, mutation, the force of natural selection. Whatever afflicted that Gambian rat, it probably wasn't a single pure strain but a swarm of variants. And some of those strains possessed the ability to transmit from animals to people. We don't know yet whether some of the strains also were capable of spreading from human to human, but that would not be surprising given what we know about the disease in Africa. It is the inevitable logic of natural selection at work: Those variants that are best at transmitting to people will be the ones that make the jump from animal to human. Then, among those strains, those even better at transmitting might jump again from human to human. This is a sort of winnowing-out process, where the best jumpers win.

In one well-documented outbreak in Congo, the chain of person-to-person monkeypox transmission was seven links long. If it hadn't stopped moving, whether through medical intervention or because it ran out of hosts in the village, the disease would have become better and better at spreading among people. It would have become a more "humanized" disease.

It would have looked more and more like smallpox.

What would make a monkeypox germ a good jumper? Putting it simply, the virus has to do something to its host so it can get out of one human body and into the next. Some viruses, like measles, cause sneezing. Polio is passed in the stool and spread through the process unattractively known as "fecal/oral contact." Monkeypox, like smallpox, has two such methods. As evolutionary biologist Paul W. Ewald, author of the well-known "Plague Time," puts it, smallpox and monkeypox are "sit-and-wait pathogens": Viral particles shed from the pox wait outside the body for the next host to happen by. These particles can last a long time in the external environment. Smallpox scabs kept on a shelf in a researcher's office contained live, infectious virus after 13 years!

But smallpox, a highly evolved human disease, has another property that monkeypox sometimes has and sometimes hasn't. This is the capacity to form sores or lesions in the throat. Such a sore, called an enanthema, is one of the chief ways smallpox spreads, particularly since these sores are formed before the patient gets terribly sick. You can walk around coughing and sneezing, infecting many people, before the disease knocks you off your feet. (This is why biodefense experts fear the so-called suicide cougher scenario for a smallpox attack.)

Only one person in this monkeypox outbreak appeared, at this writing, to have suffered from such enanthema. A young man in Indiana had to be taken to the emergency room because of sores in his throat. In Wisconsin, said epidemiologist Charles Edmiston, no enanthema had been found. This suggests that the particle salad of monkeypox strains brought over (apparently) by the giant Gambian rat may not have been particularly virulent at the outset, but we can't be certain that will remain true. If human-to-human transmission is confirmed, it is likely that the disease will gain in virulence and transmissibility as it passes from one person to another.

The precautions taken by health departments in Milwaukee and elsewhere have helped to slow the spread of the disease, and their epidemiological investigations have been admirable. But the story is not over yet, and we should not be complacent.

Even if this outbreak is controlled quickly, the next time someone is foolish enough to pluck a wild African animal out of its natural habitat and ship it to the United States to entertain some animal fancier too jaded for a dog or cat or hamster, the strains might include some variants even better suited to human spread. To keep diseases out of this country, we must remember that it is not just people who transmit deadly human infections. Animals do as well (UCLA, 2003).

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Title: Tale Of A Dangerous Rat
Date: June 17, 2003
Source: UCLA

Abstract: OK, enough already with all the animal viruses. They live over there. And we live over here. And unless all cuddly creatures housing weird viruses decide to don little face masks, there's a good reason for separation.

Everyone likes fuzzy little things. Thanks to animal cartoons and superheroes, Americans grow up anthropomorphizing, reading the most darling of preposterous thoughts into the simple instincts of ordinary animals, who can be grand companions. So it's but one small step for mankind that live, moving critters from the wild are even more exciting than stuffed teddy bears. And in our interaction with them lies a genuine health problem, apparently growing and unmonitored.

Dogs, cats and the like are usually coddled, vaccinated, even bathed in perfume-y stuff that no normal four-legged critter would be caught dead wearing outdoors. That's their price for a roof, free eats and sleeping anywhere. In return, humans may qualify for affection.

The problem comes with so-called exotic pets. They walk the wild, unknowingly housing harmful viruses that cleverly don't kill their host. The viruses jump to humans. Now we've seen the first non-Africa monkeypox in humans. A smallpox cousin, this ugly disease was spread by a platoon of pet shop prairie dogs, cute guys unless mining lawns. The prairie dogs, since sold, resold and traded, caught the virus in an Illinois pet shop from a nearby Gambian rat. Now, you might ask, exactly who needs a giant Gambian pet rat, especially an immigrant from the heart of monkeypox land? No one thought to ask.

