Jonathan Epstein studies how diseases are transferred between animals and people. This bat carries Nipah virus. The germ killed hundreds of people and more than one million farm animals. When people talk about catching the flu, most consider classmates, family members or neighbors as likely sources. So it might be surprising to learn that the viruses we get a flu shot for each year originate in birds, not people. Birds can spread flu not only to other birds,
but also to livestock and people (which then spread the virus among their own kind).

Can people get diseases from animals?

Like all viruses, influenza — or flu, for short — can live only within an organism. Scientists call that animal the germ’s host. Over time, some animals become long-term hosts, and often no longer become sickened by the germs. When a virus commonly lives inside an animal without harming it, that host is called a reservoir. Birds, particularly ducks, have evolved to become a natural reservoir for flu viruses.

Look at the glossary at the end of this article, read the definition of a reservoir and rewrite it in your own words here.

There are many different versions, or strains, of flu. Most emerge in Asia, where many people raise poultry. Some keep chickens and ducks in their backyards or roaming around in rural villages. Others produce these birds on large-scale farms. In each place, these farmed birds can mix with wild birds. Such a mingling allows viruses to jump from one host into a new one. Migrating wild birds can then carry these viruses with them, making world travelers of their germs.

Animals newly exposed to the viruses may become ill and die. When poultry farmers handle a sick or dead chicken, the virus may find yet another host — people.

All viruses mutate — or change — when their genes develop slight alterations over time. These tweaks occur at random as a virus makes copies of itself inside its host. Flu viruses also alter their genetic makeup by swapping genes with other viruses. The changing nature of viruses makes it
challenging for scientists and health officials to create appropriate vaccines that outwit these microbes and keep them from spreading.

They mentioned genes, which we have talked about. What are genes? Hint: They have something to do with DNA.

Kristine Smith, a wildlife veterinarian, points out that it is important not to blame wildlife for diseases. Instead, we should be aware of the risks of being close to animals and adjust our behavior. “I never want people to think wildlife are nasty things that have all these diseases — it’s not about that,” says Smith. “It’s about how we interact with them,” she cautions, that can allow animals diseases to spread into people.

What would be the difference between a regular veterinarian and a wildlife veterinarian?

Understanding how pathogens get a foothold in animal or human populations can help scientists not only combat current disease outbreaks, but also predict future ones and prevent or lessen their spread.

Look in the glossary for pathogen and rewrite that definition in your own words.
Detective work helps
Ian Lipkin works with Epstein and other scientists around the world to identify where viruses might emerge in human populations. Lipkin is a virologist, or scientist who studies viruses, at Columbia University. Researchers like Lipkin and Epstein survey critters to understand what diseases are making animals sick. This way, if some new pathogen appears in people, Lipkin says, the medical community will have some notion of how it spreads and sickens. Then, he adds, researchers may stand a chance of developing a vaccine to slow its spread.

“The idea is that you want to get out in front of the crime,” says Lipkin. Vaccines are typically made from the germs that cause an infectious disease. They contain part of the germ, or the whole — but dead — germ. When we are injected with this material, our bodies recognize that it is foreign and potentially dangerous. Our immune system is alerted and prepares to fight the germ. It turns out they don’t have to fight too hard, because it’s not a live germ. But in the process of revving up to fight it, the body develops a resistance to that disease. And when we next encounter the real thing — the live germ — our body is primed to kill it.

Do you remember that we talked about vaccines on Friday? Can you name a vaccine that you were given and about how old you probably were?

Some vaccines are administered only once a decade — or even once in a lifetime. For other diseases, like flu, doctors encourage people to get a vaccination every year. The main reason for that: Flu germs change so often and so much that the vaccine prepared in one year may no longer be effective against the flu germs circulating among people the next year.

Alas, vaccines aren’t available for many diseases. To control these, scientists have to develop other techniques. And that’s one reason researchers around
the world are taking a close look at how animals and people interact. A better understanding of how we share our lives with other creatures can help reduce how often we also share deadly germs.

**Too close for comfort**

Farming, forestry (planting and harvesting trees), hunting and even handling exotic pets put us in close, frequent contact with animals. Such activities “allow these pathogens to jump from their natural reservoir into people,” notes Epstein. “And that’s when disease occurs.”

**Can you think of ways you could protect yourself from the germs in or on animals?**

Dr. Smith studies the global trade in wildlife. That is the sale of animals to foreign countries, where they will become pets or food. The United States is the world’s biggest importer of wildlife — both legal and illegal, she says. Between 2000 and 2006 the United States imported 1.5 billion animals and an additional 5,000 metric tons of critters by weight (mostly fish and reptiles). More than 90 percent of the animals were brought in for sale as pets.

