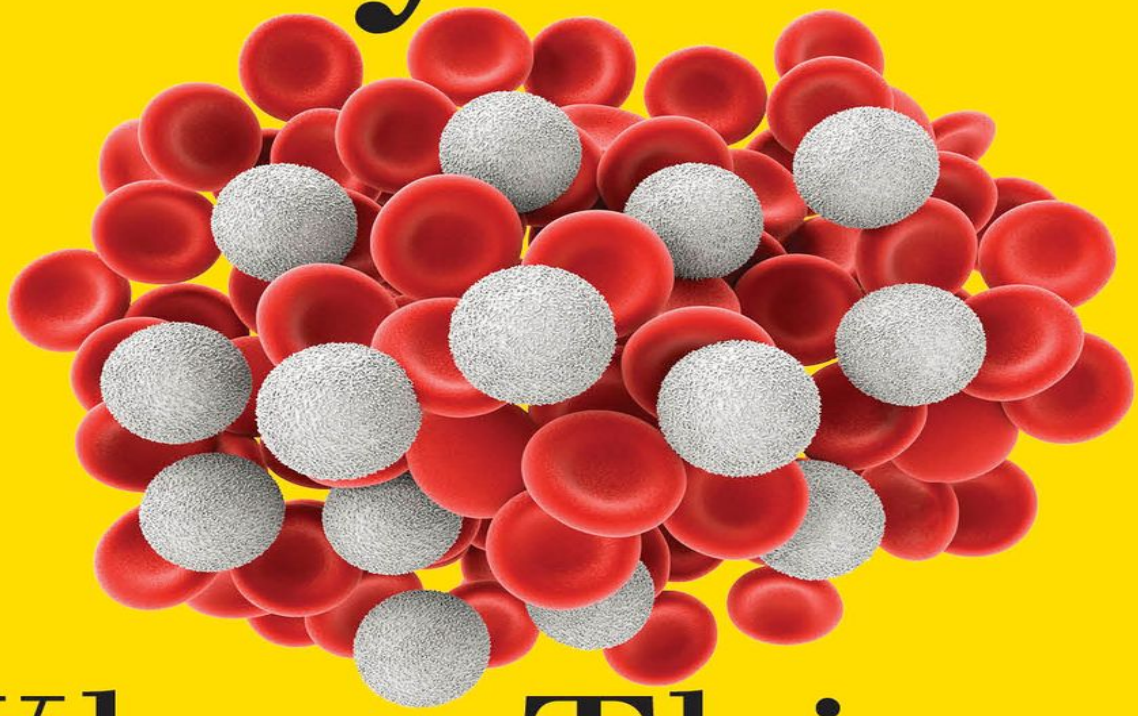
A VINTAGE SHORT

Bill Bryson



When Things Go Wrong: Diseases

from THE BODY

Bill Bryson

Bill Bryson's bestselling books include *A Walk in the Woods*, *The Life and Times of the Thunderbolt Kid*, and *A Short History of Nearly Everything* (which won the Aventis Prize in Britain and the Descartes Prize, the European Union's highest literary award). He was chancellor of Durham University, England's third oldest university, from 2005 to 2011, and is an honorary fellow of Britain's Royal Society.

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> I came to typhoid fever—read the symptoms—discovered that I had typhoid fever, must have had it for months without knowing it—wondered what else I had got; turned up St. Vitus's Dance—found, as I expected, that I had that too,—began to get interested in my case, and determined to sift it to the bottom, and so started alphabetically—read up ague, and learnt that I was sickening for it, and that the acute stage would commence in about another fortnight. Bright's disease, I was relieved to find, I had only in a modified form, and, so far as that was concerned, I might live for years.
>
> —JEROME K. JEROME ON READING A MEDICAL TEXTBOOK

I

IN THE AUTUMN of 1948, people in the small city of Akureyri, on the north coast of Iceland, began to come down with an illness that was at first taken to be poliomyelitis, but then proved not to be. Between October 1948 and April 1949, almost five hundred people, out of a population of ninety-six hundred, grew ill. The symptoms were wondrously diverse—muscle aches, headaches, nervousness, restlessness, depression, constipation, disturbed sleep, loss of memory, and generally being out of sorts but in a pretty serious way. The illness didn't kill anyone, but it did make nearly every victim feel wretched, sometimes for months. The cause of the outbreak was a mystery. All tests for pathogens came back negative. The disease was so peculiarly specific to the vicinity that it became known as the Akureyri disease.

