

COVID-19 and “The Next Big One”: *Spillover* revisited

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February 2020

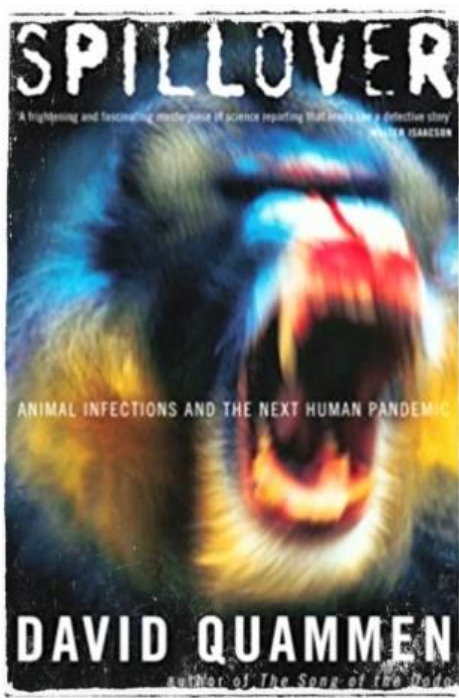


(Beth Clifton collage)

Science writer David Quammen saw COVID-19 coming

COVID-19, though renamed twice just in the first few months of 2020, “is not as novel as you might think,” explained veteran science writer David Quammen in the January 28, 2020 edition of *The New York Times*.

Quammen, 72, was uniquely positioned to comment, not only because he has been reporting about related issues for a lifetime, but as author of *Spillover*, an award-winning 2012 nonfiction bestseller subtitled *Animal Infections & The Next Human Pandemic*.



See [*Spillover: Animal Infections & The Next Human Pandemic*](#).

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No need for mad scientists

Spillover could be said to have accurately prophesied the emergence of COVID-19, but might equally accurately be said to have accurately prophesied the MERS-COV scare of 2013, the Ebola virus scare of 2015, which was near peak when *ANIMALS 24-7* reviewed the book, and many other zoonotic disease outbreaks which have crossed species barriers that were until recently believed to be impermeable, immutable, and unlikely ever to be violated—except by mad scientists tinkering in top-secret laboratories to develop the germ warfare equivalent of H-bombs.

Quammen in *Spillover* demonstrated that interspecies disease transmission is actually rather routine. In his *New York Times* essay, Quammen briefly reprised *Spillover*, explaining that the COVID-19 outbreak followed an increasingly well-beaten and familiar path.



(Beth Clifton collage)

Bat virus similar to COVID-19 known since 2015

Explained Quammen, “Something very much like [COVID-19] was found several years ago in a cave in Yunnan, a province roughly a thousand miles southwest of Wuhan,” where COVID-19 first appeared during mid-November 2019 in the Huanan Seafood Wholesale Market, possibly transmitted from bats to humans by way of pangolins as an intermediary host.

The virus resembling COVID-19 was discovered, Quammen continued, by “Zheng-Li Shi, of the Wuhan Institute of Virology.” With collaborators, Shi “back in 2005 showed that the SARS pathogen was a bat virus that had spilled over into people. Shi and colleagues have been tracing coronaviruses in bats since then,” Quammen wrote, “warning that some of them are uniquely suited to cause human pandemics.



Intermediate horseshoe bat. (Wikipedia photo)

“The intermediate horseshoe bat”

“In a 2017 paper,” Quammen detailed, “they set out how, after nearly five years of collecting fecal samples from bats in the Yunnan cave, they had found coronaviruses in multiple individuals of four different species of bats, including one called the intermediate horseshoe bat, because of the half-oval flap of skin protruding like a saucer around its nostrils. The genome of that virus, Shi and her colleagues have now announced, is 96% identical” to COVID-19.

EcoHealth Alliance president Peter Daszak, identified by Quammen as “a co-author of the 2005 bats-and-SARS study, and again of the 2017 paper about the multiple SARS-like coronaviruses in the Yunnan cave,” told Quammen that in connection with doing the 2017 study, “the field team took blood samples from a couple of thousand Yunnanese people, about 400 of whom lived near the cave. Roughly 3% of them carried antibodies against SARS-related coronaviruses,” possibly including COVID-19, though this appears to be unknown as yet.

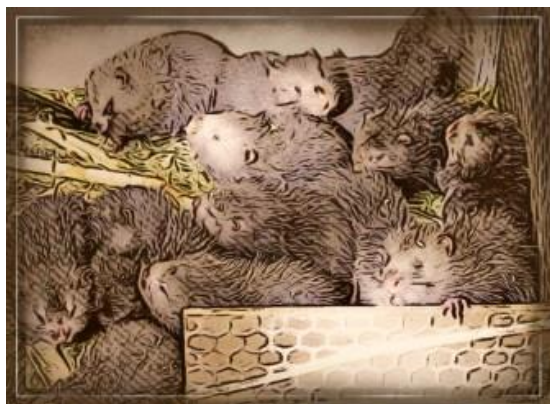


COVID-19 over Seattle. (Beth Clifton collage)

“These viruses make the jump repeatedly”

Said Daszak, “We don’t know if they got sick. We don’t know if they were exposed as children or adults. But what it tells you is that these viruses are making the jump, repeatedly, from bats to humans.” Assessed Quammen, “In other words, COVID-19 is no novel event. It’s part of a sequence of related contingencies that stretches back into the past and will stretch forward into the future, as long as current circumstances persist.

