

# The Great Influenza

THE EPIC STORY OF THE DEADLIEST  
PLAGUE IN HISTORY



John M. Barry

author of *Rising Tide*

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# INFLUENZA

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Deadliest Plague in History

**JOHN M. BARRY**

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## PROLOGUE

**T**HE GREAT WAR had brought Paul Lewis into the navy in 1918 as a lieutenant commander, but he never seemed quite at ease when in his uniform. It never seemed to fit quite right, or to sit quite right, and he was often flustered and failed to respond properly when sailors saluted him.

Yet he was every bit a warrior, and he hunted death.

When he found it he confronted it, challenged it, tried to pin it in place like a lepidopterist pinning down a butterfly, so he could then dissect it piece by piece, analyze it, and find a way to confound it. He did so often enough that the risks he took became routine.

Still, death had never appeared to him as it did now, in mid-September 1918. Row after row of men confronted him in the hospital ward, many of them bloody and dying in some new and awful way.

He had been called here to solve a mystery that dumbfounded the clinicians. For Lewis was a scientist. Although a physician he had never practiced on a patient. Instead, a member of the very first generation of American medical scientists, he had spent his life in the laboratory. He had already built an extraordinary career, an international reputation, and he was still young enough to be seen as just coming into his prime.

A decade earlier, working with his mentor at the Rockefeller Institute in New York City, he had proved that a virus caused polio, a discovery still considered a landmark achievement in the history of virology. He had

then developed a vaccine that protected monkeys from polio with nearly 100 percent effectiveness.

That and other successes had won him the position of founding head of the Henry Phipps Institute, a research institute associated with the University of Pennsylvania, and in 1917 he had been chosen for the great honor of giving the annual Harvey Lecture. It seemed only the first of many honors that would come his way. Today, the children of two prominent scientists who knew him then and who crossed paths with many Nobel laureates say their fathers each told them that Lewis was the smartest man they had ever met.

The clinicians now looked to him to explain the violent symptoms these sailors presented. The blood that covered so many of them did not come from wounds, at least not from steel or explosives that had torn away limbs. Most of the blood had come from nosebleeds. A few sailors had coughed the blood up. Others had bled from their ears. Some coughed so hard that autopsies would later show they had torn apart abdominal muscles and rib cartilage. And many of the men writhed in agony or delirium; nearly all those able to communicate complained of headache, as if someone were hammering a wedge into their skulls just behind the eyes, and body aches so intense they felt like bones breaking. A few were vomiting. Finally the skin of some of the sailors had turned unusual colors; some showed just a tinge of blue around their lips or fingertips, but a few looked so dark one could not tell easily if they were Caucasian or Negro. They looked almost black.

Only once had Lewis seen a disease that in any way resembled this. Two months earlier, members of the crew of a British ship had been taken by ambulance from a sealed dock to another Philadelphia hospital and placed in isolation. There many of that crew had died. At autopsy their lungs had resembled those of men who had died from poison gas or pneumonic plague, a more virulent form of bubonic plague.

Whatever those crewmen had had, it had not spread. No one else had gotten sick.

But the men in the wards now not only puzzled Lewis. They had to have chilled him with fear also, fear both for himself and for what this disease could do. For whatever was attacking these sailors was not only spreading, it was spreading explosively.

And it was spreading despite a well-planned, concerted effort to con-

tain it. This same disease had erupted ten days earlier at a navy facility in Boston. Lieutenant Commander Milton Rosenau at the Chelsea Naval Hospital there had certainly communicated to Lewis, whom he knew well, about it. Rosenau too was a scientist who had chosen to leave a Harvard professorship for the navy when the United States entered the war, and his textbook on public health was called "The Bible" by both army and navy military doctors.

Philadelphia navy authorities had taken Rosenau's warnings seriously, especially since a detachment of sailors had just arrived from Boston, and they had made preparations to isolate any ill sailors should an outbreak occur. They had been confident that isolation would control it.

Yet four days after that Boston detachment arrived, nineteen sailors in Philadelphia were hospitalized with what looked like the same disease. Despite their immediate isolation and that of everyone with whom they had had contact, eighty-seven sailors were hospitalized the next day. They and their contacts were again isolated. But two days later, six hundred men were hospitalized with this strange disease. The hospital ran out of empty beds, and hospital staff began falling ill. The navy then began sending hundreds more sick sailors to a civilian hospital. And sailors and civilian workers were moving constantly between the city and navy facilities, as they had in Boston. Meanwhile, personnel from Boston, and now Philadelphia, had been and were being sent throughout the country as well.

That had to chill Lewis, too.

Lewis had visited the first patients, taken blood, urine, and sputum samples, done nasal washings, and swabbed their throats. Then he had come back again to repeat the process of collecting samples and to study the symptoms for any further clues. In his laboratory he and everyone under him poured their energies into growing and identifying whatever pathogen was making the men sick. He needed to find the pathogen. He needed to find the cause of the disease. And even more he needed to make a curative serum or a preventive vaccine.

