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Introduction

Still, thou art blest, compar'd wi' me!
The present only toucheth thee:
But Och! I backward cast my e'e,
On prospects drear!
An' forward tho' I canna see,
I guess an' fear!

—Robert Burns, “To a Mouse”

CONFESSIONS OF A SUPERSPREADER

Never in our lifetimes, it seems, has there been greater uncertainty about the future—and greater ignorance of the past. At the beginning of 2020, very few people grasped the significance of the news coming out of Wuhan about a new coronavirus. When I first spoke and wrote publicly about the rising probability of a global pandemic, in the week ending January 26, 2020,¹ I was regarded as eccentric (certainly by the majority of the delegates at the World Economic Forum in Davos, who seemed oblivious to the danger). The conventional wisdom at that time, from Fox News to *The Washington Post*, was that the coronavirus posed a lesser threat to Americans than the usual winter wave of influenza. On February 2, I wrote, “We are now dealing with an epidemic in the world’s most populous country, which has a significant chance of becoming a global pandemic. . . . The challenge is . . . to resist that strange fatalism

that leads most of us not to cancel our travel plans and not to wear uncomfortable masks, even when a dangerous virus is spreading exponentially.”² Looking back, I read those sentences as a veiled confession. I was traveling manically in January and February, as I had done for most of the previous twenty years. In January, I flew from London to Dallas, from Dallas to San Francisco, and from there to Hong Kong (January 8), Taipei (January 10), Singapore (January 13), Zurich (January 19), back to San Francisco (January 24), and then to Fort Lauderdale (January 27). I wore a mask once or twice but found it intolerable after an hour and took it off. In the course of February, I flew almost as frequently, though not so far: to New York, Sun Valley, Bozeman, Washington, D.C., and Lyford Cay. You may wonder what kind of life that was. I used to joke that the lecture circuit had turned me into an “international man of history.” I realized only later that I might have been one of the “superspreaders” whose hyperactive travel schedules were spreading the virus from Asia to the rest of the world.

My weekly newspaper column in the first half of 2020 became a kind of plague diary, though I never mentioned the fact that I was ill for most of February, with a painful cough I could not shake off. (To get through lectures, I relied heavily on Scotch.) “Worry about grandparents,” I wrote on February 29; “the mortality rate for people in their eighties is above 14 per cent, whereas it’s close to zero for those under 40.” I omitted the less comforting data on asthmatic men in their mid-fifties. I also left out the fact that I went to see a doctor twice, only to be told that—as more or less everywhere in the United States at that time—there were no tests available for COVID-19. All I knew was that it was serious, and not only for me and my family:

Those who blithely say, “This is no worse than the flu” . . . are missing the point. . . .

Uncertainty surrounds it because it is so difficult to detect in its early stages, when many carriers are both infectious and asymptomatic. We don’t know for sure how many people have it, so we don’t exactly know its reproduction number and its mortality rate. There’s no vaccine and there’s no cure.³

In another article, published in *The Wall Street Journal* on March 8, I wrote, “If the U.S. turns out to have proportionately as many cases as South Korea, it will soon have some 46,000 cases and more than 300 deaths—or 1,200 deaths if the U.S. mortality rate is as high as Italy’s.”⁴ At that point, total confirmed cases in the United States stood at just 541; deaths at 22. We passed 46,000 cases on March 24 and 1,200 deaths on March 25, just over two weeks later.⁵ On March 15 I noted, “John F. Kennedy airport was thronged yesterday with people doing what, since time immemorial, they have done in times of plague: fleeing the big city (and spreading the virus). . . . We are entering the panic phase of the pandemic.”⁶ That was the same day I myself flew, with my wife and my two youngest children, from California to Montana. I have been here ever since.

I wrote and thought about little else in the first half of 2020. Why this intense preoccupation? The answer is that, although my core competency is financial history, I have been keenly interested in the role of disease in history ever since studying the Hamburg cholera epidemic of 1892 as a graduate student more than thirty years ago. Richard Evans’s meticulously detailed study of that episode introduced me to the idea that the mortality caused by a deadly pathogen is partly a reflection of the social and political order it attacks. It was the class structure as much as the bacterium *Vibrio cholerae* that killed people in Hamburg, Evans argued, because the entrenched power of the city’s property owners had been an insuperable obstacle to improving the city’s antiquated water and sewage systems. The mortality rate for the poor was thirteen times higher than for the rich.⁷ Researching *The Pity of War* a few years later, I was struck by statistics that suggested the German army had collapsed in 1918 partly because of a surge of illness, possibly resulting from the Spanish influenza pandemic.⁸ *The War of the World* delved more deeply into the history of the 1918–19 pandemic, showing how the First World War ended with twin pandemics—not only influenza but also the ideological contagion of Bolshevism.⁹

The work I did on empires in the 2000s also involved excursions into the history of contagious disease. No account of European settlement in the New World could have omitted the role that disease played in “thinning the *Indians*,

to make room for the *English*,” as John Archdale, the governor of Carolina in the 1690s, callously remarked. (The title of the second chapter of my book *Empire* was “White Plague.”) I was also very struck by the terrible toll of tropical disease on British soldiers stationed far from home: a man’s chances of surviving a tour of duty in Sierra Leone were pitifully low—1 in 2.¹⁰ *Civilization* devoted an entire chapter to the role of modern medicine in the expansion of Western settlement and rule, showing how colonial regimes meaningfully improved our knowledge of and ability to control contagious diseases, without glossing over the brutal methods often employed.¹¹ *The Great Degeneration* explicitly warned of our growing vulnerability to “the . . . random mutation of viruses like influenza,”¹² while *The Square and the Tower* was essentially a history of the world based on the insight that “network structures are as important as viruses in determining the speed and extent of a contagion.”¹³

As I write (in late October 2020), the COVID-19 pandemic is far from over. There have been nearly twenty-six million confirmed cases, a fraction of the total number infected with the SARS-CoV-2 virus, to judge by seroprevalence figures from around the world.¹⁴ The death toll approaches 1.2 million, which is certainly an underestimate, as the statistics from a number of large countries (notably Iran and Russia) cannot be trusted. And the cumulative body count continues to rise globally at a rate of more than 3.5 percent a week—to say nothing of the number of people whose health has been permanently damaged, which no one has yet estimated. It seems increasingly likely that Lord Rees, Britain’s astronomer royal, has won his bet with the Harvard psychologist Steven Pinker that “bioterror or bioerror will lead to one million casualties in a single event within a six month period starting no later than Dec 31 2020.”¹⁵ Some epidemiologists have argued that, without drastic social distancing and economic lockdowns, the ultimate death toll could have been between thirty and forty million.¹⁶ Because of government restrictions and changes in public behavior, it will surely not be as high. Yet precisely these “non-pharmaceutical interventions” have inflicted a shock on the world economy far greater than that caused by the 2008–9 financial crisis—potentially as great as the shock of the Great Depression, but compressed into months, not years.