“So when you’re done worrying about this outbreak, worry about the next one. Or do something about the current circumstances.



Bamboo rats. (Beth Clifton collage)

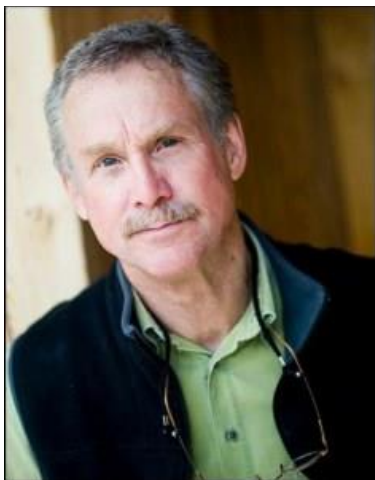
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“Perilous trade in wildlife for food”

“Current circumstances include a perilous trade in wildlife for food,” Quammen emphasized, “with supply chains stretching through Asia, Africa and to a lesser extent, the United States and elsewhere. That trade has now been outlawed in China, on a temporary basis; but it was outlawed also during SARS, then allowed to resume — with bats, civets, porcupines, turtles, bamboo rats, many kinds of birds and other animals piled together in markets such as the one in Wuhan,” creating a perfect storm of opportunities for viruses, including coronavirus, to cross-infect new species and mutate into new forms.

Elaborated Quammen in the March 5, 2020 edition of *Global Health Now*, “When a virus passes from a nonhuman animal into a human, we call that moment of spillover a zoonotic transmission. It’s an ecological event. What happens next depends on evolutionary potential and chance. If the virus is adaptable, it may succeed in replicating and proliferating in the new human host,” as COVID-19 has.



David Quammen

“What makes a virus adaptable?”

“Maybe it kills the person and the line of transmission comes to an end there—as happens with rabies,” Quammen said. “But if the virus is even more adaptable, it may acquire the ability to pass from one human host to another, perhaps by sexual contact (as with HIV), perhaps in bodily fluids such as blood (as with Ebola), perhaps in respiratory droplets launched by coughing or sneezing (as with influenza or SARS),” or as is now known, with COVID-19.

Finished Quammen, “What makes a virus adaptable? The changeability of its genome, plus Darwinian natural selection. Those viruses with single-stranded RNA genomes, which replicate themselves inaccurately and therefore have highly changeable genomes, are among the most adaptable. Coronaviruses belong to that group.”

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(Beth Clifton collage)

How to spark a pandemic

To spark a pandemic, as COVID-19 has, a disease agent must not only adapt to living within a new host, but also become able to easily and rapidly move from one host to the next without killing the host first. The disease agent can do this in either of two ways, or both.

The disease agent can, like HIV, evolve a long incubation interval before producing effects that kill the host.

Alternatively, the disease agent can, like COVID-19, evolve to produce symptoms so mild that most carriers are unaware they are infected, most infected carriers recover to go on hosting and transmitting the agent, and deaths occur only among those infected hosts who were already severely ill and therefore relatively unlikely to have the opportunity to infect others.

Of note is that disease agents can evolve from a less deadly to more deadly form, but when this occurs, killing the host tends to cause the disease to lose transmissibility and burn out.



(Beth Clifton collage)

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COVID-19 lacks “the right stuff” to be “The Next Big One”

By January 17, 2020, Program for Monitoring Emerging Diseases deputy editor Marjorie Pollack noted, the available evidence strongly suggested that COVID-19 had only a normal incubation interval of two to nine days, comparable to the incubation intervals for seasonal influenzas and the constellation of mild respiratory infections that are collectively recognized as the common cold.

The available evidence also strongly suggested that COVID-19 was not likely to become “The Next Big One,” the term Quammen and many other epidemiologists use to denote the next zoonotic pandemic that will sweep the world, causing thousands of “additive” rather than “compensatory” deaths; in other words, deaths over and above expected mortality.

That assessment turned out to be wrong, because COVID-19 turned out to behave unlike any other coronavirus—or any virus—known to science.

COVID-19 was not believed likely to become “The Next Big One” because in order to be as easily passed from one host to the next as it is, it had to take an extremely mild form in most hosts, such that they do not feel sick, stay home, and thereby fail to shed virus to be inhaled or ingested by others.

(See [*Why COVID-19 is NOT the zoonotic illness most likely to kill you.*](#))



(Beth Clifton collage)

“The Next Big One” hits the young & strong

Before COVID-19, a disease agent with the potential to become “The Next Big One” felled whoever was infected, like the 1918 Spanish influenza, hitting first the young, healthy people who are the most mobile, with the greatest likelihood of exposure.

