

pandemic strikes again, it could be cold comfort to know that lessons learned from the 1918 flu epidemic may offer more help than modern medicine. Here are some insights gleaned from the Dartmouth archives and from a Dartmouth graduate who studies pandemics.

I had a little bird,
Its name was Enza.
I opened the window,
And in-flew-enza.
—Children's Rhyme, 1918

nza was anything but a cute little bird. She was vicious. She was violent. She was a killer. In 1918, while World War I raged, 675,000 Americans died of the flu; estimates of the worldwide death toll now range from 50 million to 100 million. But maybe the children singing that ditty were on to something. Today, scientists believe that the 1918 flu was caused by a bird—or avian—virus.

Its symptoms were so brutal that many physicians mistook it at first for dengue, malaria, cholera, dysentery, typhoid, or even plague. But soon they realized it was influenza—a strain that became known as "Spanish flu," not because it had originated in Spain but because Spain was neutral during World War I and its press didn't hesitate to report on the deadly disease. The same was not true of the countries engaged in combat; in the U.S., newspapers were urged to downplay the flu's severity for fear that morale would be affected.

The flu came in three waves: the first in the ear-

Laura Carter is the associate editor of Dartmouth Medicine magazine. For ease of comprehension, some punctuation, spelling, and abbreviations in the historical quotations have been standardized; the wording, however, has not been altered at all.

ly months of 1918, the second in the fall of 1918, and the third in early 1919. The second wave was the deadliest.

On September 13, 1918, U.S. Surgeon General Rupert Blue issued a bulletin warning the public that the flu's onset could be sudden—that people could be stricken on the streets or while at work in factories, shipyards, or offices. He advised anyone experiencing symptoms to go home at once, get in bed, and call a physician immediately. But so as not to alarm people, he did not go into the disease's severity. And he did not say that flu was sweeping the country—especially military installations. Camp Devens, near Boston, was hit especially hard.

"These men start with what appears to be an ordinary attack of la grippe or influenza," wrote Dr. Roy Grist, a Camp Devens physician, to a friend, "and when brought to the hospital they very rapidly develop the most vicious type of pneumonia that has ever been seen. Two hours after admission they have the mahogany spots over the cheekbones, and a few hours later you can begin to see cyanosis extending from their ears and spreading all over the face, until it is hard to distinguish the colored men from the white. . . . It is only a matter of a few hours then until death comes. . . . It is horrible. One can stand it to see one, two, or 20 men die, but to see these poor devils dropping like flies. . . . We have been averaging 100 deaths per day. . . . It takes special trains to carry away the dead. For several days there were no coffins and the bodies piled up something fierce."

Dartmouth, and the towns around Hanover, did not suffer as badly but were not spared. The College

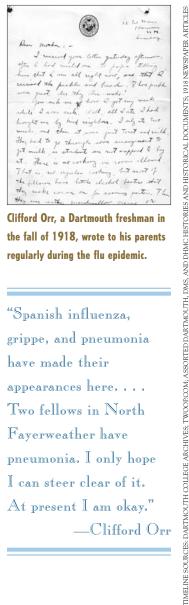


"It is only a matter of a few hours then until death comes. . . . It is horrible. . . . We have been averaging 100 deaths per day."

-Military physician

Scenes like the one below—row on row of cots filled with patients stricken in the 1918 influenza epidemic—were common all across the country, including in Dartmouth College's Memorial Gymnasium, which is pictured at left. No photos exist of that cavernous space filled with flu victims, although the Dartmouth archives contain many written accounts of the gym's use for that purpose. The image below was taken at a naval training station in California; the sign on the lefthand balcony prohibits spitting, to prevent the spread of the influenza virus.





Clifford Orr, a Dartmouth freshman in the fall of 1918, wrote to his parents regularly during the flu epidemic.

"Spanish influenza, grippe, and pneumonia have made their appearances here.... Two fellows in North Fayerweather have pneumonia. I only hope I can steer clear of it. At present I am okav." -Clifford Orr

An Influenza Timeline

March 1918: First flu case is reported at Camp Funston in Kansas. In three weeks, over 1,100 of 56,000 troops are admitted to the hospital and 38 of them die.