Remember ebola? Scary stuff. The fatal hantavirus that hangs in the dust of mice feces? SARS probably came from a civet in China. Lyme disease from ticks. Mosquitoes bite humans and deliver West Nile virus, unknown here just four years ago. Even HIV hopped to humans from monkeys, which are eaten in Africa. And mad cow disease can pass through the food chain's unregulated links. Officials moved swiftly to find humans exposed to monkeypox. But imagine if one sick prairie dog escapes. Not noted for marital fidelity, these social creatures could spread monkeypox nationally because of an exotic rat in an unmonitored business.

Capital's global liquidity is one measure of the world's accelerating connectedness. So are air travel, immigration and now, animal trading. Foreign travel always carries risks; the plague spread to Europe on stowaway rats. Dutch elm disease and fire ants arrived in lumber shipments. The 9/11 terrorists came as immigrants and students.

But with the breadth and pace of trade growing faster than our ability to detect or, indeed, anticipate threats, we must step up vigilance of exotic wildlife arriving on our shores. If you must have a rat, you must prove it healthy — lest the nation's most powerful pets become less the cuddly, benign critters and more the lethal, invisible viruses (UCLA, 2003).

Title: Beyond Cute: Exotic Pets Come Bearing Exotic Germs
Date: June 17, 2003
Source: New York Times

Abstract: Epidemiologists can be such killjoys. Consider, for instance, Dr. Michael T. Osterholm, who has been publicly denouncing prairie dogs since 1997. A prairie dog in a burrow is one thing, but a prairie dog in the house makes Dr. Osterholm a bit edgy.

The fact that the United States has exported thousands of prairie dogs to Japan, where they are not found in nature and where people find them adorable, gives Dr. Osterholm a full-blown case of the willies. Japan banned prairie dog imports in March, and the European Union halted them yesterday, but

researchers still worry about what havoc may be wrought by the animals that have already been shipped overseas.

Where some people see a cute and cuddly ball of fur, scientists like Dr. Osterholm see a vector: a ball of disease-causing viruses, bacteria, parasites and who knows what other germs. Dr. Osterholm, who is director of the Center for Infectious Disease Research and Policy and a professor of public health at the University of Minnesota, said that until recently, his main objection to prairie dogs was that they and their fleas sometimes carried bubonic plague. He had not even thought about monkeypox, the disease brought to the Americas for the first time last month, presumably by a three-pound African rat, which infected its fellow inmates in a pet shop, prairie dogs, which may then have spread the disease to as many as 82 people in five states.

Though Dr. Osterholm had not predicted monkeypox, its arrival did not entirely surprise him. The worldwide trade in so-called exotic pets has done two things that are practically a recipe for spreading exotic diseases. First, the trade has transported animals like giant Gambian rats across oceans and brought them together with species that they would never encounter naturally, like prairie dogs. Not much is known about what microbes those animals might spread to each other, or what the microbes might do inside a new host. Second, the trade has brought people close to animals — and to diseases — they had little or no contact with before.

"It clearly stacks the deck in favor of infectious agents," Dr. Osterholm said, and he rattled off a list of agents that have animal origins and can cause severe illness in people: H.I.V., Ebola virus, a highly virulent form of the bacterium E. coli, the Nipah virus that spread from bats to pigs to people in Malaysia in 1998, and the current epidemic of the respiratory disease SARS.

Like SARS, which has been traced to a previously unknown coronavirus carried by palm civets and badgers in the jam-packed live-animal markets of southern China, the outbreak of monkeypox in the United States is a reminder of how little is known about infectious diseases in wild animals and the threat they may pose to humans.

Dr. Frank Fenner, an expert on pox viruses and other viruses at Australian National University in Canberra, said, "Quite a lot of new viruses have been turning up, all coming out of animal hosts."

He added: "I think we know so little about the viruses of wild animals."

Dr. Fenner said scientists were familiar with hundreds of viruses carried by people and domestic animals, but had much less information about the many viruses that are probably carried by wild animals.

"With all the animals in the wild," he said, "we really know so little about what virus diseases they have unless they get into livestock or humans."