Lewis loved the laboratory more than he loved anyone or anything. His work space was crammed; it looked like a thicket of icicles—test tubes in racks, stacked petri dishes, pipettes—but it warmed him, gave him as much and perhaps more comfort than did his home and family. But he did not love working like this. The pressure to find an answer did



not bother him; much of his polio research had been conducted in the midst of an epidemic so extreme that New York City had required people to obtain passes to travel. What did bother him was the need to abandon good science. To succeed in preparing either a vaccine or serum, he would have to make a series of guesses based on at best inconclusive results, and each guess would have to be right.

He had already made one guess. If he did not yet know precisely what caused the disease, nor how or whether he could prevent it or cure it, he believed he knew what the disease was.

He believed it was influenza, although an influenza unlike any known before.

Lewis was correct. In 1918 an influenza virus emerged—probably in the United States—that would spread around the world, and one of its earliest appearances in lethal form came in Philadelphia. Before that worldwide pandemic faded away in 1920, it would kill more people than any other outbreak of disease in human history. Plague in the 1300s killed a far larger proportion of the population—more than one-quarter of Europe—but in raw numbers influenza killed more than plague then, more than AIDS today.

The lowest estimate of the pandemic's worldwide death toll is twenty-one million, in a world with a population less than one-third today's. That estimate comes from a contemporary study of the disease and newspapers have often cited it since, but it is almost certainly wrong. Epidemiologists today estimate that influenza likely caused at least fifty million deaths worldwide, and possibly as many as one hundred million.

Yet even that number understates the horror of the disease, a horror contained in other data. Normally influenza chiefly kills the elderly and infants, but in the 1918 pandemic roughly half of those who died were young men and women in the prime of their life, in their twenties and thirties. Harvey Cushing, then a brilliant young surgeon who would go on to great fame—and who himself fell desperately ill with influenza and never fully recovered from what was likely a complication—would call these victims “doubly dead in that they died so young.”

One cannot know with certainty, but if the upper estimate of the death toll is true as many as 8 to 10 percent of all young adults then living may have been killed by the virus.

And they died with extraordinary ferocity and speed. Although the influenza pandemic stretched over two years, perhaps two-thirds of the deaths occurred in a period of twenty-four weeks, and more than half of those deaths occurred in even less time, from mid-September to early December 1918. Influenza killed more people in a year than the Black Death of the Middle Ages killed in a century; it killed more people in twenty-four weeks than AIDS has killed in twenty-four years.

The influenza pandemic resembled both of those scourges in other ways also. Like AIDS, it killed those with the most to live for. And as priests had done in the bubonic plague, in 1918, even in Philadelphia, as modern a city as existed in the world, priests would drive horse-drawn wagons down the streets, calling upon those behind doors shut tight in terror to bring out their dead.

Yet the story of the 1918 influenza virus is not simply one of havoc, death, and desolation, of a society fighting a war against nature superimposed on a war against another human society.

It is also a story of science, of discovery, of how one thinks, and of how one changes the way one thinks, of how amidst near-utter chaos a few men sought the coolness of contemplation, the utter calm that precedes not philosophizing but grim, determined action.

For the influenza pandemic that erupted in 1918 was the first great collision between nature and modern science. It was the first great collision between a natural force and a society that included individuals who refused either to submit to that force or to simply call upon divine intervention to save themselves from it, individuals who instead were determined to confront this force directly, with a developing technology and with their minds.

In the United States, the story is particularly one of a handful of extraordinary people, of whom Paul Lewis is one. These were men and some very few women who, far from being backward, had already developed the fundamental science upon which much of today's medicine is based. They had already developed vaccines and antitoxins and techniques still in use. They had already pushed, in some cases, close to the edge of knowledge today.

In a way, these researchers had spent much of their lives preparing for the confrontation that occurred in 1918 not only in general but, for a few

of them at least, quite specifically. In every war in American history so far, disease had killed more soldiers than combat. In many wars throughout history war had spread disease. The leaders of American research had anticipated that a major epidemic of some kind would erupt during the Great War. They had prepared for it as much as it was possible to prepare. Then they waited for it to strike.

The story, however, begins earlier. Before medicine could confront this disease with any promise of effect, it had to become scientific. It had to be revolutionized.

Medicine is not yet and may never be fully a science—the idiosyncrasies, physical and otherwise, of individual patients and doctors may prevent that—but, up to a few decades before World War I, the practice of medicine had remained quite literally almost unchanged from the time of Hippocrates more than two thousand years earlier. Then, in Europe first, medical science changed and, finally, the practice of medicine changed.

But even after European medicine changed, medicine in the United States did not. In research and education especially, American medicine lagged far behind, and that made practice lag as well.