For about a year, nothing more happened. Then outbreaks began to occur in other, curiously distant places—in Louisville, Kentucky; in Seward, Alaska; in Pittsfield and Williamstown, Massachusetts; in a little farming community in the far north of England called Dalston. Altogether through the 1950s ten outbreaks were recorded in the United States and three in Europe. The symptoms everywhere were broadly similar but often with local peculiarities. People in some places said they felt unusually depressed or sleepy or had very specific muscle tenderness. As the disease proliferated, it attracted other names: post-viral syndrome, atypical poliomyelitis, and epidemic neuromyasthenia, by which it is most commonly known now. Why outbreaks didn't radiate outward to neighboring communities but rather leaped across great geographical expanses was just one of many puzzling aspects of the disease.[*1]

All the outbreaks attracted little more than local attention, but in 1970, after several years of quiescence, the epidemic reappeared at Lackland Air Force Base in Texas, and now at last medical investigators began to look at it closely—though not, it must be said, much more productively. The Lackland outbreak made 221 people sick, most for about a week but some for up to a year. Sometimes just one person in a department came down with it; sometimes nearly everyone did. Most victims recovered completely, but a few experienced relapses weeks or months later. As usual nothing about the outbreak fit into a logical pattern, and all tests for bacterial or viral agents came back negative. Many of the victims were children too small to be suggestible, ruling out hysteria—the most common explanation for otherwise unexplained mass outbreaks. The epidemic lasted for a little over two months, then ceased (apart from the relapses) and has never returned. A report in *The Journal of the American*

Medical Association concluded that the victims had been suffering from a “subtle but nevertheless primarily organic illness whose effects may include exacerbation of underlying psychogenic illness.” Which is another way of saying, “We have no idea.”

Infectious diseases, as you will gather, are curious things. Some flit about like Akureyri disease, popping up seemingly at random, then going quiet for a time before popping up somewhere else. Others advance across landscapes like a conquering army. West Nile virus surfaced in New York in 1999 and within four years had covered the whole of America. Some diseases wreak havoc and then quietly withdraw, sometimes for years, occasionally forever. Between 1485 and 1551, Britain was repeatedly ravaged by a terrifying malady called the sweating sickness, which killed untold thousands. Then it abruptly stopped and was never seen there again. Two hundred years later, a very similar illness appeared in France, where it was called the Picardy sweats. Then it too vanished. We have no idea where and how it incubated, why it disappeared when it did, or where it might be now.

Baffling outbreaks, particularly small ones, are more common than you might think. Every year in the United States about six people, preponderantly in northern Minnesota, grow ill with Powassan virus. Some victims suffer only mild flu-like symptoms, but others are left with permanent neurological damage. About 10 percent die. There is no cure or treatment. In Wisconsin in the winter of 2015–16, fifty-four people, from twelve different counties, fell ill from a little-known bacterial infection called Elizabethkingia. Fifteen of the victims died. Elizabethkingia is a common soil microbe, but it only rarely infects people. Why it suddenly became rampant across a wide area of the state, and then stopped, is anyone’s guess. Tularemia, an infectious disease spread by ticks, kills 150 or so people a

year in America, but with unaccountable variability. In the eleven years from 2006 to 2016, it killed 232 people in Arkansas, but only one person in neighboring Alabama despite abundant similarities in climate, ground cover, and tick populations. The list goes on and on.

Perhaps no case has been harder to explain than Bourbon virus, named for the county in Kansas where it first appeared in 2014. In the spring of that year, John Seested, a healthy, middle-aged man from Fort Scott, about ninety miles south of Kansas City, was working on his property when he noticed he had been bitten by a tick. After a while he began to grow achy and feverish. When his symptoms didn't improve, he was admitted to a local hospital and given doxycycline, a drug for tick-bite infections, but it had no effect. Over the next day or two, Seested's condition steadily worsened. Then his organs began to fail. On the eleventh day he died.