Dr. Fenner suggested that every species of wild animal probably carried its own distinct viruses, many more than are known. Most do not infect people, but the ones that do can lead to nasty surprises.

Monkeypox is not new. It was first identified in monkeys in 1959, but its ability to infect people was not recognized until 1970. The disease is usually milder than smallpox in humans, causing a death rate up to 10 percent in Africa, compared to 30 percent for smallpox. Although the disease was named for monkeys (because it was first found in them), scientists later came to realize that its real host is a rodent. Dr. Fenner said three or four species of African squirrels were thought to be the main hosts, and infections in monkeys and people were considered accidental. Squirrels are commonly eaten in some parts of Africa, and people are probably infected from handling sick animals.

Monkeypox outbreaks in people in Congo were detected in the 1990's, and a 1999 report by the World Health Organization suggested that the disease might have found a foothold when health experts said people no longer needed smallpox vaccinations, which can prevent monkeypox because the vaccine and monkeypox viruses are closely related.

Despite that theory, the health organization did not recommend that smallpox vaccination be resumed in Africa, because H.I.V. rates are high there, and the smallpox vaccine can be quite dangerous for people with H.I.V. or AIDS.

The viruses that cause smallpox, monkeypox and cowpox, because they infect people, are among the best-known members of the pox virus family. But the family has several dozen other members that infect a broad range of animals, causing diseases not found in people, like camelpox, skunkpox, raccoonpox, rabbitpox, mousepox and bird poxes specific to canaries or juncos. Suipoxvirus infects pigs, taterapox infects naked-soled African gerbils, and still another pox virus, thought to have an unknown main host, causes a sickness called Uasin Gishu disease in horses in Africa. Chickenpox, despite its name, is not caused by a pox virus; the microbe that causes it belongs to the herpes family.

Some pox viruses, as far as researchers can tell, infect only a single host. Camelpox, for instance, has been found only in camels. And yet of all the pox viruses, it is the one most closely related to smallpox. Smallpox also has only one natural host, people, which explains why it could be eradicated: since there was no animal host in the wild, once the virus was stamped out in people, it had nowhere else to go.

Cowpox, on the other hand, might be called promiscuous: it infects not only cows, but also people, rodents, cats, elephants, rhinoceroses and okapis. In people, it generally causes a very mild disease, and secretions from people and animals with cowpox were among the earliest substances used to vaccinate people against smallpox.

Scientists do not know why some pox viruses are limited to a single species while others infect a multitude, but Dr. Fenner said the ones with more than one host were likely to be the most enduring.

"If a virus affects only one rare species of animal and that animal becomes extinct, the virus becomes extinct with it," he said. "But if it infects several species of animal it may survive, as cowpox does. We know it occurs in gerbils in Russia and in field mice and voles in England as a natural infection in the wild. And there may be other rodents as well, so it's very unlikely to be wiped out except by a new ice age or something like that."

The most familiar member of the pox virus family is in some ways the most mysterious. Many people assume that *vaccinia*, the virus used to make smallpox vaccine, is the same virus that causes cowpox and that was first used by Dr. Edward Jenner in 1796 to vaccinate people against smallpox. In fact, vaccinia is not the cowpox virus. It is a distinct species, and scientists do not know where it came from. But in the early days of vaccination, there was no way to store a vaccine, so people were usually vaccinated with secretions taken from other people or animals. Scientists have speculated that such arm-to-arm passage may have created a hybrid of smallpox and cowpox, or perhaps even brought in a type of horsepox that no longer exists in nature.

Researchers say it should be no surprise that a virus capable of infecting multiple rodents in Africa could find a ready host in a rodent here.

And yet even those who ardently oppose exotic pets in principle may succumb to their furry charms. Dr. Osterholm admitted that he gave in to his son's insistence on having an African dwarf hedgehog.

"Everyone had them," Dr. Osterholm said.

But for a public health expert, letting this animal into the house was as bad as smoking. The moment it relieved itself, Dr. Osterholm collected the droppings and whisked them off to his lab to analyze. He found that the hedgehog was carrying three strains of salmonella bacteria. He let his son keep the pet, but imposed extensive hand-washing requirements any time a family member touched it.

"It was no fun at all," Dr. Osterholm said (New York Times, 2003).