June 25, 1918: An Army training detachment of 272 men is posted at Dartmouth College.

July 1918: Public health officials in Philadelphia warn of the "Spanish influenza."

August 27, 1918: Sailors in Boston report to sick bay with cold symptoms. By August 30, 60 have the flu.

September 1918: Flu explodes among the 45,000 men at Camp Devens near Boston. On a single day, 1,543 fall ill. On September 22, 19.6% of the camp is on sick report, almost 75% of them hospitalized.

Mid-September 1918: New Hampshire Governor Henry Keyes falls ill with the flu; he eventually recovers.

September 18, 1918: Flu epidemic begins at Marv Hitchcock Hospital, which gets so crowded that beds are placed in corridors and sunrooms. Nursing classes are postponed until November, but few cases develop in nurses and none in patients admitted for other reasons.

September 21, 1918: The first Dartmouth student— George Conant, DC '22—dies of influenza.

September 25, 1918: There are over 100 cases of flu in the training detachment at Dartmouth.



September 26, 1918: Dartmouth political science professor Eldon Evans, age 30, dies of the flu.

Late September-early October 1918: Dartmouth chapel services are suspended and Dartmouth Night festivities postponed; Hanover's Nugget movie theater closes; area schools and churches close.

recorded 325 cases of the flu. One faculty member, five students, and 10 soldiers posted at a military training detachment on campus succumbed to the disease.

"One of the first signs of this epidemic would have been that the number of [obituary] pages in the [local newspaper] would increase threefold," explains Dr. Elmer Pfefferkorn, a virologist and professor emeritus of microbiology at Dartmouth Medical School. "This really reflects the extraordinary death rate from that epidemic. It's unprecedented in medical history. There hasn't been an event like that. Not even wars and starvations and other untoward events . . . have [had] this extraordinary mortality."

The 1918 flu was notable not only for how many people died, but also for who died; an unusual number of victims were previously healthy 25- to 35year-olds. "The traditional influenza would kill off the elderly and the very young—and certainly those groups fared badly in the [1918] epidemic," Pfefferkorn explains. But "the astonishing thing was the peak of death rates in the young, presumably most healthy, group we had. It was a great social tragedy because . . . [that] generation had yet to make its major contribution to society."

▼ hose who lived in close quarters, like military barracks, were especially susceptible to the virus. And wartime demands meant that many college campuses had been turned into military installations. At Dartmouth, 272 men in an Army training detachment were barracked in the gymnasium, and 695 students in the Student Army Training Corps (SATC) were barracked in dorms. Commons, then the student dining hall (in the building that today houses the Collis Student Center), functioned as a military mess. When students and soldiers began falling ill with flu, the gym was turned into a hospital and College Hall into a convalescent facility.

The November 1918 issue of the Dartmouth Alumni Magazine rued the fact that "Dartmouth and Hanover, healthful as is their location, were unable to escape the ravages of the epidemic of Spanish influenza. . . . But the epidemic was brought to a stop here much more quickly than in most communities, and the percentage of fatalities was lower, so that we may congratulate ourselves on our good fortune in escaping as early as we did.

"That which contributed to the quick control of the situation was the stopping of all class work of the College for a period of two weeks. All academic work ceased on the morning of October 1, the day of the induction of the SATC, to be resumed on the morning of October 14, when further spread of the disease appeared to be checked. During that period, the outdoor work of the SATC went on in intensified form. The only activity was the drilling of units, and the students were thereby kept out of doors for at least nine hours a day—in itself a good preventive of the influenza."

The Dartmouth archives also contain a number of letters and journals describing the events of that fall. Clifford Orr, a DC '22 who went on to become a writer, including for the *New Yorker* magazine, chronicled the epidemic in letters to his parents. Harold Rugg, a DC '06 who in 1918 was on the staff of Dartmouth's Baker Library, kept a journal that fall. And the archives also contain letters to and from Ernest Martin Hopkins, a DC '01 and the president of Dartmouth College from 1916 to 1945. Here are a few excerpts from these accounts:

September 22, 1918; from Clifford Orr to his mother:

Spanish influenza, grippe, and pneumonia have made their appearances here. Several soldiers have the former and in one dormitory two students have it seriously, while eight or 10 others think they are "coming down" with it. Two fellows in North Fayerweather have pneumonia. I only hope I can steer clear of it. At present I am okay. . . .