Bourbon virus, as it became known, represented a whole new class of virus. It came from a group called thogotoviruses, which are endemic to regions of Africa, Asia, and eastern Europe, but this particular strain was entirely novel. Why it appeared suddenly in the very middle of the United States is a mystery. No one else got the disease in Fort Scott or anywhere else in Kansas, but a year later a man 250 miles away in Oklahoma came down with it. At least five other cases have since been reported. The Centers for Disease Control is curiously reticent about numbers. It says only that "as of June 2018, a limited number of Bourbon virus disease cases have been identified in the Midwest and southern United States," a somewhat odd way of putting it because there is clearly no limit on the number of infections any disease can cause. The most recent confirmed case, at the time of writing, was a fifty-eight-year-old woman who was bitten by a tick while

working in Meramec State Park in eastern Missouri and died soon afterward.

It may be that all of these elusive diseases infect lots more people, but not seriously enough to be noticed. “Unless doctors are doing laboratory tests specifically for this infection, they’ll miss it,” a CDC scientist told a reporter for National Public Radio in 2015, in reference to Heartland virus, yet another mysterious pathogen. (There really are a lot of these.) As of late 2018, the Heartland virus had infected some twenty people and killed an unknown number since it first appeared near St. Joseph, Missouri, in 2009. But so far all that can be said for sure is that these diseases only infect a very unlucky few people far removed from each other with no known connections between them.

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Sometimes it turns out that what seems to be a new disease is not new at all. Such proved to be the case in 1976 when delegates to an American Legion convention at the Bellevue-Stratford Hotel in Philadelphia began to fall ill from a disease no authority could identify. Soon many of them were dying. Within a few days, 34 were dead and another 190 or so were ill, some gravely. An additional puzzle was that about one-fifth of the victims had not set foot in the hotel, but had only walked past it. Epidemiologists from the Centers for Disease Control took two years to identify the culprit, a novel bacterium from a genus they called *Legionella.* It had spread through the hotel’s air-conditioning ducts. The unlucky passersby had been infected by walking through exhaust fumes.

Only much later was it realized that *Legionella* was almost certainly responsible for similarly unexplained outbreaks in Washington, D.C., in 1965 and in Pontiac,

Michigan, three years later. Indeed, it turned out that the Bellevue-Stratford Hotel had suffered a smaller, less lethal cluster of pneumonia cases two years earlier during a convention of the Independent Order of Odd Fellows, but that had attracted little attention because no one died. We now know that *Legionella* is widely distributed in soil and freshwater, and Legionnaires' disease has become more common than most people suppose. A dozen or so outbreaks are reported each year in America, and about eighteen thousand people become sick enough to need hospitalization, but the CDC thinks that that number is probably underreported.

Much the same thing happened with Akureyri disease where further investigations showed that there had been similar outbreaks in Switzerland in 1937 and 1939 and probably in Los Angeles in 1934 (where it was taken to be a mild form of poliomyelitis). Where, if anywhere, it was before that is unknown.

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Whether or not a disease becomes epidemic is dependent on four factors: how lethal it is, how good it is at finding new victims, how easy or difficult it is to contain, and how susceptible it is to vaccines. Most really scary diseases are not actually very good at all four; in fact, the qualities that make them scary often render them ineffective at spreading. Ebola, for instance, is so terrifying that people in the area of infection flee before it, doing everything in their powers to escape exposure. In addition, it incapacitates its victims swiftly, so most are removed from circulation before they can spread the disease widely anyway. Ebola is almost ludicrously infectious—a single droplet of blood no bigger than this *o* may contain a hundred million Ebola particles, every one of them as lethal

as a hand grenade—but it is held back by its clumsiness at spreading.

A successful virus is one that doesn't kill too well and can circulate widely. That's what makes flu such a perennial threat. A typical flu renders its victims infectious for about a day before they get symptoms and for about a week after they recover, which turns every victim into a vector. The great Spanish flu of 1918 racked up a global death toll of tens of millions—some estimates put it as high as a hundred million—not by being especially lethal but by being persistent and highly transmissible. It killed only about 2.5 percent of victims, it is thought. Ebola would be more effective—and in the long run more dangerous—if it mutated a milder version that didn't strike such panic into communities and made it easier for victims to mingle with unsuspecting others.

That is, of course, no grounds for complacency. Ebola was only formally identified in the 1970s, and until recently all its outbreaks were isolated and short-lived, but in 2013 it spread to three countries—Guinea, Liberia, and Sierra Leone—where it infected twenty-eight thousand people and killed eleven thousand. That's a big outbreak. On several occasions, thanks to air travel, it escaped to other countries, though fortunately in each instance it was contained. We may not always be so lucky. Hypervigilance makes it less likely diseases will spread, but it's no guarantee that they won't.

