Covid-19 Pandemic: Think Exotic Animals Are to Blame for the Coronavirus? Think Again

Saturday 21 March 2020, by SHAH Sonia (Date first published: 18 February 2020).

Scientists have fingered bats and pangolins as potential sources of the virus, but the real blame lies elsewhere—with human assaults on the environment.

It could have been a pangolin. Or a bat. Or, as one now-debunked theory that made the rounds suggested, a snake.

The race to finger the animal source of COVID-19, the coronavirus currently ensnaring more than 150 million people in quarantines and *cordons sanitaires* in China and elsewhere, is on. The virus's animal origin is a critical mystery to solve. But speculation about which wild creature originally harbored the virus obscures a more fundamental source of our growing vulnerability to pandemics: the accelerating pace of habitat loss.

Since 1940, hundreds of microbial pathogens have either emerged or reemerged into new territory where they've never been seen before. They include HIV, Ebola in West Africa, Zika in the Americas, and a bevy of novel coronaviruses. The majority of them—60 percent—originate in the bodies of animals. Some come from pets and livestock. Most of them—more than two-thirds—originate in wildlife.

But that's not the fault of wild animals. Although stories illustrated with pictures of wild animals as "the source" [1] of deadly outbreaks might suggest otherwise, wild animals are not especially infested with deadly pathogens, poised to infect us. In fact, most of these microbes live harmlessly in these animals' bodies.

The problem is the way that cutting down forests and expanding towns, cities, and industrial activities creates pathways for animal microbes to adapt to the human body.

Habitat destruction threatens vast numbers of wild species with extinction [2], including the medicinal plants and animals we've historically depended upon for our pharmacopeia. It also forces those wild species that hang on to cram into smaller fragments of remaining habitat, increasing the likelihood that they'll come into repeated, intimate contact with the human settlements expanding into their newly fragmented habitats. It's this kind of repeated, intimate contact that allows the microbes that live in their bodies to cross over into ours, transforming benign animal microbes into deadly human pathogens.

Consider Ebola. According to a 2017 study, Ebola outbreaks, which have been linked to several species of bats, are more likely to occur in places in Central and West Africa that have experienced recent episodes of deforestation. Cutting down the bats' forests forces them to roost in trees in backyards and farms instead, increasing the likelihood that a human might, say, take a bite of a piece of fruit covered in bat saliva or hunt and slaughter a local bat, exposing herself to the microbes sheltering in the bat's tissues. Such encounters allow a host of viruses carried harmlessly by

bats—Ebola [3], Nipah [4], and Marburg [5], to name a few—to slip into human populations. When such so-called "spillover" events happen frequently enough, animal microbes can adapt to our bodies and evolve into human pathogens.

Mosquito-borne disease outbreaks have been similarly linked to the felling of forests [6], although less because of the loss of habitat than to its transformation. As trees' leaf litter and roots disappear, water and sediment flow more readily along the shorn forest floor, newly open to shafts of sunlight. Malaria-carrying mosquitoes breed in the sunlit puddles. A study in 12 countries found that mosquito species that carry human pathogens are twice as common in deforested areas compared to intact forests.

Habitat destruction also scrambles the population sizes of different species in ways that can increase the likelihood that a pathogen will spread. West Nile virus, a virus of migratory birds, is one example. Squeezed by habitat loss as well as other affronts, bird populations in North America have declined by more than 25 percent over the past 50 years [7]. But species don't decline at a uniform rate. Specialist bird species, like woodpeckers and rails, have been hit harder than generalists like robins and crows. That increases the abundance of West Nile virus in our domestic bird flocks because, while woodpeckers and rails are poor carriers of the virus, robins and crows excel at it. The likelihood that a local mosquito will bite a West Nile virus–infected bird and then a human grows [8].

Similarly, the expansion of suburbs into the Northeastern forest increases the risk of tick-borne disease [9] by driving out creatures like opossums, which help control tick populations, while improving conditions for species like white-footed mice and deer, which don't. Tick-borne Lyme disease first emerged in the United States in 1975; in the past 20 years, seven new tick-borne pathogens have followed [10].

It's not only the fact of habitat destruction that ratchets up the risk of disease emergence, it's also what we're replacing wild habitat with. To sate our species' carnivorous appetites, we've razed an area around the size of the continent of Africa [11] to raise animals for slaughter. Some of these animals are then delivered through the illicit wildlife trade or sold in so-called "wet markets." There, wild species that would rarely if ever encounter each other in nature are caged next to one another, allowing microbes to jump from one species to the next, a process that begot the coronavirus that caused the 2002–03 SARS epidemic and possibly the novel coronavirus stalking us today.

But many more are reared in factory farms, where hundreds of thousands of individuals await slaughter, packed closely together, providing microbes lush opportunities to turn into deadly pathogens. Avian influenza viruses, for example, which originate in the bodies of wild waterfowl, rampage in factory farms packed with captive chickens, mutating and becoming more virulent, a process so reliable it can be replicated in the laboratory. One strain called H5N1, which can infect humans, kills more than half of those infected. Containing another strain, which reached North America in 2014, required the slaughter of tens of millions of poultry [12].

The avalanche of excreta produced by our livestock introduces yet more opportunities for animal microbes to spill over into human populations. Because animal waste is far more voluminous than croplands can possibly absorb as fertilizer, it is collected in many places in unlined cesspools called manure lagoons. Shiga toxin–producing Escherichia coli, which lives harmlessly inside the guts of over half of all cattle on American feedlots, lurks in that waste [13]. In humans, it causes bloody diarrhea and fever and can lead to acute kidney failure. Because cattle waste so frequently sloshes into our food and water, 90,000 Americans are infected every year.