Why write history now, when the story is not yet over? The answer is that this is not a history of our perplexing postmodern plague, though two of the later chapters (9 and 10) offer a preliminary sketch of such a history. This is a general history of catastrophe—not just pandemics but all kinds of disasters, from the geological (earthquakes) to the geopolitical (wars), from the biological (pandemics) to the technological (nuclear accidents). Asteroid strikes, volcanic eruptions, extreme weather events, famines, catastrophic accidents, depressions, revolutions, wars, and genocides: all life—and much death—is here. For how else are we to see our disaster—any disaster—in a proper perspective?

THE ALLURE OF DOOM

The book's starting point is that we cannot study the history of catastrophes, natural or man-made—though the dichotomy, as we shall see, is somewhat false—apart from the history of economics, society, culture, and politics. Disasters are rarely entirely exogenous events, with the exception of a massive meteor strike, which hasn't happened in sixty-six million years, or an alien invasion, which hasn't happened at all. Even a catastrophic earthquake is only as catastrophic as the extent of urbanization along the fault line—or the shoreline, if it triggers a tsunami. A pandemic is made up of a new pathogen and the social networks that it attacks. We cannot understand the scale of the contagion by studying only the virus itself, because the virus will infect only as many people as social networks allow it to.¹⁷ At the same time, a catastrophe lays bare the societies and states that it strikes. It is a moment of truth, of revelation, exposing some as fragile, others as resilient, and others as “antifragile”—able not just to withstand disaster but to be strengthened by it.¹⁸ Disasters have profound economic, cultural, and political consequences, many of them counterintuitive.

All societies live under uncertainty. Even the earliest civilizations of which records remain were acutely aware of the vulnerability of *Homo sapiens*. Since human beings began recording their thoughts in art and literature, the possibility of an extinction event or “end time” has loomed large. As chapter 1 explains, the prospect of the Apocalypse—of a final, spectacular Day of Judgment—has

been central to Christian theology since Jesus himself prophesied it. Muhammad incorporated into Islam the spectacular denouement described in the Book of Revelation. We find similar visions of destruction even in the more cyclical faiths of Hinduism and Buddhism—and indeed in ancient Norse mythology. Often, sometimes subconsciously, we modern humans interpret the disasters we encounter or experience in eschatological terms. Indeed, in some secular ideologies, notably Marxism, a secular apocalypse, in which capitalism collapses under the weight of its contradictions, is something as devoutly to be wished for as the “Rapture” of the evangelicals. There is something familiar about the vehemence with which the most radical prophets of disastrous climatic change demand drastic economic penance to avert the end of the world.

I first encountered the word “doom” as a boy in East Africa, where it was the brand name of a popular insecticide spray, nowadays occasionally used for religious purposes.¹⁹ To my sons, *Doom* is a computer game. The word originates in the Old English *dóm*, Old Saxon *dóm*, and Old Norse *dómr*, meaning a formal judgment or sentence, usually of the adverse variety. “All un-avoided is the doom of destiny,” says Richard III. “What, will the line stretch out to th’ crack of doom?” asks Macbeth. We dread doom, of course. Yet we are also fascinated by it—hence the abundant literature on the subject of “the last days of mankind” (the ironical title of Karl Kraus’s great satirical play about World War I). Science fiction and cinema have portrayed our doom as a species countless times: a lethal pandemic is only one of the many ways mankind has been wiped out in the course of popular entertainment. It was revealing that, during the first phase of the COVID-19 lockdowns in the United States, one of the most frequently watched movies on Netflix was *Contagion*, the 2011 film by Steven Soderbergh about a (much worse) pandemic.²⁰ I found myself rewatching the BBC’s 1975 drama *Survivors* and reading Margaret Atwood’s MaddAddam trilogy with appalled fascination. Doom is alluring.

Yet what we have to fear is not the end of the world—which invariably disappoints the millennialists by failing to occur on schedule—but big disasters that most of us survive. These can take multiple forms. They vary enormously in scale. And even if they have been predicted, they cause a very

distinctive kind of pandemonium. The petrifying yet squalid reality of catastrophe is rarely captured in literature. A rare exception is Louis-Ferdinand Céline's deeply cynical account of the German invasion of France in 1914 in *Voyage au bout de la nuit* (1932). "When you have no imagination, dying is small beer," observes Céline. "When you do have an imagination, dying is too much."²¹ Few authors have better captured the chaos of a large disaster and the sheer terror and disorientation of the individual's experience. France survived the horrendous casualties of the opening phase of the First World War. Yet Céline's cynical, traumatized portrayal of French low life, from the outposts of French Equatorial Africa to the outskirts of Paris, seems to foretell the even greater calamity that lay ahead.

Strange Defeat was the title the historian Marc Bloch gave his account of France's collapse in the summer of 1940.²² There have been many such strange defeats in history—disasters that were not difficult to foresee and yet precipitated collapse. In many respects, the American and British experiences of COVID-19 have both, in their different ways, been strange defeats, intelligible only as colossal failures by governments to make adequate preparations for a disaster they always knew to be a likely contingency. To blame this failure almost entirely on populist braggadocio would be facile. In terms of excess mortality, Belgium fared as badly, if not worse. Its prime minister for most of 2020 was a liberal woman, Sophie Wilmès.

Why do some societies and states respond to catastrophe so much better than others? Why do some fall apart, most hold together, and a few emerge stronger? Why does politics sometimes cause catastrophe? These are the central questions posed by *Doom*. The answers are far from obvious.

THE UNCERTAINTY OF CATASTROPHE

If only disasters were predictable, how much less perplexing life would be! For centuries, writers have sought to tease out predictability from the historical process by means of various cyclical theories—religious, demographic, generational, and monetary. In chapter 2, I consider these and ask how much they can really help us to anticipate and, if not avoid, then at least mitigate

the next calamity. The answer is not much. The problem is that believers in such theories, or in any other form of insight that is not widely understood, invariably find themselves in the position of Cassandra. They see the future, or think they do, but cannot convince those around them. In that sense, many disasters are true tragedies, in the classical sense of the term. The prophet of doom cannot persuade the skeptical chorus. The king cannot be saved from his nemesis.