It's remarkable that bad things don't happen more often. According to one estimate reported by Ed Yong in *The Atlantic*, the number of viruses in birds and mammals that have the potential to leap the species barrier and infect us may be as high as 800,000. That is a lot of potential danger.[*2]

II

IT IS SOMETIMES said, only partly in jest, that the worst health initiative in history was the invention of agriculture. Jared Diamond has called it “a catastrophe from which we have never recovered.”

Perversely, farming didn’t bring improved diets but almost everywhere poorer ones. Focusing on a narrower range of staple foods meant most people suffered at least some dietary deficiencies, without necessarily being aware of it. Moreover, living in proximity to domesticated animals meant that their diseases became our diseases. Leprosy, plague, tuberculosis, typhus, diphtheria, measles, influenzas—all vaulted from goats and pigs and cows and the like straight into us. By one estimate, about 60 percent of all infectious diseases are zoonotic (that is, from animals). Farming led to the rise of commerce and literacy and the fruits of civilization but also gave us millennia of rotten teeth, stunted growth, and diminished health.

We forget how devastating many diseases were until quite recent times. Take diphtheria. Into the 1920s, before the introduction of a vaccine, it struck down more than 200,000 people a year in America, killing 15,000 of them. Children were especially susceptible. It usually started with a mild temperature and a sore throat, so at first was easily mistaken for a cold, but it soon became much more serious as dead cells accumulated in the throat, forming a leathery coating (the term “diphtheria” comes from the Greek for “leather”; the disease, incidentally, is correctly pronounced “diff-theria,” not “dip-theria”) that made breathing increasingly difficult, and the disease spread through the body, shutting down organs one by one. Death tended to follow swiftly. There were many cases of parents losing all their children in a single outbreak. Today diphtheria has become so rare—just five cases in the United States in the most recent decade measured—that many doctors would struggle to recognize it.

Typhoid fever was no less frightening and caused at least as much distress. The great French microbiologist Louis Pasteur understood pathogens better than anyone of his day but still lost three of his five children to typhoid fever.

Typhoid and typhus have similar names and symptoms but are different diseases. Both are bacterial in origin and marked by sharp abdominal pain, listlessness, and a tendency to grow confused. Typhus is caused by a rickettsia bacillus; typhoid is caused by a type of salmonella bacillus and is the more serious of the two. A small proportion of people infected with typhoid—between 2 and 5 percent—are infectious but have no symptoms of illness, making them highly effective, if nearly always unwitting, vectors. The most famous such carrier was a shadowy cook and housekeeper named Mary Mallon who became notorious in the early years of the twentieth century as Typhoid Mary.

Almost nothing is known of her beginnings. She was variously reported in her own day as being from Ireland, England, or the United States. All that can be said for certain is that from young adulthood Mary worked in a number of well-to-do households, mostly in the New York City area, and wherever she went, two things always happened: people came down with typhoid, and Mary abruptly disappeared. In 1907, after a particularly bad outbreak, she was tracked down and tested and in the process became the first person to be confirmed as an asymptomatic carrier—that is, was infectious but had no symptoms herself. So fearsome did this make her that she was held in protective custody, very much against her will, for three years.

She was released when she promised never again to take a job handling food. Mary, alas, was not the most trustworthy of souls. Almost immediately she began working in kitchens again, spreading typhoid to a number

of new locations. She managed to elude capture until 1915, when twenty-five people developed typhoid at the Sloane Hospital for Women in Manhattan, where Mary had been working under an assumed name as a cook. Two of the victims died. Mary fled but was recaptured and spent the remaining twenty-three years of her life under house arrest on North Brother Island in the East River until her death in 1938. She was personally responsible for at least fifty-three cases of typhoid and three confirmed deaths, but possibly many more. The particular tragedy of it is that she could have spared her unfortunate victims if she had just washed her hands before handling food.

Typhoid may not worry people as it once did, but it still affects more than 20 million people a year around the world and kills between 200,000 and 600,000, depending on whose figures you rely on. The United States has an estimated 5,750 cases each year, about two-thirds brought in from abroad but nearly 2,000 acquired domestically.

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If you want to imagine what a disease might do if it became bad in every possible way, you could do no better than consider the case of smallpox. Smallpox is almost certainly the most devastating disease in the history of humankind. It infected nearly everyone who was exposed to it and killed about 30 percent of victims. The death toll in the twentieth century alone is thought to have been around 500 million. Smallpox's astounding infectiousness was vividly demonstrated in Germany in 1970 after a youthful tourist developed it upon returning home from a trip to Pakistan. He was placed in hospital quarantine but opened his window one day to sneak a cigarette. This, it has been reported, was enough to infect seventeen others, some two floors away.