A professor of political science died last night, and the flags are half-mast today. He was all right yesterday noon, and many are the rumors of the cause of his death—everything from influenza to suicide. [This death was not, in the end, attributed to influenza.]

The epidemic has brought again into popularity the old rhyme:

I had a little bird and his name was Enza, I opened up the cage and in-flew-enza.

September 25, 1918; Harold Rugg's journal:

Called on [Donald] Powell, who is sick with the Spanish influenza. One soldier and one student have died of it. Over 100 cases in the detachment.

September 26, 1918; Harold Rugg's journal:

Dr. Evans died from Spanish influenza and pneumonia. This makes two deaths in the political science department within a week. Chapel has been given up and Dartmouth Night postponed.

September 27, 1918; from Clifford Orr to his father:

You needn't worry any more because I'm all right now. The doctor let me go to classes today, and I am feeling almost as well as usual. I still am pretty stuffed up but coming fine. I surely was lucky not to have been worse. Some fellows who were taken sick before I was are still in bed and liable to be for some time. I was in bed from Monday afternoon to Thursday noon, while several right in the same dorm



When the campus wasn't beset by wartime exigencies and influenza, this is what the Dartmouth dining facility, in College Hall, looked like during the early part of the 20th century. But when the 1918 flu hit, College Hall was turned into a convalescent facility, while the gymnasium served as a hospital.





Harold Rugg, left, and Clifford Orr, right, are among those who chronicled the 1918 flu epidemic at Dartmouth. Below is evidence of the campus military presence during WWI; the barracks living may have been a factor in the flu's spread.



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—Harold Rugg



Dartmouth Trustee Lewis Parkhurst commended President Hopkins on his handling of the flu in October 1918.

"One freshman has died, and I don't know how many soldiers. Chapel has been cut out, the movies closed, and Dartmouth Night, which was to be held next Monday to celebrate the College's 150th birthday, has been cancelled."

—Clifford Orr

September 28, 1918: Theodore Wadleigh, DC '22, dies.

September 29, 1918: Harold Mooney, DC '22, dies.

October 1, 1918: Student Army Training Corps (SATC) unit at Dartmouth inducts 695 students. Fraternities are closed and fraternity meetings are forbidden.

October 1-13, 1918: Dartmouth classes are suspended. The only activity is SATC drilling, which keeps students outside for at least nine hours a day.

October 5, 1918: Richard Campbell, DC '21, dies.

October 7, 1918: The student newspaper, The Dartmouth, reports a student death toll of four, "mark[ing] the climax at Dartmouth in the course of the Spanish influenza, which has been sweeping the country. The medical authorities have the disease well under control, as is shown by the fact that there have been no new cases recorded within the last six days."

THE DARTMOUTH

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Influenza became headline news on campus.

October 9, 1918: Spencer Slawson, DC '21, dies.

Week of October 7, 1918: The Nugget Theater and area schools reopen.

October 14, 1918: Classes resume at Dartmouth.

October 17, 1918: The *Hanover Gazette* reports that the flu seems to be on the wane locally.

October 20, 1918: Area churches reopen.

October 31, 1918: The Hanover Gazette reports that the epidemic has ended in Concord and other parts of the state. Concord had 1,000 cases of flu and 165 deaths. October 1918 ends up being the deadliest month in the history of the United States, with 195,000 Americans succumbing to influenza.

November 11, 1918: World War I ends. Dartmouth calls classes off at 10:00 a.m. More than 500 cars parade around the campus in celebration.

have been there a week. One freshman has died, and I don't know how many soldiers. Chapel has been cut out, the movies closed, and Dartmouth Night, which was to be held next Monday to celebrate the College's 150th birthday, has been cancelled.... The epidemic has killed what little college life there was....

There are only about eight doctors in town, and it takes some time to care for 100 cases in the hospital and in the gym, and probably about 150 in the different dorms. . . .