Exotic animals can make wonderful pets, says Smith. But that’s only true, she adds, if you make smart, informed choices. EcoHealth Alliance sponsors a website called [PetWatch](#) that provides information about the best and worst choices for exotic pets. It bases its recommendations on concerns about human health, the type of care a pet requires (such as frogs that need special ultraviolet light) and the risk that an animal might pose if it got loose in the environment.

Turtles, newts, iguanas, frogs and bearded dragons, for instance, are a poor choice for preschoolers, Smith says. Kids that age tend to put their hands and
most other things into their mouths. Amphibians and reptiles often carry bacteria, called *Salmonella*, in their intestines. These germs can be on the outside of the animals too.

Do you know anyone who has an exotic pet? What kind of animal is it?

Do you think you could get germs from a regular pet? If so, how?
It’s important to make wise choices when selecting pets, like this leopard gecko lizard. Amphibians, reptiles and small rodent pets can harbor bacteria called Salmonella. When children handle such pets and then fail to wash their hands, they risk getting Salmonella poisoning. Children can become sick when they touch these pets and then put their fingers into their mouths — or worse, put the animal in their mouths. The germs usually cause a mild illness that feels like food poisoning. But Salmonella can kill. It is most deadly to people with weakened immune systems. Each year, this germ sickens about 70,000 people, most of them children, reports Smith.

**How can adults protect small children from diseases?**

**A better way to live with animals**
There is no way to completely avoid getting sick. But people can reduce the risk of infections by being smarter about how they interact with animals, says Epstein. One simple tip: Wash hands frequently, especially after handling wild animals.
And the emergence and spread of Nipah virus teaches us the importance of keeping wildlife at a safe distance from livestock.
Respecting wildlife and natural habitats “doesn’t just protect us from the things we know about, like Nipah virus,” says Epstein, “it also will protect us from the things we don’t yet know about.”

Livestock is not a word in the glossary – do you know, or can you figure out what it means?
Tell me two new things you learned from this article.

Glossary

**antibody** A Y-shaped protein used by the immune system to fend off infectious invaders such as bacteria and viruses.

**bacterium** A single-celled organism. Considered primitive, bacteria lack some of the organized structure seen in other types of cells — especially those that make up plants and animals.

**emerging infectious disease** A disease that suddenly has begun infecting increasing numbers of people or other organisms and could increase dramatically, moreso in the near future.

**gene** A segment of DNA that contains the instructions for making a protein. Those proteins govern the behavior of a cell — or large groups of cells. Offspring inherit genes from their parents. Genes influence how an organism looks and behaves.

**infection** The successful invasion of a disease-causing microorganism into the body where it multiples, possibly causing serious injury to tissues (such as the skin, lungs, gut or brain).

**infectious** A germ that can be transmitted to people and other organisms through the environment.

**immunity** The state of being immune to, or having resistance to, a particular infectious germ.

**influenza (or flu)** A contagious respiratory illness caused by any of several groups of viruses. Symptoms can include headache, fever, cough, sore throat and body aches. The severity of these illnesses can range from mild to severe, sometimes resulting in death.

**filter feeder** An aquatic animal that feeds on particles or small organisms that it strains out of water by circulating them through its body. This group of species includes most of the anchored feeders, such as clams, oysters, barnacles, corals, sea squirts and sponges.
macaque A medium-sized monkey with a long face and cheek pouches. It lives mostly in forests.

outbreak The sudden emergence of disease in a population of people or animals.

pathogen A microorganism, or germ, that causes disease or illness. Pathogens include viruses, bacteria, fungi and other life-forms, such as teeny-tiny worms.

primate A type of highly intelligent mammal with an opposable thumb that includes monkeys, apes and humans.

reservoir A large store of something. Lakes are reservoirs that hold water. People who study infections refer to the environment in which germs can survive safely (such as the bodies of birds or pigs) as living reservoirs.

vaccine A biological mixture that resembles a disease-causing agent, given to help create immunity to a particular disease.

virus A tiny molecule made of a protein shell that encloses genetic information. A virus can survive and multiply only in the living cells of a host, such as people.

wetlands An area of poorly draining land that gets enough water each year to remain swampy or marshy for many months, if not all of the time.

zoonosis Any disease that originates in nonhuman animals that can be transferred to people.

Word Find (click here to print puzzle)