COVID-19 from first identification was, and still is, a disease visibly afflicting the aged and already infirm, practically exempting children. As the aged and infirm tend to be out and about the least, any disease appearing to hitting this population segment first and hardest can reasonably be presumed to have already been out and about for weeks or even months among young and healthy people.

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For that reason, COVID-19, like any other disease sharing similar characteristics, has proved almost impossible to eradicate by quarantine. Relatively isolated and immobile populations, such as the inmates of nursing homes, can be protected by quarantine, but by the time COVID-19 was even identified, it had most likely already been distributed worldwide, and will continue to spread, mostly to no visible effect, until so many people have developed antibodies to it, whether through vaccination or exposure, that it can spread no longer.



(Beth Clifton collage)

Spillover tracked six “Next Big Ones”

David Quammen in *Spillover: Animal Infections & The Next Human Pandemic* focused on other diseases which at various times in the recent past have looked, at least to some of the noisiest presumed authorities, as if they might be “The Next Big One,” only to be contained and mitigated mostly by their own virulence.

Among Quammen’s case studies were Hendra virus, SARS (short for Severe Acute Respiratory Syndrome), Nipah virus, Ebola virus, the H5N1 avian influenza, and HIV/AIDS.

Pointing out that each of these diseases is zoonotic in origin, meaning that it crossed into humans from animals, Quammen tracked each disease back to whenever and wherever the “spillover” occurred, as indicated by the best available historical and genetic evidence.



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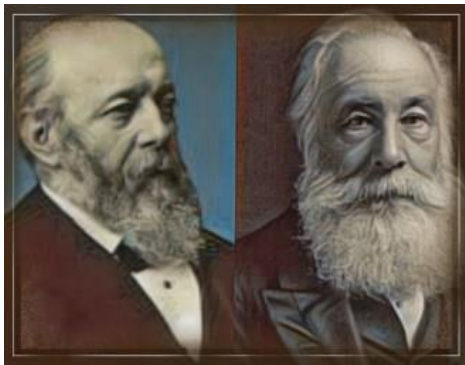
“Holy cow, Batman!”

Bats are disproportionately often the hosts for diseases that become pandemic in other species, Quammen explained, because there are perhaps more bat species than species of all other mammals; probably only humans are more numerous and broadly distributed.

Bats had already emerged in almost their present form and diversity more than 50 million years ago, and might actually be much older than that.

Though humans share common ancestors with bats, with lemurs and nonhuman primates also in the clade, humans and other animal species kept by humans as pets, steeds, and livestock had relatively little exposure to bats.

Humans, livestock, and dogs are mostly diurnal, dwelling on the ground; bats are nocturnal, dwelling either in caves or high places, rarely coming to ground except to die.



Anderson G. McKendrick, M.D., and William Ogilvy Kermack. (Beth Clifton collage)

“Susceptible, infected, recovered, SIR”

Of further relevance to COVID-19, Quammen in *Spillover* referred often to the “SIR” model of epidemics published in 1927 by Anderson G. McKendrick, a medical doctor, and William Ogilvy Kermack, a chemist who was blinded by an exploding experiment and turned to applying math to epidemiology.

“SIR” stands for “susceptible, infected, and recovered.”

The progress of epidemics can be tracked by the movement of living beings through the three categories. Much depends upon whether survivors of a disease in the “recovered” category become dead ends for the infection, or remain capable of transmitting it, even after recovering from all the evident symptoms.

(See [COVID-19: What can wildlife management teach us?](#))

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(Beth Clifton collage)

“Close the wet markets!”

Preventing emerging diseases from spreading is largely a matter of reducing the susceptible populations, most effectively through vaccination, when vaccinations are developed, and/or through changing habits and customs.

Several vaccines believed likely to be effective against COVID-19 were reportedly developed within months, and were rushed through the safety testing phase into manufacture for general use within less than a year. Mass vaccination programs, as of early 2020, have already reached millions of people around the world.

Meanwhile, for more than a year, that left changing habits and customs as our best and only defense—especially, as Quammen emphasized in his *New York Times* essay, permanently closing “wet markets,” also known as “live markets,” and discouraging any other commerce in wildlife.



Mink. (Beth Clifton collage)

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More pandemics coming

Quammen, unlike many others who have written about emerging diseases, especially COVID-19 in 2020-2021, is a calm and methodical writer, who spent about 15 years researching *Spillover*, in work often overlapping the research behind his many other books pertaining to biodiversity and evolution.

Quammen nonetheless concluded on a pensive and pessimistic note: while we do not yet know what “The Next Big One” will be, or when it will come, human population growth and increased mobility, disturbing wildlife, practically guarantee that there will be more pandemics of relatively new and initially little understood diseases.



Merritt & Beth Clifton

One such disease may eventually kill tens of millions of people.