Title: Scientists Search For Human Hand Behind Outbreak Of Jungle Virus
Date: June 19, 2003
Source: UCLA

Abstract: Thick jungle vegetation has taken over the concrete pens that once held thousands of pigs at the Leong Seng Nam farm. Rusting tractors bake in their tracks under a blistering sun. Only the lush mango and jackfruit trees appear unchanged from four years ago, when the farm and most everything on it were abandoned in terrific haste.

At the main gate, a sign bearing the silhouette of a man shooting a trespasser warns that no one should return: "We accept no visitors in view of the outbreak of swine disease."

But an ambitious group of outsiders has come back -- to ground zero of a frightening viral outbreak in 1998 and 1999. The previously unknown "Nipah" virus, named for the Malaysian village where it was first isolated, leapt from beast to man and killed both at a torrid rate. Then it disappeared back into the surrounding forests and limestone cliffs. The virus decimated Malaysia's fast-growing pork industry and killed 40% of the 257 people who caught it. So deadly is Nipah that the U.S. lists it among potential bioterrorism agents.

As governments begin to declare cautious victory over severe acute respiratory syndrome -- a disease that, like HIV, Ebola and Nipah is believed to have jumped from an animal host to humans -- some scientists are turning their attention to a question asked all too infrequently once deadly viral outbreaks have been contained: Where did that come from?

One such group of investigators is digging in at Ipoh, with an unconventional, multidisciplinary approach involving virologists, ecologists, zoologists, botanists and even agronomists familiar with pig-farming techniques.

Organized by the Consortium for Conservation Medicine in Palisades, N.Y., and equipped with a $1.4 million grant from the National Institutes of Health, the team of scientists will test over the next four years a compelling, if complex, theory of Nipah's emergence. It goes like this: The burning of over 12 million acres of virgin forest in Borneo and Sumatra in the fall of 1997 cast an extreme haze over a huge swath of Southeast Asia for months. That haze blocked sunlight, reducing the ability of trees to flower and bear fruit. This caused giant bats to travel great distances in search of sustenance. They settled on fruit trees fertilized with the manure of pigs on huge Malaysian farms cut out of the forests where the so-called flying foxes roost.

Somehow, the theory goes, the bats then passed the virus to the pigs who -- because of physiological and genetic similarities to humans -- amplified its potency and began infecting people in contact with them.

To some conservationists and scientists, there would be a dark poetic justice in a disease passed to man from an animal endangered by man's encroachment on its treetop environment. "In the case of almost every emerging disease, complex human changes to the environment drive emergence," says Dr. Peter Daszak, a parasitologist and executive director of the consortium that organized the study. "Nipah appears to be a case of the bats getting some payback."

The results of the Nipah investigation could be a key to understanding the many variables involved in sudden viral outbreaks.

They could also have implications for environmental policy. If human intervention in nature is shown to have triggered the deadly epidemics, then the arguments for protecting fragile ecology suddenly become much more palpable than the desire to preserve rare landscapes or endangered species.

It's far from certain that man brought on Nipah, or any of the other sudden viral scourges of recent years. And determining conclusively how a virus progresses among different species is extraordinarily difficult.

"There is always a massive knowledge gap in understanding what drives a virus that evolved over thousands of years and co-exists peacefully with one animal to jump and eventually come into contact with man," says Malaysian scientist Dr. Chua Kaw Bing, the first researcher to trace the Nipah virus to enormous endangered fruit bats, known locally as flying foxes.

In the case of SARS, researchers in Hong Kong have identified the civet cat, a relative of the raccoon, as one animal player in the spread of the virus. But they have also found SARS coronavirus antibodies in a Chinese ferret badger and a raccoon, meaning researchers are still a long way from establishing whether the civet is the virus's natural "reservoir" or just one link in a much more complex ecological chain.

Pinning down the animal source of the terrifying Ebola virus has also been difficult. In 1994, the first appearance of Ebola in 15 years occurred in a Swiss researcher on the Ivory Coast. Investigators quick to the scene thought they could trace the virus from chimpanzees dying of the disease to their prey, red colobus monkeys, which also die of the virus. World Health Organization researchers armed with a $250,000 grant undertook an ambitious study to find Ebola's natural host.