But there is a good reason why the Cassandras cannot persuade, and that is their inability to attach precision to their prophecies. When exactly will disaster strike? They generally cannot say. It is true that some disasters are “predictable surprises,” like “gray rhinos” that we see rumbling toward us.²³ Yet sometimes, at the moment they strike, these gray rhinos metamorphose into “black swans”—seemingly bewildering events that “no one could have foreseen.” This is partly because many black swan events—pandemics, earthquakes, wars, and financial crises—are governed by power laws, rather than a normal probability distribution of the sort that our brains more readily comprehend. There is no average pandemic or earthquake; there are a few very large ones and a great many quite small ones, and there is no reliable way of predicting when a very large one will come along.²⁴ In normal times, my family and I live not far from the San Andreas fault line. We know “the big one” could happen at any time, but how big and exactly when, no one can say. The same goes for man-made disasters such as wars and revolutions (which are more often disastrous than not) as well as financial crises—economic disasters that have lower death tolls but, often, comparably disruptive consequences. A defining feature of history, as chapter 3 shows, is that there are many more black swans—not to mention “dragon kings,” events so large in scale that they lie beyond even a power-law distribution²⁵—than a normally distributed world would lead us to expect. All such events lie in the realm of uncertainty, not of calculable risk. Moreover, the world we have built has, over time, become an increasingly complex system prone to all kinds of stochastic behavior, nonlinear relationships, and “fat-tailed” distributions. A disaster such as a pandemic is not a single, discrete event. It invariably leads to other forms of disaster—economic, social, and political. There can be, and often are, cascades or chain

reactions of disaster. The more networked the world becomes, the more we see this (chapter 4).

Unfortunately, our brains have not evolved in ways that equip us to comprehend or tolerate a world of black swans, dragon kings, complexity, and chaos. It would be wonderful if the advance of science had liberated us from at least some of the irrational ways of thinking that characterized the ancient and medieval worlds. (“We have sinned. It is God’s judgment.”) But other forms of magical thinking have grown even as religious belief has diminished. “This disaster lays bare the conspiracy” is an increasingly common response to any adverse event. Then there is that vague deference to “the science,” which proves, on close inspection, to be a new form of superstition. “We have a model; we understand this risk” is a phrase that has been uttered more than once before several recent calamities, as if gimcrack computer simulations with made-up variables constitute science. In succession to the Oxford historian Keith Thomas’s seminal *Religion and the Decline of Magic*, chapter 5 suggests, we must prepare to write *Science and the Revival of Magic*.²⁶

Disaster management is made still more difficult by the fact that our political systems increasingly promote into leading roles individuals who seem especially oblivious to the challenges described in the preceding paragraphs: subprime forecasters rather than superforecasters. The psychology of military incompetence has been the subject of an excellent study.²⁷ Less has been written at a general level about the psychology of political incompetence, the subject of chapter 6. We know that politicians seldom seek out expert knowledge without some ulterior motive.²⁸ We know, too, that inconvenient expert knowledge is quite easily sidelined. But can we identify general forms of political malpractice in the field of disaster preparedness and mitigation? Five categories come to mind:

1. Failure to learn from history
2. Failure of imagination
3. Tendency to fight the last war or crisis
4. Threat underestimation
5. Procrastination, or waiting for a certainty that never comes

Henry Kissinger's "problem of conjecture"—which he formulated in the context of nuclear strategy—captures the asymmetries of decision making under uncertainty, especially in a democracy:

Each political leader has the choice between making the assessment which requires the least effort or making an assessment which requires more effort. If he makes the assessment that requires least effort, then as time goes on it may turn out that he was wrong and then he will have to pay a heavy price. If he acts on the basis of a guess, he will never be able to prove that his effort was necessary, but he may save himself a great deal of grief later on. . . . If he acts early, he cannot know whether it was necessary. If he waits, he may be lucky or he may be unlucky. It is a terrible dilemma.²⁹

Leaders are rarely rewarded for what they did to avoid disasters—for the non-occurrence of a disaster is rarely a cause for celebration and gratitude—and more often are blamed for the pain of the prophylactic remedies they recommended. The contrast between today's style of leadership and the presidency of Dwight Eisenhower forms part of chapter 7.

Yet not all failures are failures of leadership. Often the real point of failure is further down the organizational hierarchy. As the physicist Richard Feynman proved in the aftermath of the space shuttle *Challenger's* destruction, in January 1986, the fatal lapse was not the White House's impatience for a successful launch to coincide with a presidential address, but the insistence of midlevel bureaucrats at NASA that a risk of catastrophic failure their own engineers put at 1 in 100 was in fact 1 in 100,000.³⁰ This, as much as blunders at the top, turns out to be a feature of many modern disasters. There is, as the Republican congressman Tom Davis said after Hurricane Katrina, a "vast divide between policy creation and policy implementation."³¹ Such disconnects can be found in disasters of any scale, from a sunken ship to a collapsed empire, suggesting that there is a "fractal geometry of disaster" (chapter 8).

The behavior of ordinary people—whether in decentralized networks or

acephalous crowds—can matter even more than the decisions of leaders or orders issued by governments in the event of a disaster. What leads some people to adapt rationally to a new threat, others to act passively as bystanders, and others to go into denial or revolt? And why can a natural disaster end up triggering a political one as disgruntled people form themselves into a revolutionary crowd? What causes a crowd to flip from wisdom to madness? The answer, I suggest, lies in the changing structure of the public sphere. For a disaster is directly experienced by only a minority of people. Everyone else hears about it through some network of communication. Even in the seventeenth century, the nascent popular press could sow confusion in people's minds, as Daniel Defoe found when he researched the plague of 1665 in London. The advent of the internet has greatly magnified the potential for misinformation and disinformation to spread, to the extent that we may speak of twin plagues in 2020: one caused by a biological virus, the other by even more contagious viral misconceptions and falsehoods. This problem might have been less serious in 2020 had meaningful reforms of the laws and regulations governing the big technology companies been implemented. Despite ample evidence after 2016 that the status quo was untenable, almost nothing was done.

NOT THE END OF MEDICAL HISTORY

We tend to think of epidemics and pandemics narrowly, in terms of particular pathogens' impacts on human populations. However, it is as much the social networks and state capacities that the pathogen encounters that determine the magnitude of a pandemic's impact. Population fatality rates are not inscribed in the ribonucleic acid of a coronavirus. They vary from place to place and from time to time, for reasons that are as much social and political as genetic.

For most of history, ignorance of medical science left communities more or less defenseless against new strains of disease. And the bigger and more commercially integrated a society, the more likely it was to suffer a pandemic, as the Greeks and Romans found out to their detriment. It was precisely the

existence of trans-Eurasian trade routes that enabled the bacterium *Yersinia pestis* to kill so many fourteenth-century Europeans. Likewise, European expansion overseas, beginning roughly a century and a half later, led to the so-called Columbian Exchange: pathogens brought by Europeans devastated indigenous American populations; Europeans then brought back syphilis from the New World; and by shipping enslaved Africans to the Caribbean and the Americas, Europeans also brought malaria and yellow fever to those places. By the late nineteenth century, the European empires could claim to be conquering contagious disease. Yet fin de siècle failures to cope with public health crises, such as the return of the bubonic plague, became sources of grievance for indigenous nationalists, just as outbreaks of cholera in ports and industrial cities were grist to the mills of progressives and social democrats at home. As late as the 1950s, pandemics were still seen as a recurrent feature of the global order.

