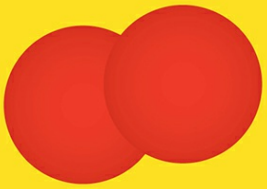
MICHAEL LEWIS



THE PREMONITION

A Pandemic Story

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To my parents, Diana Monroe Lewis and J. Thomas Lewis.

Thank you for surviving this.

Every surgeon carries within himself a small cemetery, where from time to time he goes to pray—a place of bitterness and regret, where he must look for an explanation for his failures.

—RENÉ LERICHE,
The Philosophy of Surgery, 1951

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INTRODUCTION

The Missing Americans

This book began with an unholy mix of obligation and opportunism. During the first half of the Trump administration I'd written a book, *The Fifth Risk*, that framed the federal government as a manager of a portfolio of existential risks: natural disasters, nuclear weapons, financial panics, hostile foreigners, energy security, food security, and on and on and on. The federal government wasn't just this faceless gray mass of two million people. Nor was it some well-coordinated deep state seeking to subvert the will of the people. It was a collection of experts, among them some real heroes, whom we neglected and abused at our peril. Yet we'd been neglecting and abusing them for more than a generation. That behavior climaxed with the Trump administration. My book asked: What happens when the people in charge of managing these risks, along with the experts who understand them, have no interest in them?

I had no clue what was going to happen next. I assumed something was bound to happen. But it didn't—not really. For the better part of three years, the Trump administration got lucky. That luck ran out in late 2019, as a freshly mutated virus in China made its way toward the United States. This was just the sort of management test I'd imagined when writing *The Fifth Risk*. How could I not write about it? But as I got into it, and found these wonderful characters to tell the story through, it became clear that Trump's approach to government management was only a part of the story, and maybe not even the bigger part. As one of my characters put it, "Trump was a comorbidity."

Back in October 2019—nearly three years into the Trump administration, and before anyone involved was aware of the novel coronavirus—a collection of very smart people had gathered to rank all the countries in the world, in order of their readiness for a pandemic. A group

called the Nuclear Threat Initiative partnered with Johns Hopkins and The Economist Intelligence Unit to create what amounted to a preseason college football ranking for one hundred ninety-five countries. The Global Health Security Index, it was called. It was a massive undertaking involving millions of dollars and hundreds of researchers. They created stats and polled the experts. They ranked the United States first. Number 1. (The United Kingdom was Number 2.)

Critics quibbled with the rankings. The complaints weren't all that different from the complaints you hear before every college football season. For years the University of Texas football team, with its vast resources and sway with voters, always seemed ranked more highly at the start of the season than at the end. The United States was the Longhorns of pandemic preparedness. It was rich. It had special access to talent. It enjoyed special relationships with the experts whose votes determined the rankings.

Then the game was played. The preseason rankings no longer mattered. Neither, really, did the excuses and blame-casting and rationalizations. As the legendary football coach Bill Parcells once said, "You are what your record says you are." At last count the United States, with a bit more than 4 percent of the world's population, had a bit more than 20 percent of its COVID-19 deaths. In February 2021, *The Lancet* published a long critique of the U.S. pandemic performance. By then 450,000 Americans had died. *The Lancet* pointed out that if the COVID death rate in the United States had simply tracked the average of the other six G7 nations, 180,000 of those people would still be alive. "Missing Americans," they called them. But why stop there? Before the pandemic, a panel of public-health experts had judged the United States to be more prepared for a pandemic than other G7 nations. In a war with a virus, we were not expected merely to fare as well as other rich countries. We were expected to win.

I like to think that my job is mainly to find the story in the material. I always hope that story will wind up being about more than what I think it's about—and that the reader will bring to it his own sense-making apparatus and find meanings in it missed by its author. But that doesn't mean that I don't form some opinion of what it's about. I think this particular story is about the curious talents of a society, and how those talents are wasted if not led. It's also about how gaps open between a society's reputation and its performance. After a catastrophic season, management always huddles up to figure out what needs to be changed. If this story speaks to that management in any way, I hope it is to say: There are actually some things

to be proud of. Our players aren’t our problem. But we are what our record says we are.

PART I

PROLOGUE

The Looking Glass

Laura Glass was thirteen years old and entering the eighth grade at Jefferson Middle School in Albuquerque, New Mexico, when she looked over her father's shoulder to see what he was working on. Bob Glass was a scientist at Sandia National Laboratories, created in the mid-1940s to figure out everything that needed to be figured out about nuclear weapons, apart from the creation of the plutonium and uranium inside them. It was Sandia's engineers who'd calculated how to drop a hydrogen bomb from a plane without killing the pilot, for instance. By the mid-1980s, when Bob Glass arrived, Sandia had a reputation as the place you went with a top secret problem after everyone else in the netherworld of national security had failed to solve it. It attracted people who followed wherever their minds led them, at the expense of pretty much everything else. People like Bob Glass. When she peered over her father's shoulder, Laura Glass didn't always understand what she was looking at. But it was never dull.