But even after collecting thousands of insects, birds and mammals that interact with the monkeys, the Ebola reservoir was as elusive as ever. "After four years, our agencies got fed up and our funding disappeared," says Francois Meslin, the WHO's top expert on diseases acquired from animals.

Determining the role of the flying foxes -- known scientifically as pteropus vampyrus -- will be critical to charting the origins of the Nipah virus. The bats are the world's largest, with the Malayan variety boasting a five-foot wingspan. Local hunters shoot and eat them. In Cambodia, they are prized as aphrodisiacs, and the bats are used as good-luck talismans in Filipino wedding ceremonies.

The bats are also Nipah's most likely natural host, since they have natural antibodies that protect them from the virus. As flying mammals common across the region, they also -- at least in theory -- make a highly mobile carrier of disease that could cross over to human populations.

The scientific team organized by the Consortium for Conservation Medicine, a joint venture between the Harvard Medical School's Center for Health and the Global Environment, Tufts University's School of Veterinary Medicine, the Wildlife Trust and the U.S. government's National Wildlife Health Center, starts with a working theory that the Nipah virus transmitted from bat to pig as a result of the flying foxes' messy eating habits.

After sucking the juice from fruit, they spit out pulp and drop half-eaten fruit to the ground. Scientists believe this is what they did while feeding in trees overhanging the pig pens at the Leong Seng Nam farm and other farms in Ipoh, delivering a lethal dose of virus-laden saliva to voracious hogs.

Pigs can pick up pathogens from a natural host and render them more infectious before passing them on to humans. In the case of Nipah, pigs developed encephalitis and a "one-mile cough" -- so called because their violent hacking could be heard at great distances -- before quickly dying. Men working with the swine

then picked up the disease. More than 100 people died in Malaysia. Humans apparently don't infect each other with Nipah, so a massive culling of 1.1 million pigs stopped its spread.

The linchpin of the theory is that virus-carrying flying foxes can migrate great distances -- something that has never been studied due to the nocturnal animal's remote and vast range.

The scientists hope to outfit a handful of flying foxes with solar-powered radio collars that can last four years -- if the bats don't shake the $5,000 devices. Such radio-tracking in Australia has shown that some bats will periodically travel up to 375 miles.

But the Malaysian team first has to catch them. "Very difficult," says Azizi bin Mohammed Yatim, a bat catcher with Malaysia's Veterinary Research Institute in Ipoh. On a recent nighttime trip into the jungle, Mr. Azizi and his crew struggled to apprehend even small bats in fishing nets set up around fruit trees. One small cave-dwelling bat the size of a chipmunk let out a series of terrific squeals while biting repeatedly at a handler's welding gloves.

"You can imagine the time we'll have with vampyrus," says Kevin Olival, a 27-year-old working on his Ph.D. at Columbia University. Mr. Olival is on hand to perform sophisticated genetic tracing of the bats. He hopes this will prove that flying foxes migrate over great distances and across water.

Mr. Olival hopes to take "wing punches" from captured flying foxes -- 3-millimeter holes cut from the bat's wing (they grow back). Then, he will use satellite location technology and genetic data extracted from those punches to track the movement of bats from Thailand down through Sumatra. If a "marker" in the DNA sequence of a bat in Malaysia, for instance, matches that of a bat in Sumatra, one can assume the bat populations move and mix -- or that flying foxes are all part of one huge population.

To prove the thesis of an environmental trigger to the Nipah virus, the team must also establish whether the forest fires of 1997 could really have caused atmospheric conditions disruptive enough to so alter the migratory movements of the giant bats.

As the dry, summer haze season approaches in Southeast Asia, another member of the team, 26-year-old Malaysian graduate student Chong Kwai Hoe, will use satellite images to track and map smoke from forest fires. He will then criss-cross Malaysia's ubiquitous oil palm plantations, taking readings on the effect of smoke on the fruit production of palm trees -- a proxy for all species of fruiting trees.

Other scientists will study flying-fox blood and urine -- even the ticks and fleas they carry. Then they will collate and compare what they find with studies under way in Australia of bats bearing the Hendra virus -- another killer closely related to Nipah. They also will go to India to study a recent outbreak of a deadly virus in Uttar Pradesh state similarly thought to have come from fruit bats. That virus responds to the same antibody test as Nipah.