The later twentieth century was a time of seeming progress. Even as they plotted to wage biological warfare against each other, the Soviet Union and the United States collaborated to eradicate smallpox and competed to contain malaria. From the 1950s to the 1980s, great strides were made in multiple fields of public health, from vaccination to sanitation. Indeed, by the late twentieth century it seemed to some as if the threat of a pandemic had receded. With the rise of the randomized controlled clinical trial as the standard for medical research, we had arrived, or so it seemed, at “the end of medical history.”³² We had not, of course. Beginning with the HIV/AIDS pandemic, a succession of new viruses exposed the vulnerability of an increasingly networked world.

We had countless warnings that humanity’s most clear and present danger was a new pathogen and the global pandemic it could cause. Yet somehow these warnings did not translate into swift, effective action in a majority of countries when the gray rhino became a black swan in January 2020. In China, the one-party state responded to the outbreak of the novel coronavirus in much the same way that its Soviet counterpart had responded to the 1986 Chernobyl nuclear disaster: with lies. In the United States, a populist president, echoed by cable news, at first dismissed the threat as a mere sea-

sonal flu, then erratically intervened in his administration's response. But a distinct scandal was the abject failure of the government agencies whose one job was biodefense. In Britain the pattern was similar. In Europe, federalist aspirations (and the Euroskeptic notion of a European superstate) were initially exposed as hollow as each country sought to save itself, reimposing national frontiers and seeking to hoard scarce medical equipment. Talk of a European "community of fate" (*Schicksalsgemeinschaft*) resumed only when it was clear that Germany would not suffer the fate of Italy. In each case, the disaster was a moment of revelation not just of the pathogen's virulence but of the defects of the politics concerned. For the same virus was far less devastating in Taiwan and South Korea, to name two East Asian democracies whose preparedness proved equal to the challenge. Chapter 9 seeks to explain why that was, and the harmful role that the parallel "infodemic" of fake news and conspiracy theories played. Chapter 10 considers the economic consequences of the pandemic and offers an explanation for the apparently paradoxical behavior of financial markets in the face of the biggest macroeconomic shock since 1929–32. Finally, chapter 11 considers the geopolitical consequences of the pandemic and casts tentative doubt on the popular view that China will be the principal beneficiary and the United States the principal loser from COVID-19.

ELON'S WAY

What general lessons can we learn from the historical study of catastrophes?

First, it may simply be impossible to predict or even attach probabilities to the majority of disasters. From earthquakes to wars to financial crises, the major disruptions in history have been characterized by random or by power-law distributions. They belong in the domain of uncertainty, not risk.

Second, disaster takes too many forms for us to process with conventional approaches to risk mitigation. No sooner have we focused our minds on the threat of Salafi jihad than we find ourselves in a financial crisis originating in subprime mortgages. No sooner have we relearned that such economic shocks often lead to populist political backlashes than a novel coronavirus is

wreaking havoc. What will be next? We cannot know. For every potential calamity, there is at least one plausible Cassandra. Not all prophecies can be heeded. In recent years we may have allowed one risk—namely climate change—to draw our attention away from the others. In January, even as a global pandemic was getting under way—as flights laden with infected people were leaving Wuhan for destinations all over the world—the discussions at the World Economic Forum were focused almost entirely on questions of environmental responsibility, social justice, and governance (ESG), with the emphasis on the *E*. As will become clear, I see the dangers arising from climbing global temperatures as real and potentially catastrophic, but climate change cannot be the sole threat we prepare for. Recognition of the multiplicity of threats we confront, and the extreme uncertainty of their incidence, would encourage a more flexible response to disaster. Not coincidentally, the states that did best in 2020 included three—notably Taiwan and South Korea (and initially Israel)—that face multiple threats, including an existential threat from neighbors.

Third, not all disasters are global. However, the more networked human society becomes, the greater the potential for contagion, and not just of the biological variety. A networked society needs to have well-designed circuit breakers that can swiftly reduce the connectivity of the network in a crisis, without atomizing and paralyzing society completely. Moreover, any disaster is either amplified or dampened by flows of information. Disinformation in 2020—for example, viral fake news about bogus therapies—made COVID-19 worse in many places. By contrast, effective management of information flows about infected people and their contacts helped contain the pandemic in a few well-run countries. The global network of scientific research worked wonders.

Fourth, as chapter 9 shows, COVID-19 exposed a serious failure of the public health bureaucracy in the United States and a number of other countries. It was tempting—and many journalists succumbed to the temptation—to lay all the blame for the excess mortality caused by the pandemic on the president. This was the kind of error Tolstoy mocked in *War and Peace*: the tendency to attach too much importance in the historical process to individual leaders. In reality, there were multiple points of failure in 2020, from the

assistant secretary for preparedness and response at the Department of Health and Human Services to the governor of New York and the mayor of New York City to traditional and social media. On paper, the United States was ready for a pandemic—better prepared and better resourced than any country in the world. Almost as well prepared—on paper—was the British government. Yet when, in January, reports from China made it clear that the new coronavirus now known as SARS-CoV-2 was both contagious and lethal, there was a disastrous failure to act, on both sides of the Atlantic. The American epidemiologist Larry Brilliant, a key figure in the campaign to eradicate smallpox, has said for many years that the formula for dealing with an infectious disease is “early detection, early response.”³³ In Washington and London there was just the opposite. Would a different kind of threat produce an equally sluggish and ineffectual reaction? If the problems exposed by the pandemic are not specific to the public health bureaucracy but are general problems of the administrative state, then it probably would.

Finally, there is a tendency throughout history, at times of acute social stress, for religious or quasi-religious ideological impulses to impede rational responses. We had all previously contemplated the danger of a pandemic, but more as entertainment (*Contagion*) than as a potential reality. Even now, when other science fiction scenarios are being realized—not only rising temperatures and climatic instability but also the rise and expansion of the Chinese surveillance state, to name just two—we struggle to react coherently and consequently. In the summer of 2020, millions of Americans took to the streets of nearly three hundred cities to protest loudly and sometimes violently against police brutality and systemic racism. However shocking the incident that precipitated the protests, this was risky behavior amid a pandemic of a highly contagious respiratory disease. At the same time, the rudimentary precaution of wearing a mask became a symbol of partisan affiliation. The fact that, in some parts of the country, gun buying seemed more popular than mask wearing testified to the potential for a public-order as well as a public-health disaster.

