

Spillover: Animal Infections and the Next Human Pandemic (2012) by David Quammen,
Reviewed by Dr. Jay Bushnell*

The Pandemic of 2019 was clearly anticipated in 2012. As outlined by Quammen, scientist had been working feverishly to understand and identify the deadly outbreaks of diseases affecting humans. The mantra that defined their research was NBO, the next big one. The urgency was apparent and we now know why.

Quammen is an investigative journalist that searched for reliable details. He takes the reader to areas of the world where this research was being done. Whether stomping through the jungles of the Congo, or on farms in Australia or caves in Indonesia, one gets the sensation of a journalist on a mission to discover the truth. It reads very much like a detective story with a little humor sprinkled into the story. Well worth the read.



Here is what was known in 2012. Three fourth of the recent disease outbreaks have been **zoonotic** i.e.from animals. Interesting because the potential pathogens have been there all along safely residing in what is termed a '**reservoir host**'. Humans repeatedly have breached the stability of the reservoir hosts spilling genetic material in the form of viruses or bacteria into the human gene pool. Since humans have not evolved with these new genetic forms, they can become pathogenic. Quammen makes it clear that the cause of this disruption has been the need to feed the human population explosion and to support our consumption economy. Whether it is bush meat in the Congo, wet markets in China, or deforestation the world over or the domestication of animals, human's have been adversely impacting nature and now it is killing us and other forms of life. Presently, the estimate is that the human's biomass exceeds that of any large body species to ever have lived on earth.

All life forms on earth evolved by using the same building blocks, known as nucleotides. Each life form has a distinctive number and arrangement of nucleotides that define the life form ability to survive. If successful, new adaptive needs result by mutations to restructure

the nucleotides. This is called natural selection. Failure to adjust equals extinction. Today one might question how natural it is in terms of human influence. Within a species, a condition of homeostasis or balance exists until there are new environment pressures arising. When a spillover happens as it has with covid19, the virus attempts to adapt in a new host. Now here is the issue we presently face. A spillover does not necessarily mean a pandemic unless there is a large number of potential hosts that gives the virus a chance to evolve. Here size matters. The large number of unvaccinated equals a greater chance for the virus to evolve and survive, a goal of all life.

There are many zoonosis diseases like; SARS, Hendra, Ebola, HIV, Spanish influenza, Machupa and malaria but let's examine two familiar diseases.

Lyme disease, named after Lyme Connecticut where it was first identified, is a disease caused by a bacteria. There has been many miss steps in trying to determine the source of Lyme disease. It was finally discovered that the black legged tick (miss labeled deer ticks) caused the disease not deer. Turns out that white-footed mice and shrews were the host sources. You may have guessed by now that the disease results from ecological disruption. Lyme disease is less likely in a biodiverse ecosystem with a healthy mix of predators of mice. Again, size matters. A large ecological diverse environment is more likely to be healthy.

One final example to examine is AIDs. Because it has an identifiable mutation rate, the HIV virus has been traced back to southeastern Cameroon, Africa around 1908 when a hunter contracted the disease from a chimp he killed. Since the disease can only contracted from fluids like blood, it is assumed the hunter had a cut. The virus would have died off if it had not somehow been passed on. Eating the meat would not do the trick. The research involved how this virus survived before it finally emerged as an epidemic in the 1950.

One final note of interest is that aquatic birds are the ultimate reservoir for all influenzas!

*I am often ask why I do these reviews. My answer is that it is: a part of my academic training, it keeps my mind active and I believe it is important to share