This process of transforming animal microbes into human pathogens is accelerated today, but it is not new. It began with the Neolithic revolution, when we first cleared wildlife habitat to make way

for crops and yoked wild animals into servitude. The “deadly gifts” we received from our “animal friends,” as Jared Diamond put it, include measles and tuberculosis, from cows; pertussis from pigs; and influenza from ducks. It continued during the era of colonial expansion. Belgian colonists in Congo built the railroads and cities that allowed a lentivirus in local macaques to perfect its adaptations to the human body [14]; British colonists in Bangladesh cut down the Sundarbans wetlands to build rice farms, exposing humans to water-borne bacteria in the wetlands’ brackish waters.

The pandemics those colonial-era intrusions created plague us to this day. The macaque’s lentivirus evolved into HIV. The water-borne bacteria of the Sundarbans, now known as cholera, has caused seven pandemics so far, the latest churning just a few hundred miles off the coast of Florida in Haiti.

The good news is that, because we are not passive victims of animal microbes invading our bodies but fully empowered agents who turn harmless animal microbes into pandemic-causing pathogens, there’s much we can do to reduce the risk that these disease-causing microbes emerge at all.

We can protect wildlife habitat, so that animal microbes stay in their bodies and don’t cross over into ours, an approach championed by the “One Health” movement [15], among others.

We can conduct active surveillance in places where animal microbes are most likely to transform into human pathogens, hunting for ones that show signs of adapting to the human body—and squelching them before they cause epidemics. For the past 10 years, scientists funded by the USAID’s Predict program did just that. While the human footprint has continued to expand across the planet, Predict scientists have pinpointed more than 900 novel viruses around the world that emerged as a result [16], including new strains of SARS-like coronaviruses

Today, the shadow of the next pandemic looms. But that’s not just because of the novel coronavirus. The Trump administration’s liberation of extractive industries and industrial development from environmental and other regulatory constraints can be expected to accelerate the habitat destruction that brings animal microbes into human bodies. At the same time, the administration is reducing our ability to pinpoint the next spillover microbe and to contain it when it starts to spread. The administration decided to end the Predict program in October [17]. Officials reportedly felt “uncomfortable funding cutting-edge science.” Last week, the administration proposed cutting funds to the World Health Organization too, by 53 percent [18].

The epidemiologist Larry Brilliant once said, “Outbreaks are inevitable, but pandemics are optional.” [19] But pandemics only remain optional if we have the will to disrupt our politics as readily as we disrupt nature and wildlife. In the end, there is no real mystery about the animal source of pandemics. It’s not some spiky scaled pangolin or furry flying bat. It’s populations of warm-blooded primates: The true animal source is us.

Sonia Shah

Clarification: A previous version of this article stated that E. coli lives harmlessly inside the guts of over half of all cattle on American feedlots. While the prevalence of E. coli in cattle can reach that high on particular feedlots, it is more complicated to calculate the figure nationwide, since the presence of E. coli varies according to geography and time of year. This post has been updated.

P.S.

• THE NATION. FEBRUARY 18, 2020: https://www.thenation.com/article/environment/coronavirus-habitat-loss/

• Sonia Shah is a science journalist and the author of PANDEMIC: Tracking Contagion from Cholera to Ebola and Beyond (Farrar, Straus & Giroux, 2016). Her fifth book, The Next Great Migration: The Beauty and Terror of Life on the Move, will be published in June.

• EDITOR'S NOTE: The Nation believes that helping readers stay informed about the impact of the coronavirus crisis is a form of public service. For that reason, this article, and all of our coronavirus coverage, is now free. Please subscribe to support our writers and staff, and stay healthy: https://subscribe.thenation.com/flex/NA/key/G0C1CNP/

Footnotes

[1] https://www.sciencemag.org/news/2019/01/bat-species-may-be-source-ebola-epidemic-killed-more-11000-people-west-africa

[2] https://www.theguardian.com/world/2018/nov/17/habitat-loss-biodiversity-wildlife-climate-change

[3] https://www.sciencemag.org/news/2019/01/bat-species-may-be-source-ebola-epidemic-killed-more-11000-people-west-africa

[4] https://now.tufts.edu/articles/do-we-need-worry-about-nipah-virus

[5] https://www.cdc.gov/media/releases/2020/s0124-marburg-virus.html

[6] https://www.the-scientist.com/news-opinion/deforestation-tied-to-changes-in-disease-dynamics-65406

[7] https://www.nytimes.com/2019/09/19/science/bird-populations-america-canada.html

[8] https://www.sciencedaily.com/releases/2009/02/090220191318.htm

[9] https://www.sciencedaily.com/releases/2009/02/090220191318.htm

[10] https://www.cdc.gov/media/dpk/diseases-and-conditions/lyme-disease/index.html

[11] https://www.theguardian.com/commentisfree/2015/nov/19/population-crisis-farm-animals-laying-waste-to-planet

[12] https://www.nytimes.com/2016/02/07/opinion/sunday/what-you-get-when-you-mix-chickens-china-and-climate-change.html

[13] https://aem.asm.org/content/82/16/5049

[14] https://www.bbc.com/news/health-29442642

[15] https://www.ecohealthalliance.org/wp-content/uploads/2016/10/One-Health-in-Action-Case-Study-Booklet_ENGLISH_Jan-7-2017-FINAL.pdf

[16] https://ohi.sf.ucdavis.edu/what-weve-found

[17] https://www.nytimes.com/2019/10/25/health/predict-usaid-viruses.html

[18] https://www.undispatch.com/the-trump-administration-seeks-massive-cuts-to-the-world-health-organization-and-un-peacekeeping-and-also-the-total-elimination-of-funding-for-unicef/

[19] https://www.facebook.com/bbcworldservice/photos/a.174309415921526/909827882369672/?type=3&theater