COVID-19 is not the last disaster we shall confront in our lifetimes. It is just the latest, after a wave of Islamist terrorism, a global financial crisis, a

rash of state failures, surges of unregulated migration, and a so-called democratic recession. Next up probably won't be a disaster attributable to climate change, as we rarely get the disaster we expect, but some other threat most of us are currently ignoring. Perhaps it will be a strain of antibiotic-resistant bubonic plague, or perhaps a massive Russian-Chinese cyberattack on the United States and its allies. Perhaps it will be a breakthrough in nanotechnology or in genetic engineering that has disastrous unintended consequences.³⁴ Or perhaps artificial intelligence will fulfill Elon Musk's forebodings, reducing an intellectually outclassed humanity to the status of "a biological boot loader for digital super intelligence." Musk was notable in 2020 for dismissing the threat posed by COVID-19. ("The coronavirus panic is dumb," he tweeted on March 6.) He has also argued that "humans will solve environmental sustainability" and that even death itself—the existential threat to every individual—can be overcome with some combination of DNA editing and neurological data storage. Yet Musk is in other respects pessimistic about our future as a civilized species on Earth:

Civilization has been around for . . . 7,000 years or something like that. If you counted from the first time there was any writing, any recorded symbols, besides cave paintings, that's a very tiny amount of time considering the universe is 13.8 billion years old. . . . And it's been . . . kind of a roller coaster, on the civilization front. . . . There is a certain probability that is irreducible, that something may happen to us, despite our best intentions, despite everything we try to do. There's a probability at a certain point that some either external force or some internal unforced error causes civilization to be destroyed. Or sufficiently impaired such that it can no longer extend to another planet.³⁵

For Musk, the choice is essentially between "the singularity," in the sense of unstoppable progress in AI, and the end of civilization ("Those are the two possibilities"). Hence his contrarian warning that "the biggest problem the world will face in 20 years is population collapse." Hence his proposal to colonize Mars.

We simply cannot know which of all the possible future disasters—discussed more fully in the conclusion—will strike and when. All we can do is learn from history how to build social and political structures that are at least resilient and at best antifragile; how to avoid the descent into self-flagellating chaos that so often characterizes societies overwhelmed by disaster; and how to resist the siren voices who propose totalitarian rule or world government as necessary for the protection of our hapless species and our vulnerable world.

1

THE MEANING OF DEATH

This fell sergeant, death, is strict in his arrest.

—*Hamlet*

WE ARE ALL DOOMED

“We’re doomed.” This line, uttered by the Caledonian Cassandra of the British television sitcom *Dad’s Army*, Private James Frazer, was one of the running jokes of my youth. The trick was to say it at the most incongruous moment possible—when the milk had run out or you had missed the last bus home. There’s a wonderful scene in one episode (“Uninvited Guests”) when Frazer—played by the great John Laurie—tells the other members of his Home Guard platoon a bloodcurdling story of a curse. As a young man, he was anchored off a small island near Samoa, where—according to his friend Jethro—there was a ruined temple, inside which stood an idol decorated with a giant ruby “the size of a duck’s egg.” They set out to steal the ruby, hacking their way through dense forest. But just as Jethro laid his hands on it, they were confronted by a witch doctor, who cursed Jethro with the words “DEATH! THE RUBY WILL BRING YE DEATH! DE-E-ATH.”

PRIVATE PIKE: Did the curse come true, Mr. Frazer?

PRIVATE FRAZER: Aye, son, it did. He died . . . last year—he was eighty-six.

We are all doomed, if not necessarily cursed. I shall be dead by 2056, at the latest. My additional life expectancy at the age of fifty-six years and two months is, according to the Social Security Administration, 26.2 years, which would get me to eighty-two, four years less than Frazer's cursed friend. Rather more encouragingly, the UK Office for National Statistics gives a man of my age an additional two years, with a 1 in 4 chance of making it to ninety-two. To see if I could improve on these numbers, I went to the Living to 100 Life Expectancy Calculator, which bases its estimate on a detailed questionnaire about one's lifestyle and family history. Living to 100 told me I probably wouldn't make a century, but I had a better-than-even chance of living thirty-six more years.¹ It might, of course, have been another story if I had caught COVID-19 back in January, as the disease then had a fatality rate of 6 percent for my age group, and perhaps slightly higher if we factor in my mild asthma.

To die at fifty-six would certainly be a disappointment, but it would be a good result by the standards of the majority of the 107 billion human beings who have ever lived. In the United Kingdom, where I was born, life expectancy at birth did not reach fifty-six until 1920, exactly a hundred years ago. The average for the entire period from 1543 until 1863 was just under forty. And the United Kingdom was notable for its longevity. Estimates for the world as a whole put life expectancy below thirty until 1900, when it reached thirty-two, and below fifty until 1960. Indian life expectancy was just twenty-three in 1911. Russian life expectancy fell to a nadir of twenty in 1920. There has been a sustained upward trend over the past century—life expectancy at birth roughly doubled between 1913 and 2006—but with numerous setbacks. Life expectancy in Somalia today is fifty-six: my age.² It is still low there partly because infant and child mortality is so high. Around 12.2 percent of children born in Somalia die before they reach the age of five; 2.5 percent die between the ages of five and fourteen.³

When I try to put my own experience of the human condition into perspective, I think of the Jacobean poet John Donne (1572–1631), who lived to the age of fifty-nine. In the space of sixteen years, Anne Donne bore her husband twelve children. Three of them—Francis, Nicholas, and Mary—died before they were ten. Anne herself died after giving birth to the twelfth child,

who was stillborn. After his favorite daughter, Lucy, had died and he himself had very nearly followed her to the grave, Donne wrote his *Devotions upon Emergent Occasions* (1624), which contains the greatest of all exhortations to commiserate with the dead: “Any man’s *death* diminishes *me*, because I am involved in *Mankind*; And therefore never send to know for whom the *bell* tolls; It tolls for *thee*.”

The Neapolitan artist Salvator Rosa painted perhaps the most moving of all memento mori, entitled simply *L'umana fragilità* (*Human Frailty*). It was inspired by an outbreak of bubonic plague that had struck his native Naples in 1655, claiming the life of his infant son, Rosalvo, as well as carrying off Salvator’s brother, his sister, her husband, and five of their children. Grinning hideously, a winged skeleton reaches out of the darkness behind Rosa’s mistress, Lucrezia, to claim their son, even as he makes his first attempt to write. The mood of the heartbroken artist is immortally summed up in the eight Latin words the baby, guided by the skeletal figure, has inscribed on the canvas:

Conceptio culpa

Nasci pena

Labor vita

Necesse mori

“Conception is sin, birth is pain, life is toil, death is inevitable.” I remember being thunderstruck when, on my first visit to the Fitzwilliam Museum, in Cambridge, I read those words. Here was the human condition, stripped down to its bleak essentials. By all accounts, Rosa was a lighthearted man, who also wrote and acted in satirical plays and masques. At around the time of his son’s death, however, he wrote to a friend, “This time heaven has struck me in such a way that shows me that all human remedies are useless and the least pain I feel is when I tell you that I weep as I write.”³⁴ He himself died of dropsy at the age of fifty-eight.