Smallpox only infects humans, and that proved to be its fatal weakness. Other infectious diseases—flus notably—can disappear from human populations but rest up, as it were, among birds or pigs or other animals. Smallpox had no such reservoir to retreat to as humans gradually persecuted it into smaller and smaller patches of the planet. At some point in the distant past, it had lost the ability to infect other animals in order to focus exclusively on humans. As it turned out, it chose the wrong enemy.

Now the only way any human can get smallpox is if we inflict it upon ourselves. Unfortunately, that has happened. In 1978, at the University of Birmingham in England, a medical photographer named Janet Parker went home from work early one afternoon in late summer complaining of a blinding headache. Soon she was very ill indeed—fevered, delirious, and covered in pustules. She had contracted smallpox via an air duct from a lab one floor below her office. There, a virologist named Henry Bedson had been studying one of the last smallpox samples on Earth still allowed for research. He was frantically working against a deadline before his own stocks were to be destroyed and evidently grew careless in keeping them safe. Poor Janet Parker died about two weeks after being exposed and in so doing became the last person on Earth to be killed by smallpox. She had actually been vaccinated against the disease twelve years earlier, but smallpox vaccine doesn’t last. When Bedson learned that smallpox had escaped from his lab and killed an innocent person, he went out to his garden shed and committed suicide, so in a sense he was smallpox’s last victim. The hospital ward on which Parker was treated was sealed off for five years.

Two years after Parker’s terrible death, on May 8, 1980, the World Health Organization announced that smallpox had been eradicated from Earth, the first and so far only human disease to be made extinct. Officially just two stocks

of smallpox remain in the world now—in government freezers at the Centers for Disease Control in Atlanta, Georgia, and at a Russian virology institute near Novosibirsk in Siberia. Both countries have several times promised to destroy the remaining stocks but never have. In 2002, the CIA claimed there were probably also stocks in France, Iraq, and North Korea. No one can say whether, or how many, samples may survive accidentally as well. In 2014, someone looking through a storage area at a Food and Drug Administration facility in Bethesda, Maryland, found vials of smallpox dating from the 1950s but still viable. The vials were destroyed, but it was an unnerving reminder of how easily such samples can be overlooked.

With smallpox gone, tuberculosis is today the deadliest infectious disease on the planet. Between 1.5 and 2 million people die of it every year. It is another disease that we have mostly forgotten, but only a couple of generations ago it was devastating. Lewis Thomas, writing in *The New York Review of Books* in 1978, recalled how hopeless all treatments for TB were in the 1930s when he was a medical student. Anyone could catch it, he noted, and there was really nothing you could do to make yourself safe from infection. If you got it, that was it. “The hardest part of the disease, for both the patient and the family, was that it took so long to die,” Thomas wrote. “The only relief was a curious phenomenon near the end, known as spes phthisica, when the patient suddenly became optimistic and hopeful, even mildly elated. This was the worst of signs; spes phthisica meant that death was coming soon.”

As a scourge, TB actually got worse as time passed. Until late in the nineteenth century, it was known as consumption and was believed to be inherited. But when Robert Koch discovered the tubercle bacillus in 1882, the medical community realized beyond doubt that it was infectious—a far more unnerving proposition to loved ones

and carers alike—and it became more widely known as tuberculosis. Victims were previously sent to sanatoriums entirely for their own sake; now there was a more urgent sense of exile.

Almost everywhere patients were subjected to harsh regimens. At some institutions, doctors reduced patients' lung capacity by cutting nerves to their diaphragm (a process known as a phrenic crush) or by injecting gas into their chest cavity so that the lungs couldn't fully inflate. At Frimley Sanatorium in England, authorities tried the opposite tack. Inmates were given pickaxes and made to do hard, pointless labor in the belief that that would strengthen their wearied lungs. None of these did, or possibly could do, the slightest bit of good. In most places, however, the approach was simply to keep patients very quiet to try to stop the disease from spreading from their lungs to other parts of their bodies. Patients were forbidden to talk, write letters, or even read books or newspapers for fear that the content would unnecessarily excite them. Betty MacDonald, in her popular and still very readable 1948 book, *The Plague and I*, about her own experiences in a TB sanatorium in Washington State, recorded that she and other inmates were allowed visits by their children just once a month for ten minutes and by spouses and other adults for two hours on Thursdays and Sundays. Patients were not allowed to talk or laugh unnecessarily or to sing ever. They were ordered to lie perfectly still for most of their waking day and not permitted to bend over or reach for things.