A separate Japanese team, meanwhile, is in Malaysia analyzing pig tissue samples from as far back as 1994. If they find the Nipah virus, the thesis that extreme haze in 1997 ignited the outbreak will have to be reconsidered (UCLA, 2003).

Title: When Animal Germs Infect Humans
Date: June 24, 2003
Source: UCLA

Abstract: "A Mysterious Disease." "Never Seen in the West." "Doctors Baffled."

A number of such headlines have appeared since West Nile virus surfaced here in the summer of 1999. Sporadic cases of bubonic plague have been reported in New York City and mad cow disease in Britain.

The Asian outbreak of severe acute respiratory syndrome became public in March and, earlier this month, monkeypox announced its foray into the Western Hemisphere - specifically, the U.S. Midwest.

What these diseases have in common is transmission into the human population through contact with animals - a process termed zoonosis.

"Every so often there is a species jump, when an infection - one we've never heard of or never described in the literature - makes a leap from one animal to another," said Dr. Dan Shapiro, a specialist in infectious diseases and an associate professor at Boston University School of Medicine, who is writing a book on zoonosis. "If the second animal is human, that can be a problem."

Federal health officials took quick action to stem the spread of monkeypox, banning the sale of domestic prairie dogs as well as six types of rodents imported from Africa - animals sold in response to Americans' taste for exotic pets. Dozens of Midwesterners had fallen ill after handling pet prairie dogs apparently infected when housed near the rodents.

Zoonotic diseases are not a new phenomenon; animals have been known to transmit a long list of illnesses, including rabies, scabies, salmonella, trichinosis, botulism, malaria, measles, yellow fever, hantavirus and a number of strains of both streptococcus and influenza. Even the pandemic of Spanish influenza that killed an estimated 20 million people in 1918 is believed to have originated in swine.

"What is potentially unique about monkeypox, and what has caught people's attention, is that monkeypox has not been introduced to the Western Hemisphere before," said Dr. Robert Kim-Farley, visiting professor of epidemiology at the University of California, Los Angeles School of Public Health.

But experts say it's hard to determine if the number of such diseases crossing the species barrier to humans has been rising in recent years. What is known is that increasing urbanization worldwide, encroachment on previously uninhabited forest and desert land and a mobile human population traversing oceans at jet speed provide ample opportunities for diseases to emerge - or re-emerge, occasionally in more virulent forms - just about anywhere.

"People are increasingly encroaching on to out-of-the-way places," said Dr. Stephen Morse, director of public health preparedness at the Mailman School of Public Health of Columbia University. "Deforestation provides more contact with forest creatures. As more land is being given over to agriculture, and there's a higher density of both animals and human beings, that puts them in contact with obscure infections that were sequestered."

And the speed of global travel heightens the potential.

"An animal can, within 24 hours, go from the jungle in the Congo to someone's bedroom in the United States," Kim-Farley said. "You just never saw that before.

"If they had been shipped by sea, they would have either no longer been contagious by the time they arrived, or have died," he said.

Some epidemiologists do believe zoonotic diseases are on the rise, but they say there's no cause for alarm because scientists today are adept at tracing new infections and eager to follow the trail.

"The conditions that favor these transfers into human populations continue to increase," Morse said.

The leap between species can be made a number of ways: by consuming diseased meat, being bitten by mosquitoes or fleas, handling a pet or having contact with animal products like blood, hides, fur or wool, or dairy products, experts say.

Britons were infected with the human version of mad cow disease by eating beef containing the microscopic protein particle that causes the disease. And health officials believe food handlers in China may have become infected with the SARS virus after handling animals at a market that supplied restaurants in Guangdong.

In the United States, the growing popularity of exotic pets led to a chain of monkeypox infection that is believed to have started when the prairie dogs were housed with imported animals that carry the illness. Federal health officials said six types of rodents have been implicated in the monkeypox outbreak in humans: the giant Gambian rat, tree squirrel, rope squirrel, brush-tailed porcupine, striped mouse and dormouse. All African rodents have been banned for sale and import, and it is illegal to release them to the wild.

This is not the first time federal health officials have taken the bold action of banning pets. In 1975, federal officials banned the miniature pet turtles kids used to win at street fairs when it became known they were the source of 14 percent of all human salmonellosis cases in the country.