Death was ubiquitous in the medieval and early modern world in a way that we struggle to imagine. As Philippe Ariès argued in *The Hour of Our*

Death, death was “tamed” by being, like marriage and even childbirth, a social rite of passage, shared with family and community and followed by funerary and mourning rites that offered familiar consolations to the bereaved. Beginning in the seventeenth century, however, attitudes changed. As mortality became more perplexing, even while its causes became better understood, so Western societies began to create a certain distance between the living and the dead. While the Victorians excessively sentimentalized and romanticized death—creating in literature “beautiful deaths” that bore less and less relation to the real thing—the twentieth century went into denial about the “end of life.” Dying became an increasingly solitary, antisocial, almost invisible act. What Ariès called “an absolutely new type of dying” arose, which removed the moribund to hospitals and hospices and ensured that the moment of expiration was discreetly hidden behind screens.⁵ Americans eschew the verb “to die.” People “pass.” Evelyn Waugh cruelly satirized this American way of death in *The Loved One* (1948), inspired by an unhappy sojourn in Hollywood.

The British way of death is only slightly better, however. In Monty Python’s *The Meaning of Life*, death is one enormous faux pas. The Grim Reaper—John Cleese, shrouded in a black cloak—arrives at a picturesque English country home where three couples are in the middle of a dinner party:

GRIM REAPER: I am death.

DEBBIE: Well, isn’t that extraordinary? We were just talking about death only five minutes ago. . . .

GRIM REAPER: Silence! I have come for you.

ANGELA: You mean . . . to—

GRIM REAPER: Take you away. That is my purpose. I am death.

GEOFFREY: Well, that’s cast rather a gloom over the evening, hasn’t it? . . .

DEBBIE: Can I ask you a question?

GRIM REAPER: What?

DEBBIE: How can we all have died at the same time?

GRIM REAPER: *(After long pause, points finger at serving dish)* The salmon mousse.

GEOFFREY: Darling, you didn't use canned salmon, did you?

ANGELA: I'm most dreadfully embarrassed.

THE IMMINENT ESCHATON

Each year, around the world, around fifty-nine million people expire—roughly the entire population of the world at the time King David ruled over the Israelites. In other words, roughly 160,000 people die each day—the equivalent of one Oxford or three Palo Altos. Around 60 percent of those who die are sixty-five or older. In the first half of 2020, roughly 510,000 people worldwide died of the new disease COVID-19. Each death is a tragedy, as we shall see. But even if none of these people would have died then anyway—which is unlikely, given the age profile of the dead—that represents only a modest (1.8 percent) increase in total expected deaths for the first half of 2020. In 2018, 2.84 million Americans died, so around 236,000 died per month, and 7,800 a day. Three quarters of those who died were sixty-five or older. By far the biggest killers were heart disease and cancer, which accounted for 44 percent of the total. In the first half of 2020, according to the Centers for Disease Control and Prevention, there were 130,122 American deaths recorded as “involving COVID-19.” However, total excess (above-normal) mortality from all causes was close to 170,000. If none of these people would have died anyway—again unlikely—that represented an 11 percent increase in deaths for that period above the baseline derived from recent averages.

We are all doomed, then, even if medical scientists are able to extend life expectancy still further—as some predict, beyond a century. Despite the ongoing quest for solutions to the problem that life is a terminal condition,⁶

immortality remains a dream—or, as Jorge Luis Borges intimated in “The Immortal,” a nightmare.⁷ But are we also doomed, collectively, as a species? The answer is yes.

Life, as our physicist mother never tired of reminding my sister and me, is a cosmic accident—a view also held by better-known physicists such as Murray Gell-Mann.⁸ Our universe began 13.7 billion years ago, in what we call the Big Bang. On our planet, with the help of ultraviolet rays and lightning, the chemical building blocks of life developed, leading to the first living cell 3.5 to 4 billion years ago. Starting around 2 billion years ago, sexual reproduction by simple multicellular organisms unleashed waves of evolutionary innovation. About 6 million years ago, a genetic mutation in chimpanzees led to the first humanlike apes. *Homo sapiens* appeared extremely recently, 200,000 to 100,000 years ago, dominated other human types around 30,000 years ago, and had spread to most of the planet by around 13,000 years ago.⁹ A lot of things had to be just right for us to get to this point. But the “Goldilocks” conditions in which we flourish cannot endure indefinitely. To date, around 99.9 percent of all species ever to have inhabited Earth have become extinct.

In other words, to quote Nick Bostrom and Milan M. Ćirković, “extinction of intelligent species *has* already happened on Earth, suggesting that it would be naive to think it may not happen again.”¹⁰ Even if we avoid the fate of the dinosaurs and the dodos, “in about 3.5 billion years, the growing luminosity of the sun will essentially have sterilized the Earth’s biosphere, but the end of complex life on Earth is scheduled to come sooner, maybe 0.9–1.5 billion years from now,” since conditions will by then have become intolerable for anything resembling us. “This is the default fate for life on our planet.”¹¹ We might conceivably be able to find another habitable planet if we solve the problem of intergalactic travel, which involves almost unimaginably vast distances. Even then, we shall eventually run out of time, as the last stars will die roughly a hundred trillion years from now, after which matter itself will disintegrate into its basic constituents.

The thought that, as a species, we may have around a billion years left on Earth should be reassuring. And yet many of us seem to yearn for doomsday to come much sooner than that. The “end time,” or eschaton (from the Greek

eskhatos), is a feature of most of the world's major religions, including the most ancient, Zoroastrianism. The Bahman Yasht envisages not only crop failures and a general moral decay but also "a dark cloud [that] makes the whole sky night" and a rain of "noxious creatures." Although Hindu eschatology assumes vast cycles of time, the one currently under way, Kali Yuga, is expected to end violently, when Kalki, the final incarnation of Vishnu, descends on a white horse at the head of an army to "establish righteousness upon the earth." In Buddhism, too, there are apocalyptic scenes. Gautama Buddha prophesied that, after five thousand years, his teachings would be forgotten, leading to the moral degeneration of mankind. A bodhisattva named Maitreya would then appear and rediscover the teaching of dharma, after which the world would be destroyed by the deadly rays of seven suns. Norse mythology, too, has its Ragnarök (twilight of the gods), in which a devastating great winter (Fimbulvetr) will plunge the world into darkness and despair. The gods will fight to the death with the forces of chaos, fire giants, and other magical creatures (*jötunn*). In the end, the ocean will completely submerge the world. (Devotees of Wagner have seen a version of this in his *Götterdämmerung*.)