September 29, 1918; from Clifford Orr to his mother:

I received your letter yesterday afternoon, after I had mailed one to papa telling him that I am all right now, and that I received the pickles and bread. The pickles were great. . . .

You ask me of how I got my meals while I was sick. Well, all I ate I had brought me by kind neighbors. I only ate two meals, and then it was just toast and milk. They had to go through some arrangement to get milk, as students are not supposed to buy it. There is no cooking in rooms allowed. That is, no regular cooking, but most of the fellows have little alcohol heaters that they make cocoa on for evening parties. Then they use either marshmallow crème or malted milk. I went to a party where they used the latter for milk, and marshmallows for sweetening, and it was fairly good. . . .

Another freshman, another professor, and more soldiers have died here. The flags have been halfmast for over a week now. They can't barrack until this is over.

September 29, 1918; Harold Rugg's journal:

On account of the Spanish influenza, all public gatherings have been given up, so there was a bee today for digging and picking up the hospital potatoes. I went up for a while in the a.m.

October 1, 1918; Harold Rugg's journal:

To date, three freshmen, three soldiers, and one faculty member have died of the influenza. A lovely bright day. Promptly at noon the student body were inducted into the SATC. The very impressive service took place on the campus. The faculty were in cap and gown. Because of the epidemic, recitations have been called off for a while and the men are drilling from morn until night.

October 2, 1918; from President Hopkins to Harris Hatch of Philadelphia, father of Tracy Hatch, DC '22:

In case you are worried concerning Tracy, you will be glad to know that he is entirely well and states that he has had no suggestion of the influenza epidemic, which has been more widely prevalent here than any disease ever was in the College before.

I have thought that with the increase in cases in Philadelphia you might like to know how things were with him. We seem to have turned the corner on the proposition and the condition is improving greatly.

October 4, 1918; from President Hopkins to Trustee Lewis Parkhurst of Boston:

You will be interested to know that we have had well over 400 freshmen enter—somewhere between 410 and 420—which is up to last year's class. Some considerable number, however, have left: because of their fear of influenza on the one hand, or because of the assumption that they could get preparation for some special form of service elsewhere that couldn't be got here.

The influenza is letting up. I did not follow the suggestion of the War Department that we suspend operations until October 10, for we were so near panic here that I felt the whole College would disappear if that were done. The doctors stated that plenty of fresh air and outdoor work were the best antidotes for the disease, and I therefore arranged with Captain Patterson to put in practically the whole time from daylight until dark in military drill until October 10.

The net result is that the epidemic is being cut down very fast; all but one of our student cases bid fair to recover, and I think at last that we have seen the worst of it in the training detachment, although it has been a very sad thing the way it has raged in there.

All in all, I think that we have good days ahead of us, both actually and metaphorically.

October 5, 1918; from Lewis Parkhurst to President Hopkins:

I am delighted to learn of the way things are headed at Hanover. Your treatment of the influenza was most sensible. No place in the world could be better for boys threatened with that disease than the country around Hanover, especially in the bright days we have had this week. I judge from your letter that there have been some fatalities in the training detachment at the gymnasium. I shall be glad to know about that. I hope that the worst is now over. The disease is still rampant in and around Boston. Our manufacturing department and business generally is absolutely demoralized, but we are doing the best we can to keep going.

October 7, 1918; from President Hopkins to Lewis Parkhurst:

Replying to your inquiry about the influenza epidemic, we are still having a hard time of it. Our fourth student died on Saturday, a young sophomore, son of Dick Campbell of Denver. Another



This is not a European battlefield but the Dartmouth football field—the site of trench-digging exercises for members of the Student Army Training Corps. The fact that students were kept outside at such activities during the height of the flu epidemic was credited with keeping the number of cases down.





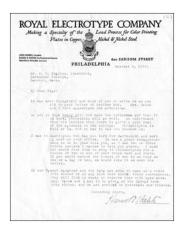
Above and below are four of the five Dartmouth students who died of flu—clockwise from the top left, Harold Mooney, Richard Campbell, Theodore Wadleigh, and Spencer Slawson. One member of the faculty also died of the flu.