The same year, officials also banned imported monkeys and other nonhuman primates as pets because they carry serious diseases like tuberculosis.

The problem with zoonotic diseases is two-fold, experts say. Once an animal population harbors a virus, it is virtually impossible to eradicate the disease. That's why public health officials have urged pet owners not to let prairie dogs or rodents free, an action that could create a persistent animal reservoir of monkeypox in this country's wildlife.

The second factor is how efficiently a new disease is transmitted among humans. HIV, for example, is transmitted very efficiently through sex, and its virulence doesn't weaken as it is transmitted time after time (UCLA, 2003).

Title: Death Sought for Animals In Monkeypox Case
Date: July 3, 2003
Source: New York Times

Abstract: Moving to prevent monkeypox from reaching wild animals in the United States, the Centers for Disease Control and Prevention recommended yesterday that all 850 animals from a contaminated shipment of exotic pets from Africa in April be destroyed, along with all prairie dogs that might have been exposed to them.

The agency warned pet owners not to release any sick or potentially exposed animals into the wild.

Other mammals in homes or pet shops that might have been exposed should be killed or should be quarantined for six weeks and watched for symptoms — fever or cough, cloudy or crusty eyes, swollen lymph nodes or rash, the agency said. Bodies should be burned, not buried or thrown out, and the premises disinfected, it added.

An outbreak of monkeypox tentatively traced to a Gambian giant pouched rat in the shipment has caused 81 confirmed or suspected cases in humans, mostly in the Midwest. Its spread seems to have stopped, and no cases of human-to-human transmission were found. But the disease spreads easily to rodents.

A spokesman for the agency acknowledged that the authorities did not know the whereabouts of many of the estimated 850 animals in an April 9 shipment from Ghana to Texas, nor do they know if any were released.

"That's one of the things we're really worried about," said David Daigle, a spokesman for the agency. "Tracking them all down is darn near impossible."

Nonetheless, a "very aggressive" effort is on now, said Dr. Martin Cetron, the agency's deputy director for quarantine. But many were sold at informal pet swaps, he said, "and then things end without a good paper trail."

Monkeypox — so called because it was first diagnosed in monkeys — is a less virulent cousin of smallpox, and vaccination against smallpox appears to protect against it. There were no deaths in the June outbreak, but in West Africa, up to 10 percent of cases are fatal.

At the beginning of the outbreak, the centers and the Food and Drug Administration banned importing of all African rodents and the sale or distribution of six species from the April shipment: tree squirrels, rope squirrels, dormice, Gambian giant pouched rats, brush-tailed porcupines and striped mice. They also banned the transport, sale or release of prairie dogs.

Yesterday's directive was ambiguous about what constituted contact with an infected animal, and it confused some pet shop owners. Details of the directive are at cdc.gov/ncidod/monkeypox /quarantineremoval.htm.

Eileen Whitmarsh, an owner of Rainbow Pets in Shorewood, Wis., who caught monkeypox from a prairie dog in her store, mistakenly thought the order meant she had to kill the 60 apparently healthy hamsters, rats and gerbils she now has quarantined.

"Our animals are checked by the Health Department daily, and they are having babies," Ms. Whitmarsh said. "Sick animals do not have babies."

David Crawford of Boulder, Colo., acting director of the Prairie Dog Coalition, which defends wild prairie dog habitats and opposes keeping the animals as pets, called the euthanasia suggestion "a classic case of blaming the victim."

"This problem was caused by human beings, and it's easy for us to take the `kill them all' approach," he said. "But if this was a human population, we'd be aghast at an order to kill. This calls for quarantine and testing, not euthanasia."

Two weeks ago, at a meeting of the Advisory Committee on Immunization Practices at the centers, Dr. Gregory A. Poland, a committee member and the chief of vaccine research at the Mayo Clinic in Minnesota, asked why the agency had not already ordered all possibly exposed animals killed.

An official of the centers replied that people became attached to their pets.

"So what?" Dr. Poland said. "I know what we'd do if this was an outbreak of mad cow disease. We'd kill the whole herd" (New York Times, 2003).

Title: Zoonoses Likely To Be Used In Bioterrorism
Date: May-June 2008
Source: Pub Med

Abstract: Bioterrorism is the deliberate release of viruses, bacteria, or other agents used to cause illness or death in people, animals, or plants. Only modest microbiologic skills are needed to produce and effectively use biologic weapons. And biological warfare has afflicted campaigns throughout military history, at times playing an important role in determining their outcomes.