In each of these religions, destruction is the prelude to rebirth. The Abrahamic religions, by contrast, have a linear cosmology: the end of days really is The End. Judaism foresees a Messianic Age with the return to Israel of the exiled Jewish Diaspora, the coming of the Messiah, and the resurrection of the dead. Christianity—the faith established by the followers of a man who claimed to be that Messiah—offers a much richer version of the eschaton. Prior to the Second Coming of Christ (*parousia*), as Jesus himself told his followers, there would be a time of "great tribulation" (Matthew 24:15–22), "affliction" (Mark 13:19), or "days of vengeance" (Luke 21:10–33 offers the most detail of the Gospels). The Revelation of Saint John offers perhaps the most striking of all visions of doom—of a war in heaven between Michael and his angels and Satan, an interlude when Satan would be cast down and bound for a thousand years, after which Christ would reign for a millennium with resurrected martyrs by his side, only for the Whore of Babylon, drunk with the blood of the saints, to appear atop a scarlet beast, and a great battle to be fought at Armageddon. After that, Satan would be unleashed, then thrown

into a lake of burning sulfur, and, finally, the dead would be judged by Christ and the unworthy cast down into the fiery lake. The description of the four horsemen of the Apocalypse is astonishing:

And I saw when the Lamb opened one of the seals, and I heard, as it were the noise of thunder, one of the four beasts saying, Come and see. And I saw, and behold a white horse: and he that sat on him had a bow; and a crown was given unto him: and he went forth conquering, and to conquer.

And when he had opened the second seal, I heard the second beast say, Come and see. And there went out another horse that was red: and power was given to him that sat thereon to take peace from the earth, and that they should kill one another: and there was given unto him a great sword.

And when he had opened the third seal, I heard the third beast say, Come and see. And I beheld, and lo a black horse; and he that sat on him had a pair of balances in his hand.

And I heard a voice in the midst of the four beasts say, A measure of wheat for a penny, and three measures of barley for a penny; and see thou hurt not the oil and the wine.

And when he had opened the fourth seal, I heard the voice of the fourth beast say, Come and see.

And I looked, and behold a pale horse: and his name that sat on him was Death, and Hell followed with him. And power was given unto them over the fourth part of the earth, to kill with sword, and with hunger, and with death, and with the beasts of the earth. (Revelation 6:1–8)

The day of wrath is heralded by a great earthquake, an eclipse of the sun, and a blood moon. The stars fall to the earth, and the mountains and islands are “moved out of their places.”

A clever feature of the Christian eschaton was the uncertainty Christ left in his disciples’ minds about its timing: “But of that day and hour knoweth no man, no, not the angels of heaven, but my Father only” (Matthew 24:36).



Albrecht Dürer, *The Four Horsemen of the Apocalypse* (1498).

The destruction of Jerusalem in AD 70 at the hands of Titus was interpreted by the early Christians as fulfillment of Jesus's prophecy that the Second Temple would be destroyed, but the subsequent spectacular events Christ had prophesied did not materialize.¹² By the time of Augustine of Hippo, it seemed prudent to downplay the millennium, as he did in *The City of God* (AD 426), consigning it to the realm of the unknowable and (implicitly) remote.

Perhaps the decline of Christian millennialism helps explain the revolutionary impact of Muhammad's new religion when it erupted from the Arabian Desert in the seventh century. In a number of respects, Islam simply dusted down the more exciting parts of Revelation. In Mecca, Muhammad taught his followers that the Day of Judgment would be preceded by the appearance of the one-eyed al-Masih ad-Dajjal (the false messiah), with an entourage of

seventy thousand Jews from Isfahan. Isa (Jesus) would then descend to triumph over the false messiah. In Sunni doctrine, the *ashrāt al-sā'a*—the conditions of the hour—would include a huge black cloud of smoke (*dukhān*) covering the earth, a succession of sinkings of the earth, and the appearance of Ya'jūj and Ma'jūj (Gog and Magog) to ravage the earth and slaughter believers. After Allah had disposed of Gog and Magog, the sun would rise from the west, the *Dābbat al-Ard* (Beast of the Earth) would rise out of the ground, and, after the sounding of the divine trumpet, the dead would also rise (*al-Qiyāmah*) for the final judgment (*Yawm al-Hisāb*). When this prophecy failed to come true, however, Muhammad impatiently turned from redemption to imperialism. Allah, he argued in Medina, wanted Muslims to preserve his honor by punishing the unbelievers—to go from awaiting Judgment Day to expediting it with acts of jihad.¹³ Shia eschatology is broadly similar to Sunni, but with the return of the Twelfth Imam, Muhammad al-Mahdi, foreseen after a period of declining morality and modesty.

For Christians, the Islamic conquests of the Near East and North Africa were just the biggest of a number of ghastly threats—Vikings, Magyars, and Mongols were also menacing Christendom. These and other disasters were interpreted by some as intimations of the end time; Christian eschatology never entirely receded. Joachim of Fiore (1135–1202) divided history into three ages, of which the third would be the final one. Likewise, in the wake of the Black Death of the 1340s—in terms of its mortality rate the biggest calamity ever suffered by Christians—there were those who inferred that the end was nigh. In 1356, a Franciscan monk named John of Roquetaillade wrote *Vademecum in tribulationibus*, prophesying a time of troubles in Europe that would feature social upheaval, tempests, floods, and more plagues.¹⁴ Similar quasi-revolutionary visions inspired the Taborites in Bohemia in 1420 and the Franciscan Johann Hilten's 1485 prophecies of the twilight of the papacy.¹⁵ And again, in the wake of Martin Luther's epoch-making challenge to the ecclesiastical hierarchy, millennialism gave sects as diverse as the Anabaptists, the Diggers, and the Levellers the confidence to defy established authority. Although the pursuit of the millennium abated in the eighteenth century, it revived again in the nine-

teenth and twentieth centuries, when some followers of the would-be prophet William Miller, later known as the Seventh-day Adventists, established a new church with a strongly millennialist doctrine that anticipated the end of the world in 1844. (The Millerites referred to mankind's survival that year as "the Great Disappointment.") Jehovah's Witnesses and members of the Church of Jesus Christ of Latter-day Saints (Mormons) both hold their own distinctive views of the imminence of the eschaton. Numerous modern cult leaders have persuaded their followers that the end was nigh. A number—notably Jim Jones, David Koresh, and Marshall Applewhite—achieved localized apocalypses in the form of mass suicides.

The end of the world, in short, has been a remarkably recurrent feature of recorded history.