If TB is off the radar for most of us, that's because 95 percent of its more than a million and a half annual deaths are in low- or middle-income countries. About one in every three people on the planet carries the TB bacterium, but only a small proportion of those contract the disease. But it is still around. About seven hundred people a year die from

tuberculosis in America. Some boroughs of London now have rates of infection that nearly match those of Nigeria or Brazil. No less alarmingly, drug-resistant strains of TB now account for 10 percent of new cases. It is entirely possible that we could one day in the not too distant future be facing an epidemic of TB that medicine cannot treat.

Lots of historically formidable diseases are still out there, not quite entirely vanquished. Even bubonic plague is still around, believe it or not. The United States averages seven cases a year. Most years there are one or two deaths. And there are lots of diseases in the wider world from which most of us in the developed world are spared—diseases like leishmaniasis, trachoma, and yaws, which few of us have even heard of. Those three and fifteen others, known collectively as neglected tropical diseases, affect more than a billion people worldwide. More than 120 million people, to take just one example, suffer from lymphatic filariasis, a disfiguring parasitic infection. What is particularly unfortunate is that a simple compound added to table salt could eliminate the filariasis wherever it appears. Many of the other neglected tropical diseases are beyond horrible. Guinea worms grow up to a meter long inside the bodies of their victims, then escape by burrowing out of their skin. The only treatment, even now, is to speed the process of exit by winding the worms onto a stick as they emerge.

To say that much of our progress against these diseases has been hard won is to put it mildly. Consider the contribution of the great German parasitologist Theodor Bilharz (1825–62), who is often called the father of tropical medicine. His entire career was devoted, at constant risk to himself, to trying to understand and conquer some of the world’s worst infectious diseases. Wishing to better understand the truly horrid disease schistosomiasis—also now sometimes called bilharzia in his honor—Bilharz bandaged the pupae of cercariae worms to his stomach and

took careful notes over the following days as they burrowed through his skin en route to invading his liver. He survived that experience but died soon afterward, aged just thirty-seven, while trying to help stop a typhus epidemic in Cairo. Similarly, Howard Taylor Ricketts (1871–1910), the American discoverer of the bacterial group rickettsia, went to Mexico to study typhus but contracted the disease himself and died. His fellow American Jesse Lazear (1866–1900), from the Johns Hopkins Medical School, went to Cuba in 1900 to try to prove that yellow fever was spread by mosquitoes, caught the disease—probably by intentionally infecting himself—and died. Stanislaus von Prowazek (1875–1915), of Bohemia, traveled the world studying infectious diseases, and found the agent behind trachoma, before succumbing to typhus himself in 1915 while working on an outbreak at a German prison. I could go on and on. Medical science has never produced a more noble and selfless group of investigators than the pathologists and parasitologists who risked and all too often lost their lives in trying to conquer the most pernicious of the world's diseases in the late nineteenth and early twentieth centuries. There ought to be a monument to them somewhere.

III

IF WE DON'T die so much from communicable diseases anymore, plenty of other maladies have stepped in to fill the gap. Two types of diseases in particular are more visible now than they were in times past, in part at least because we aren't being killed off by other things first.

One is genetic diseases. Twenty years ago, about five thousand genetic diseases were known. Today it is seven thousand. The number of genetic diseases is constant. What has changed is our ability to identify them. Sometimes one rogue gene can cause a breakdown, as with

Huntington’s disease, which used to be known as Huntington’s chorea, from the Greek for “dance,” a strange and decidedly insensitive reference to the jerky movements of Huntington’s sufferers. It is a thoroughly wretched disease, affecting about one person in every ten thousand. Symptoms usually first appear when the victim is in his or her thirties or forties, and progress ineluctably to senility and premature death. It is all because of one mutation in the HTT gene, which produces a protein called huntingtin, one of the largest and most complex proteins in the human body, and we have no idea what huntingtin is for.