"The doctors stated that plenty of fresh air and outdoor work were the best antidotes for the disease, and I therefore arranged with Captain Patterson to put in practically the whole time from daylight until dark in military drill until October 10."

-President Hopkins



Harris Hatch, the father of Dartmouth freshman Tracy Hatch, wrote President Hopkins during the influenza epidemic.

"We hope that there are no more fatal cases, although any of the convalescents appear to be inexplicably subject to pneumonia up to the moment of complete recovery. The training detachment proposition has been so bad as to be almost tragic."

-President Hopkins

December 12, 1918: The *Hunover Gazette* reports that the U.S. Public Health Service warns tuberculosis might be on the rise as a result of the flu.

January 10, 1919: Dartmouth Night, originally scheduled for October 13, 1918, takes place.

Spring 1919: Several severe cases of influenza appear at the Mary Hitchcock School of Nursing and Mary Hitchcock Hospital, among nurses and other workers.



The nursing staff was stricken in the spring.

Fall 1919: Dartmouth College is free of influenza and there are practically no cases in New Hampshire.

1927: It's estimated that 21.5 million people died worldwide during the 1918 epidemic.

1991: Researchers revise their estimate and report that 30 million people died of the 1918 flu.

1997: Using lung tissue taken 79 years earlier in an autopsy of a U.S. Army private who died of the 1918 flu, scientists at the Armed Forces Institute of Pathology analyze the virus and conclude that it is unique but related to swine flu.

2002: The *Bulletin of the History of Medicine* reports yet another revision in the estimate of 1918 flu deaths, to between 50 million and 100 million.

February 2004: Researchers at the Scripps Institute in California and at Britain's Medical Research Council discover that the 1918 virus may have jumped directly from birds to humans rather than from birds to pigs to humans. The 1918 strain was so deadly because the human immune system isn't prepared for viruses coming directly from birds.

October 2005: Using a technique called reverse genetics, scientists at the Armed Forces Institute of Pathology recreate the 1918 virus. They recovered the genome information from a flu victim who had been buried in the Alaskan permafrost since 1918.

boy named Slawson, of Greenwich, Conn., can hardly live. Beyond these, we hope that there are no more fatal cases, although any of the convalescents appear to be inexplicably subject to pneumonia up to the moment of complete recovery.

The training detachment proposition has been so bad as to be almost tragic, and that in spite of the contribution of strength and service on the part of doctors, nurses, and women of the town beyond anything we have ever seen here.

The disease struck there almost as soon as it appeared in this country, and before the medical officer realized its seriousness. I do not mean that anything was left undone, but I think that if we could have secured permission from Washington to break up the detachment at once we might have escaped some of the fatalities. What seemed so good an arrangement, namely barracking the men in the gymnasium, and what would have been a fine arrangement in the 99 percent of possible situations, turned out in this to be the one worst thing possible. There have been eight deaths, and there are two others fighting pneumonia at the present time whose chances of recovery would be fair if we could have some clear, dry days but who are handicapped by the kind of weather we have been having. It is small comfort to know that the conditions in town about us are far worse, ... but it is some solace to know that all the efforts that have been made have perhaps been of some assistance.

October 7, 1918; Harold Rugg's journal:

In a.m., mama and I went after butternuts, and at 2:00 I went to Ludlow on train and then by stage-coach to Norwich. A lovely ride, as the autumn colors were wonderful. Find that there have been 14 deaths in Norwich to date from Spanish influenza. Clarence Gowdy, one of the mailmen, died today. Eight soldiers, four students, one faculty, and one townsman have succumbed.

October 8, 1918; from Harris Hatch to President Hopkins:

It was most thoughtful and kind of you to write us as you did in your letter of October 2nd. Mrs. Hatch and I both appreciate the attention.

We are in hope Tracy will not have the influenza and that if he does, everything will go well. We understood from his letters that there is quite a good deal of the epidemic in the College. Philadelphia is full of it, but so far it has not touched us.