While for decades European medical schools had, for example, required students to have a solid background in chemistry, biology, and other sciences, as late as 1900, it was more difficult to get into a respectable American college than into an American medical school. At least one hundred U.S. medical schools would accept any man—but not woman—willing to pay tuition; at most 20 percent of the schools required even a high school diploma for admission—much less any academic training in science—and only a single medical school required its students to have a college degree. Nor, once students entered, did American schools necessarily make up for any lack of scientific background. Many schools bestowed a medical degree upon students who simply attended lectures and passed examinations; in some, students could fail several courses, never touch a single patient, and still get a medical degree.

Not until late—very late—in the nineteenth century, did a virtual handful of leaders of American medical science begin to plan a revolution that transformed American medicine from the most backward in the developed world into the best in the world.

William James, who was a friend of—and whose son would work for—several of these men, wrote that the collecting of a critical mass of men of genius could make a whole civilization “vibrate and shake.” These men intended to, and would, shake the world.

To do so required not only intelligence and training but real courage, the courage to relinquish all support and all authority. Or perhaps it required only recklessness.

In *Faust*, Goethe wrote,

’Tis writ, “In the beginning was the Word.”  
I Pause, to wonder what is here inferred.  
The Word I cannot set supremely high:  
A new translation I will try.  
I read, if by the spirit, I am taught,  
This sense, “In the beginning was the Thought. . . .”

Upon “the Word” rested authority, stability, and law; “the Thought” roiled and ripped apart and created—without knowledge or concern of what it would create.

Shortly before the Great War began, the men who so wanted to transform American medicine succeeded. They created a system that could produce people capable of thinking in a new way, capable of challenging the natural order. They, together with the first generation of scientists they had trained—Paul Lewis and his few peers—formed a cadre who stood on alert, hoping against but expecting and preparing for the eruption of an epidemic.

When it came, they placed their lives in the path of the disease and applied all their knowledge and powers to defeat it. As it overwhelmed them, they concentrated on constructing the body of knowledge necessary to eventually triumph. For the scientific knowledge that ultimately came out of the influenza pandemic pointed directly—and still points—to much that lies in medicine’s future.



■ Part I

# THE WARRIORS



## CHAPTER ONE

**O**N SEPTEMBER 12, 1876, the crowd overflowing the auditorium of Baltimore's Academy of Music was in a mood of hopeful excitement, but excitement without frivolity. Indeed, despite an unusual number of women in attendance, many of them from the uppermost reaches of local society, a reporter noted, "There was no display of dress or fashion." For this occasion had serious purpose. It was to mark the launching of the Johns Hopkins University, an institution whose leaders intended not simply to found a new university but to change all of American education; indeed, they sought considerably more than that. They planned to change the way in which Americans tried to understand and grapple with nature. The keynote speaker, the English scientist Thomas H. Huxley, personified their goals.

The import was not lost on the nation. Many newspapers, including the *New York Times*, had reporters covering this event. After it, they would print Huxley's address in full.

For the nation was then, as it so often has been, at war with itself; in fact it was engaged in different wars simultaneously, each being waged on several fronts, wars that ran along the fault lines of modern America.

One involved expansion and race. In the Dakotas, George Armstrong Custer had just led the Seventh Cavalry to its destruction at the hands of primitive savages resisting encroachment of the white man. The day Huxley spoke, the front page of the *Washington Star* reported that "the



hostile Sioux, well fed and well armed" had just carried out "a massacre of miners."

In the South a far more important but equally savage war was being waged as white Democrats sought "redemption" from Reconstruction in anticipation of the presidential election. Throughout the South "rifle clubs," "saber clubs," and "rifle teams" of former Confederates were being organized into infantry and cavalry units. Already accounts of intimidation, beatings, whippings, and murder directed against Republicans and blacks had surfaced. After the murder of three hundred black men in a single Mississippi county, one man, convinced that words from the Democrats' own mouths would convince the world of their design, pleaded with the *New York Times*, "For God's sake publish the testimony of the Democrats before the Grand Jury."

Voting returns had already begun to come in—there was no single national election day—and two months later Democrat Samuel Tilden would win the popular vote by a comfortable margin. But he would never take office as president. Instead the Republican secretary of war would threaten to "force a reversal" of the vote, federal troops with fixed bayonets would patrol Washington, and southerners would talk of reigniting the Civil War. That crisis would ultimately be resolved through an extra-constitutional special committee and a political understanding: Republicans would discard the voting returns of three states—Louisiana, Florida, South Carolina—and seize a single disputed electoral vote in Oregon to keep the presidency in the person of Rutherford B. Hayes. But they also would withdraw all federal troops from the South and cease intervening in southern affairs, leaving the Negroes there to fend for themselves.

The war involving the Hopkins was more muted but no less profound. The outcome would help define one element of the character of the nation: the extent to which the nation would accept or reject modern science and, to a lesser degree, how secular it would become, how godly it would remain.

Precisely at 11:00 A.M., a procession of people advanced upon the stage. First came Daniel Coit Gilman, president of the Hopkins, and on his arm was Huxley. Following in single file came the governor, the mayor, and other notables. As they took their seats the conversations in the audience quickly died away, replaced by expectancy of a kind of declaration of war.