What she saw on this day in 2003 was a screen filled with green dots moving around, at random, it seemed to her. Then she noticed that a few of the dots were not green but red—and when a red dot bumped into a green dot, the green dot turned red. It was what was called an "agent-based model," her father explained. *You can think of these dots as people. There are a whole bunch of people on the planet. One of them is you. There are different types of people, with different types of schedules, and there are rules about how these people interact. I put together a kind of schedule for each person and then set them loose to see what happens . . .*

One of the things Bob Glass liked about this type of modeling was how easy it was to explain. Models were abstractions, but what this model was abstracting from was familiar: a single entity, which you could describe as a person, a piece of information, or any number of other things. As the

green dots turned red, you could be watching gossip travel, a traffic jam, a riot start, or a species go extinct. “When you start talking about it this way, everyone can understand it immediately,” he said.

His model was a crude picture of the real world, but it allowed him to see things in the real world that might be obscured in a more detailed picture. It also enabled him to answer the complicated questions that now routinely found him, most of which had to do with preventing some national disaster. The Federal Reserve Bank of New York just then was using him to help figure out how failure in one corner of the U.S. financial system might ripple into others. The Department of Energy wanted him to determine if a small glitch in the electric grid might trigger rolling blackouts across the country. Once you stopped talking about people and started talking about, say, money flows, the links between the little dots on the screen and the real world became harder for most people to follow. But not for him. “This is the crux of science,” he’d say with enthusiasm. “All science is modeling. In all science you are abstracting from nature. The question is: is it a useful abstraction.” Useful, to Bob Glass, meant: Does it help solve a problem?

At that moment Laura Glass had her own problem: that year’s science fair. There was no question of skipping it. Science had always played a big part in her relationship with her dad; it was an unspoken Glass family rule that she and her two sisters would compete in the fair every year. And actually Laura loved it. “The kind of science I was able to do with my dad was very different from the kind of science I did in school,” she said. “I always struggled with science in school.” With her dad, science was this tool for finding cool new questions to ask, and answer. Exactly what questions didn’t matter: her father had no respect for the boundaries between subjects and thought of all sciences as one and the same. They’d created one project on probability and coin flipping, and another on the differences in photosynthesis from one plant species to the next. Each year was more competitive than the year before. “When you got to middle school,” recalled Laura, “you started to see the competition ramp up.”

As she watched her father’s computer screen, she thought, *It’s almost like the red dots are infecting the green dots*. In history class she’d been reading about the Black Death. “I was fascinated by it,” she said. “I had no idea. It wiped out a third of Europe.” She asked her father: *Could you use this model to study how a disease spreads?* He hadn’t considered using his model to study disease. “I thought, Oh God, how am I going to help her with this?” he said. His assistance was the only thing that neither father nor daughter questioned. Bob Glass was a “science dad,” in the way other

fathers were “Little League dads.” He might not live through his daughters’ science projects in the way those fathers lived through their kids’ baseball games. On the other hand . . .

Soon they were deep into a new science fair project. That first year, the model was crude. The disease was the Black Death, which in Albuquerque, New Mexico, in 2004 felt a bit silly. Laura’s village had ten thousand people in it, a fraction of the population of her school district. In what she called “Infect World,” people gave the plague to each other simply by passing each other, which wasn’t realistic. She was the one who had to stand beside her Styrofoam boards with their charts and graphs and answer questions from the science fair judges, so she was the most acutely aware of the limitations of her work. “The judges would always ask: How real is this situation? How can you take this and use it?,” she recalled. Still. She was the only kid at the fair who had done epidemiology. Her project qualified for the state championships. Afterward she went back to her father and said: *Let’s make it real*.

To make it real, she needed a more plausible pathogen. “I told my dad, ‘It won’t be the Black Death. It’ll be something in the modern world. A flu-like thing.’ ” Whatever the pathogen was, she’d need to learn more about it, along with the society with which it would interact. “She came to me,” recalled Bob Glass, “and said, ‘Dad, it’s not so great that they just pass each other and they get sick. Dad, another thing, people don’t just walk around like this. They have social networks. I need to have social networks in here.’ ” Through 2004, Bob watched as his now fourteen-year-old child designed a survey and administered it to hundreds and hundreds of people in her school district: workers, teachers, parents, grandparents, high school students, middle school students, preschool students. “At first it was going to my peers and asking them questions,” said Laura. “How often did they hug and kiss? How many people? How many different people did they sit next to? How many minutes did they spend sitting next to them? Then I went from them to their parents.” She mapped their social networks and their movements, and then mapped the interactions among the different social networks. She counted up the number of people each person spent in close enough proximity with to infect them with an airborne pathogen.