October 13, 1918; Harold Rugg's journal:

Recitations began after a vacation of two weeks, during which time the boys have been drilling eight hours a day. Shall have to keep reference continued on page 56

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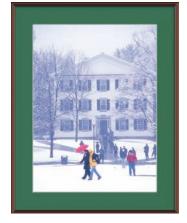


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Cold Comfort

continued from page 42

room open evenings now. I have been over to library every night the last two weeks except Saturday nights. Shall have to continue doing evening work because of the lack of student help.

October 14, 1918; Harold Rugg's journal:

Donald Powell, one of my advisees, returned today, and as his room had been given up I took him in for the night.

November 11, 1918; Harold Rugg's journal:

Wakened at 6:45 by whistles and bells announcing peace. Classes called off at 10:00 and SATC were given freedom at 3:00. An auto parade of 500 to 700 cars went past College Hall. It took over an hour for them to pass. I closed the library for two hours. The new news too good to be true.

Lessons learned from 1918

Dr. Cleto DiGiovanni, a 1956 Dartmouth College graduate, is trying to determine what lessons the 1918 flu holds for us today. As part of his work with the Defense Threat Reduction Agency in the Department of Defense, he joined forces with several University of Michigan medical historians to investigate how some communities escaped the flu—suffering few cases and no more than one flu-related death in the fall of 1918.

They reported in the December 2006 issue of *Emerging Infectious Diseases*, a publication of the Centers for Disease Control and Prevention, that coordination among public agencies was essential to an effective public health response and that protective sequestration and other nonpharmaceutical interventions were the best way to prevent or delay the onset of influenza. They found no consistent data to suggest that facemasks conferred any protection.

The question DiGiovanni is now asking is how do we structure disease-containment strategies in a way that fosters public compliance. He's looking for answers to communities spared in 1918: Princeton University in New Jersey; Bryn Mawr College outside Philadelphia; San Francisco Naval Training Station on Yerba Buena Island; Western Pennsylvania School for Blind Children in Pittsburgh; Trudeau [Tuberculosis] Sanatorium in Saranac Lake, N.Y.; and the towns

of Fletcher, Vt., and Gunnison, Colo.

As a Dartmouth alumnus, DiGiovanni was also "curious about how Hanover fared." So when he was meeting with the Michigan scholars at Saranac Lake, he drove over to Hanover to look at the College's records. He confirmed that "Dartmouth was not one of the escaped communities—they had their share of illness and death."

Princeton, however, did escape. There, as at Dartmouth and other colleges, most of the students were enrolled in military training outfits. The reason Princeton had so few cases of flu and no student deaths was because officials enacted protective sequestration the shielding of healthy people from contact with outsiders who might be infected with the flu. Students were forbidden to enter offcampus buildings. Anyone coming onto the campus was treated at a disinfecting plant. A medical officer performed careful inspections every morning. The barracks were well ventilated. And all suspected cases of the flu were isolated. The other spared communities had instituted similar procedures.

For all the advances in medicine since 1918, these nonpharmaceutical interventions—protective sequestration and the closing of schools and other gathering places— "remain the only tools we have in our bag" today, DiGiovanni says. "The lessons of 1918 really do describe techniques, and ways of implementing [them], which may have applicability now."

DiGiovanni has also been working on quarantine strategies and is helping to shape new federal guidelines designed to help communities prepare for a possible influenza pandemic. It's "incumbent upon everyone in public health to realize that these are not guidelines to be put on a shelf and brushed off when needed," he cautions. "Work needs to start now to prepare."

Dartmouth and DHMC are already working with government agencies and other organizations to prepare for the possibility of pandemic flu, as well as for other emergencies—such as power outages, earthquakes, or terrorist activity.

For the flu, "we'll be relying on the same types of interventions that people had to rely on in 1918," DiGiovanni emphasizes. "So a careful reading of history is useful."

Maybe one day children will chant: "I had a little bird and its name was Enza. I opened the window and *out-flew-enza*."



Donna

For over two decades, DHMC has cared for Donna's family. When her son injured his spine, he came to DHMC for expert care. When her husband was diagnosed with non-Hodgkin's lymphoma, he consulted with DHMC's oncologists about treatment options. And when her sonin-law needed a hip replacement, he came to DHMC for his surgery.

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