Far more often, multiple genes are at play, usually in ways too complex to fully understand. The number of genes that have been implicated in inflammatory bowel disease, for instance, is comfortably over a hundred. At least forty have been linked to type 2 diabetes, and that is before you start to factor in other determinants like health and lifestyle. Most diseases have a complex array of triggers.

That means that it is often impossible to pinpoint a cause. Take multiple sclerosis, a disease of the central nervous system in which sufferers experience a gradual onset of paralysis and loss of motor control, nearly always beginning before the age of forty. It is indubitably genetic, but it also has a geographical element that no one can quite explain. People from northern Europe get it much more often than people from warmer climes. As David Bainbridge has observed, “Why a temperate climate should make you attack your own spinal cord is not so obvious. Yet the effect is clear, and it has even been shown that if you are a northerner you can reduce your risk by relocating southward before puberty.” It also affects women disproportionately, again for no reason that anyone has yet determined.

Mercifully, most genetic diseases are quite rare, often vanishingly so. One of the more famous sufferers of a rare

genetic disorder was the artist Henri de Toulouse-Lautrec, who is thought to have suffered from pycnodysostosis. Toulouse-Lautrec was normally proportioned until puberty, but then his legs stopped growing while his trunk continued growing to normal adult size. In consequence, when standing, he looked as if he were on his knees. Only about two hundred cases of the disorder have ever been recorded.

Rare diseases are defined as diseases that afflict no more than one person in two thousand, and there is a paradox at their heart, which is that although each disease doesn't affect many people, collectively they affect a lot. Altogether there are about seven thousand rare diseases—so many that about one person in seventeen in the developed world has one, which isn't very rare at all. But, sadly, so long as a disease affects only a small number of people, it is unlikely to get much research attention. For 90 percent of rare diseases, there are no treatments at all.

A second category of disorders that have become more common in modern times, and represent a much greater risk for most of us, is what Professor Daniel Lieberman of Harvard calls mismatch diseases—that is, diseases brought on by our indolent and overindulgent modern lifestyles. The idea, roughly, is that we are born with the bodies of hunter-gatherers but pass our lives as couch potatoes. If we want to be healthy, we need to eat and move about a little more like our ancient ancestors did. That doesn't mean we have to eat tubers and hunt wildebeest. It means we should consume a lot less processed and sugary foods and get more exercise. Failure to do that, however, is what is giving us the disorders like type 2 diabetes and cardiovascular disease that are killing us in great numbers. Indeed, as Lieberman notes, medical care is actually making things worse by treating the symptoms of mismatch diseases so effectively that we "unwittingly perpetuate their causes."

As Lieberman puts it with chilling bluntness, “You are most likely going to die from a mismatch disease.” Even more chillingly, he believes that 70 percent of the diseases that kill us could easily be preventable if we would just live more sensibly.

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When I met Washington University’s Michael Kinch in St. Louis, I asked him what he believed was the greatest disease risk to us now.

“Flu,” he said without hesitation. “Flu is way more dangerous than people think. For a start, it kills a lot of people already—about thirty to forty thousand every year in the United States—and that’s in a so-called good year. But it also evolves very rapidly, and that’s what makes it especially dangerous.”

Every February, the World Health Organization and the Centers for Disease Control get together and decide what to make the next flu vaccine from, usually based on what’s going on in eastern Asia. The problem is that flu strains are extremely variable and really hard to predict. You are probably aware that all flus have names like H5N1 or H3N2. That is because every flu virus has two types of proteins on its surface—hemagglutinin and neuraminidase—and these account for the *H* and *N* in their names. H5N1 means that the virus combines the fifth known iteration of hemagglutinin with the first known iteration of neuraminidase, and for some reason that is a particularly nasty combination. “H5N1 is the version commonly known as bird flu, and it kills between 50 to 90 percent of victims,” says Kinch. “Luckily, it isn’t readily transmissible between humans. So far this century, it has killed about four hundred people—roughly 60 percent of those it has infected. But look out if it mutates.”

Based on all the available information, the WHO and CDC announce their decision on February 28, and all the flu vaccine manufacturers in the world begin working on the same strain. Says Kinch, “From February to October they make the new flu vaccine, in the hope that we will be ready for the next big flu season. But when a really devastating new flu emerges, there’s no guarantee that we will actually have targeted the right virus.”