DOOMSDAYS

It might be thought that the advance of science would ultimately liberate human beings from religious and pseudo-religious eschatology. Not necessarily. As the sociologist James Hughes has said, few of us are "immune to millennial biases, positive or negative, fatalist or messianic."¹⁶ Just over a century ago, as the first truly industrialized war ground toward its conclusion—a war waged with tanks, planes, submarines, and poison gas—there were apparitions of the Virgin Mary in the Portuguese village of Fatima, a battle at Armageddon (Megiddo, in what was then Palestine), the proclamation of a Jewish home in the Holy Land, a German offensive named after the Archangel Michael, and a global pandemic more lethal than the war itself.¹⁷ One of many intimations of impending apocalypse was the rise to power of Vladimir Ilyich Lenin, who unleashed a wave of anticlerical violence and iconoclasm across the Russian Empire.¹⁸ As *The New York Times* reported on June 21, 1919, Lenin was widely seen by Russian peasants as "none other than the antichrist foretold in the Scriptures."¹⁹

To the Cologne-born political theorist Eric Voegelin, the reality was that Communism, like the Nazism he had to flee in 1938, was itself based on a

flawed utopian interpretation of Christianity. Voegelin defined “gnosis” as “a purported direct, immediate apprehension or vision of truth without the need for critical reflection; the special gift of a spiritual and cognitive elite.” Gnosticism, he argued, was a “type of thinking that claims absolute cognitive mastery of reality.” When it took the form of a political religion, it harbored a dangerous and misguided ambition to “immanentize the eschaton”—in other words, to create a heaven on earth.²⁰ Voegelin’s modern gnostics sought the “redivinization of society . . . substituting more massive modes of participation in divinity for faith in the Christian sense.”²¹ (Voegelin speculated that this shift to “massive participation” might be a response to the sheer difficulty of sustaining an authentic Christian faith.)²² Writing more recently but in a similar spirit, the historian Richard Landes has detected the same urge in a wide range of historical and modern millennialist movements, up to and including Salafi jihadism and radical environmentalism.²³

Far from displacing the eschaton, science seemed to bring it nearer. When J. Robert Oppenheimer witnessed the first atomic explosion at White Sands, New Mexico, he famously thought of Krishna’s words from the *Bhagavad Gita* (the Hindu Song of the Lord): “I am become Death, the destroyer of worlds.”²⁴ At the very beginning of the Cold War, the artist Martyl Langsdorf, whose husband was a key figure in the Manhattan Project, came up with the image of a “Doomsday Clock.”²⁵ It first appeared in the *Bulletin of the Atomic Scientists* to illustrate the fear of many physicists—including some who had been involved in the creation of the atomic bomb—that a “technology-induced catastrophe” might be terrifyingly close. Midnight on the Doomsday Clock meant nuclear Armageddon. For many years, it was the *Bulletin’s* editor, Eugene Rabinowitch, who decided where the hands on the clock stood. After his death, a committee took over, meeting twice a year to adjust the clock. During the Cold War, the closest it came to midnight was in the years 1953–59, when the Doomsday Clock was moved to two minutes before midnight. The scientists also thought the years 1984–87 were fraught with peril: it was three minutes to midnight for four straight years. Popular literature reflected these anxieties. In Nevil Shute’s *On the Beach* (1957), the year is 1963 and the people of Melbourne helplessly await a lethal cloud of radioactive fallout in the aftermath

of World War III, which has been triggered, somewhat implausibly, by an Albanian nuclear attack on Italy. The choice is between heavy drinking and a government-issued suicide pill. In Raymond Briggs's graphic novel *When the Wind Blows* (1982), an elderly couple, Jim and Hilda Bloggs, dutifully build a fallout shelter, acting as if World War III will be as survivable as World War II had been.

Yet the reliability of the Doomsday Clock is open to question. Historians today agree that the most dangerous moment in the Cold War was the Cuban Missile Crisis. But the Doomsday Clock was at seven minutes to midnight throughout 1962, and it went back to 11:48 p.m. the following year, remaining there even as President Lyndon B. Johnson escalated the American involvement in the Vietnam War. Remarkably, the atomic scientists decided we were back to two minutes to Armageddon in January 2018,²⁶ and two years later they moved the clock forward to one hundred seconds to midnight, on the grounds that "humanity continues to face two simultaneous existential dangers—nuclear war and climate change—that are compounded by a threat multiplier, cyber-enabled information warfare, that undercuts society's ability to respond. The international security situation is dire, not just because these threats exist, but because world leaders have allowed the international political infrastructure for managing them to erode."²⁷ Somehow, today's doom is always better than last year's.

The nightmare of nuclear war was not the only apocalyptic vision to haunt the Cold War world. From the 1960s until the 1980s, a fear of global overpopulation led to a succession of mostly misguided and often downright harmful efforts to "control" reproduction in what was then called the Third World. Stephen Enke, of the RAND Corporation, argued that paying poor people to agree to sterilization or the insertion of intrauterine devices (IUDs) would be 250 times more effective in promoting development than other forms of aid. Paul Ehrlich's *The Population Bomb*, commissioned by the Sierra Club, predicted mass starvation in the 1970s, with devastating famines killing hundreds of millions of people. Lyndon Johnson was convinced, as were a majority of members of Congress, which increased the U.S. Agency for International Development's budget for family planning by a factor of twenty.

As president of the World Bank, former defense secretary Robert McNamara declared in 1969 that the bank would not finance healthcare “unless it was very strictly related to population control, because usually health facilities contributed to the decline of the death rate, and thereby to the population explosion.” Some American institutions—including the Ford Foundation and the Population Council—toyed with the idea of mass involuntary sterilization of entire populations. The consequences provide yet another illustration that people convinced of an imagined impending apocalypse can do a great deal of real harm. Encouraging, if not quite forcing, Indian women to accept IUDs and Indian men to accept vasectomies led to much suffering. At the height of the Indian Emergency of the mid-seventies, the government of Indira Gandhi carried out more than eight million sterilizations. Nearly two thousand people died because of botched operations. The United Nations also supported the Chinese Communist Party’s even more brutally administered “one-child policy.”²⁸ With hindsight, we can see that the solution to the problem of rising population was not mass sterilization but the “Green Revolution” in agricultural technology, pioneered by agronomists such as Norman Borlaug.

Today’s latter-day millennialists are the prophets of catastrophic climate change. “Around 2030,” the Swedish environmentalist Greta Thunberg has written, “we will be in a position to set off an irreversible chain reaction beyond human control that will lead to the end of our civilization as we know it.”²⁹ “The world is going to end in 12 years if we don’t address climate change,” the Democratic congresswoman Alexandria Ocasio-Cortez prophesied in 2019.³⁰ Thunberg’s emergence as the personification of radical environmentalism recalls past forms of eschatology, not least in the severity of the sacrifices she demands. “We don’t need a ‘low carbon economy,’” she declared at the World Economic Forum in January 2020. “We don’t need to ‘lower emissions.’ Our emissions have to stop if we are to have a chance to stay below the 1.5-degree target. . . . Any plan or policy of yours that doesn’t include radical emission cuts at the source, starting today, is completely insufficient.”³¹ The new green revolution—or Green New Deal—proposed by Ocasio-Cortez, Thunberg, and others implies a drastic reduction in all CO₂ emissions, with little regard for the economic and social costs. We shall return to this subject below; suffice