She’d become passionate about a science project, and her father loved it. The deeper she went, the deeper he went. “I treated her like a grad student,” he said. “I’d say, Show me what you’ve done, and here are my questions.” In order for it to help her, his own computer model needed to improve in ways that were beyond even his powers. The most gifted

computer programmer Bob Glass had ever met was a guy at Sandia National Labs, Walt Beyeler. “Sandia’s a really weird place,” said Bob. “Los Alamos is full of people with pedigrees. Sandia hires the most brilliant people they could possibly find, and they don’t really care about pedigree.” Bob Glass was most people’s idea of a brilliant mind, but Walt was Bob’s idea of a brilliant mind. Asking him to help with a child’s science fair project felt a bit like pulling LeBron James in to play on your pickup basketball team. Walt was game.

The model needed to include realistic social interactions. It needed to account for incubation periods, during which people were infected but not infectious. It needed people without symptoms but capable of spreading disease. It needed people to be removed from the network after they died or became immune. It needed to make assumptions about the social behavior of the ill, and about the likelihood of one person infecting another when the two came into contact. Father and daughter agreed that, given the nature of their own social interactions, children were twice as likely as adults to infect each other in any given social interaction. They also agreed to leave stuff out, for the sake of simplicity. “We didn’t have college students in it,” said Bob Glass. “There weren’t all of these single-night stands or whatever.”

Bob Glass was now seriously interested. To him, it felt less like a science project than an engineering one. Once you understood the way a disease moved through a community, you might find ways to slow it, and maybe even stop it. But how? He began to read whatever he could about disease, and the history of epidemics. He picked up *The Great Influenza*, a book by the historian John Barry about the 1918 flu pandemic. “My God, fifty million people died!” said Bob. “I had no idea. I started thinking, God, this is an important problem.”

Father and daughter were both now alert to the real world of disease. They perked up when they read the news, in the fall of 2004, that because a single vaccine-making factory in Liverpool, England, became contaminated, the United States had lost half of its supply of flu vaccine. There was not enough vaccine to go around. So: Who should get it? United States government policy at the time was to administer the vaccine to those most at risk of dying: old people. Laura thought that wasn’t right. “She said, ‘It’s young people who have all these social interactions and are transmitting the disease,’ ” recalled her father. “ ‘What if you give it to them?’ ” They went to their model and gave the young people the vaccine, thereby eliminating the ability of young people to transmit the disease. Sure enough, the old people never got it. Bob Glass searched the literature

for the infectious-disease specialist or epidemiologist who had already figured this out. “I can find only one paper that even suggested this,” he said.

In the end Laura Glass, now a freshman at Albuquerque High School, would win the Grand Award at the New Mexico state science fair. She was on her way to internationals in Phoenix, with two thousand other kids from around the world. Her big white foam boards now focused tightly on a question. “Flu strains mutate all the time,” she’d written on them. “What would we do if we didn’t have the right vaccine in time?” For his part, Bob Glass had now read or at least skimmed everything ever written about epidemics, and how to stop them. The disease in 1918 that had killed fifty million people had sprung from a handful of mutations in the virus inside some bird. By 2005, the seasonal flu had already achieved a few of these mutations. “We had a looming life-or-death problem of global proportions,” he wrote later. Yet all the experts basically assumed that, in the first months after some killer mutation, little could be done to save lives, apart from isolating the ill and praying for a vaccine. The model he’d built with his daughter showed that there was no difference between giving a person a vaccine and removing him or her from the social network: in each case, a person lost the ability to infect others. Yet all the expert talk was about how to speed the production and distribution of vaccines. No one seemed to be exploring the most efficient and least disruptive ways to remove people from social networks. “I had this sudden fear,” said Bob. “No one is going to realize what you could do.”

ONE

Dragon

By the time Charity heard about the young woman, it was too late to help. The woman was on life support in a Santa Barbara County hospital. The doctors had just found tuberculosis in her brain. Before they could find anything more, she was dead. And that was just the start of the problem.

Dr. Charity Dean was the newly appointed chief health officer for Santa Barbara County. A health officer was a stopper of things, and the most important thing Charity was meant to stop, in her view, was people from giving diseases to their fellow citizens. *Mycobacterium tuberculosis* moves through droplets in the breath of the infected person, and is able to hang in the air for impressive stretches. “The vast majority of the risk is the first hour, but it may be there for two, three, four hours,” said Charity. “No one actually knows.” There were other things about TB that no one knew. Some TB patients infected no one, and others infected huge numbers: no one knew why. No one knew why some people were superspreaders: Was it their behavior? Their biology? The biology of their particular case of TB? The disease has been around basically forever; at the turn of the twentieth century it was the leading killer of human beings; and it remains, in many ways, a mystery. “It’s the most intriguing infectious disease,” said Charity. “My favorite infectious disease. It can do anything or be anywhere in the body. We’ve had TB of the uterus. Of the eye. Of the *finger*.” Once, in Niger, she’d treated a man whose TB had started in his lungs, wormed its way through his chest wall, and finally oozed in pus down the side of his torso.

To move from one person to another, however, TB needed to invade the lungs. The young woman in the Santa Barbara county hospital had been diagnosed with tuberculosis of the brain, and, had the bacteria