There is a long list of potential pathogens for use by terrorists, but only a few are easy to prepare and disperse. Of the infectious diseases, the vast majority are zoonoses. The Centers for Disease Control and Prevention's highest-priority bioterrorism agents are in Category A. The only disease that does not affect animals in Category A is smallpox, which was eliminated by a worldwide vaccination program in the late 1970s. Because these diseases can infect animals and humans, the medical and veterinary communities should work closely together in clinical, public health, and research settings.

The Model State Emergency Health Powers defines bioterrorism as the intentional use of any microorganism, virus, infectious substance, or biological product that may be engineered as a result of biotechnology—or any naturally occurring or bioengineered component of any such microorganism, virus, infectious substance, or biological product—to cause death, disease, or other biological malfunction in a human, animal, plant, or other living organism to influence the conduct of government or to intimidate or coerce a civilian population. Biological weapons (bioweapons) are relatively easy and inexpensive to produce, cause death or disabling disease, and can be aerosolized and distributed over large geographic areas.

There is a long list of potential pathogens for use by terrorists; however, only a few are easy to prepare and disperse. Traditional agents of offensive biological warfare (biowarfare) programs have included the causative organisms of anthrax, plague, tularemia, brucellosis, glanders, melioidosis, various foodborne illnesses, cryptosporidiosis, cryptococcosis, Q fever, psittacosis, dengue fever, smallpox, viral equine encephalitides, and the viral hemorrhagic fevers. All are seen in animals, except for smallpox and dengue fever.

A Russian panel of bioweapons experts reviewed pathogens and determined the vast majority of pathogens were animal diseases transmissible to people, or zoonoses. A report in the *Journal of the American Medical Association* concluded that 80% of the common pathogens likely to be used in biowarfare are zoonoses. The Centers for Disease Control and Prevention (CDC) currently classifies bioterrorism diseases/agents most likely to be used into categories A, B, and C, with A having the highest priority. Of the infectious diseases in CDC's classification system, the majority are zoonoses. Of the Category A diseases, more than 80% are zoonoses. Category C includes emerging diseases, of which about 75% are zoonoses (Pub Med, 2008).

Title: Animal Health - Beware of Animal Diseases In Bioterrorism
Date: July 1, 2010
Source: All Africa

Abstract: The suspected outbreak of anthrax in hippos in Western Uganda in the past weeks has yet again reminded us of some of the ignored facts about animal diseases. I overheard someone on the streets of Kampala inform a colleague ignorantly that anthrax was a disease of those who live with or stay near animals in the villages. This totally shocked me and I felt like going over to him and giving a lecture of a lifetime.

I, however, restrained myself and just thought about how they didn't know that the same disease could be brought right at their footsteps in their so-called city. They were possibly unaware of what we call bioterrorism.

It is possible for unscrupulous people to use known lethal animal disease agents as weapons of mass destruction. This is known as bioterrorism. Anthrax is indeed one of the microorganisms that can be used as biological weapons of mass destruction. The other significant animal diseases in that group include; Botulism, Plague, Tularaemia, Ebola and Marburg diseases. These diseases are of great public health importance because:

The host animals or carriers that are sources of infection often show little or no sign of disease at all.

The disease agents have mechanisms of propagation that allow infection to move from one individual to another.

Their effects result in high mortality rates and have the potential for a major impact on the public.

They can cause public panic and social disruption.

They require special action when they occur and also need public health preparedness in order to limit their progress.

Anthrax is clearly documented as one of the diseases whose agents have been used in the past for bioterrorism. This can be alternatively spread through spraying in the air, mailed packages and release in the ventilation systems of public buildings.

In the wake of the September 11th, attacks on the USA, some people were reported to have been exposed to anthrax in powder form that had been sent to them as mail in envelopes. This incident, a classic example of how an animal disease can find you in the comfort of your office, sparked off a major public health awareness campaign on bioterrorism that got many US citizens and others around the world to be alert about such diseases.

As for Ugandans, even though we are far from the USA, and that we probably have far less enemies, we should not ignore the likelihood of such events happening (All Africa, 2010).