In the 2017–18 flu season, to take one recent example, people who had been vaccinated were only 36 percent less likely to get flu than those who hadn’t been vaccinated. In consequence, it was a bad year for flu in America, with a death toll estimated at eighty thousand. In the event of a really catastrophic epidemic—one that killed children or young adults in large numbers, say—Kinch believes we wouldn’t be able to produce vaccine fast enough to treat everyone, even if the vaccine was effective.

“The fact is,” he says, “we are really no better prepared for a bad outbreak today than we were when Spanish flu killed tens of millions of people a hundred years ago. The reason we haven’t had another experience like that isn’t because we have been especially vigilant. It’s because we have been lucky.”

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*1 Because of the similarity of symptoms and difficulty of diagnosis, it is sometimes lumped in with chronic fatigue syndrome (CFS) but is really quite different. CFS (formally myalgic encephalomyelitis) tends to affect individuals, while epidemic neuromyasthenia hits populations.

*2 When talking of diseases, people often use “infectious” and “contagious” interchangeably, but there is a difference. An infectious disease is one caused by a microbe; a contagious disease is one transmitted by contact.

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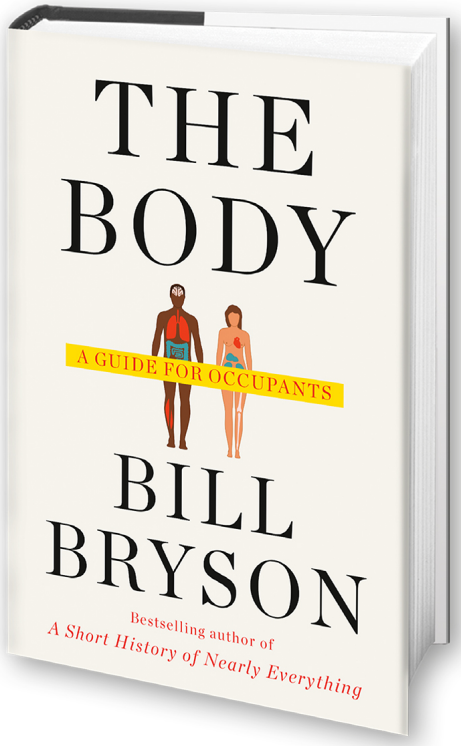

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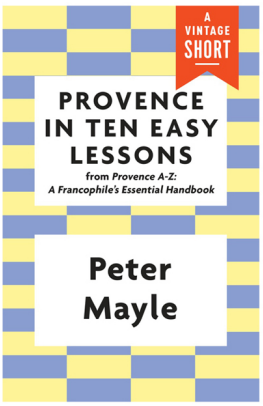

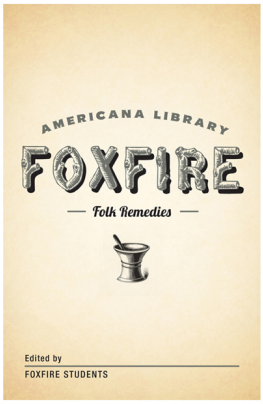

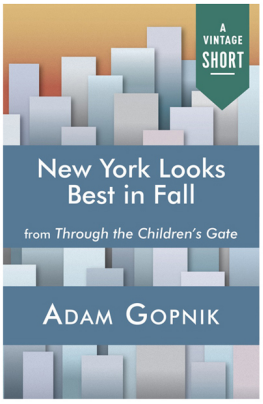

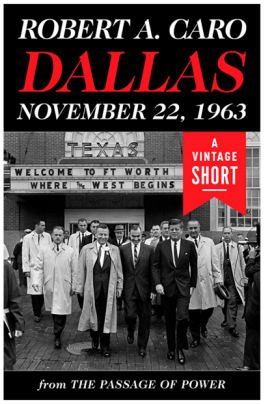

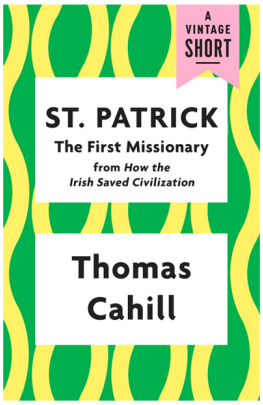

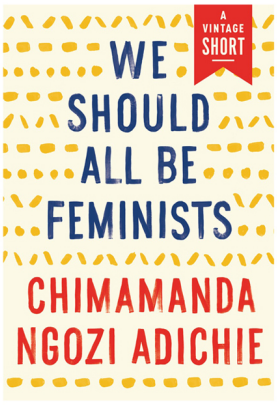

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