

THE SPANISH FLU'

(UNIT PREPARED BY ANDREW LEOPOLD.)

THE MISNOMER FOR A PANDEMIC
THAT MAY HAVE ORIGINATED IN THE
UNITED STATES, CHINA OR FRANCE.

Duration.

- The Spanish flu (a.k.a. The 1918 flu' pandemic) was an extremely virulent and deadly influenza pandemic.
- In Europe it lasted from January 1918 to December 1920, infecting 500 million people—approximately a quarter of the world's population at that time.
- The time overlapped with World War I (Armistice Day was 11/11/18).



Toll. 1

- The death toll is estimated to have been somewhere from 17 million to 50 million, and maybe as high as 100 million; thus it was one of the most lethal pandemics in human history.



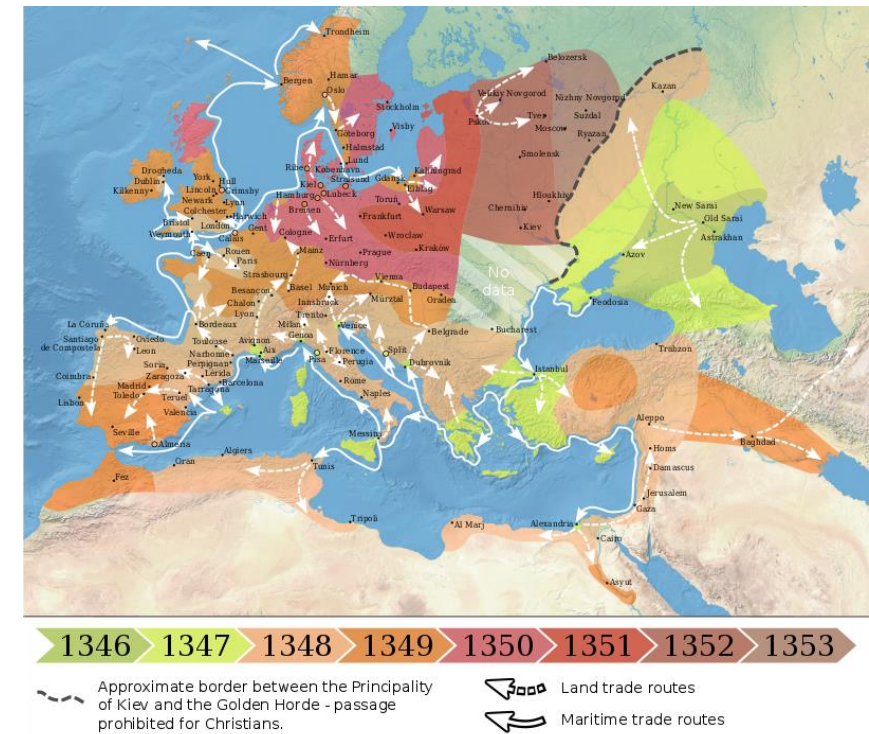
Toll. 2

As a comparison: The exact death toll from the Black Death is difficult to estimate from medieval sources.

The number of deaths varied considerably by area.

Current estimates are that between 75 and 200 million people died from the plague which peaked in Europe between 1347 and 1351.

One proposed map of the spread of the plague:



Censorship.

In early reports designed to maintain morale, World War I censors issued minimized numbers of infected patients and deaths, in France, the United Kingdom, Germany, and the United States.

Newspapers were permitted to report on the ravages in neutral Spain, and it was this that caused the misnomer of the pandemic.

These stories created the false impression that Spain was especially hard hit, particularly as King Alfonso XIII became gravely ill (he lived till 1941).



Genesis.1

Historical data, and the study of patterns in the spread of the pandemic, are inadequate to identify with certainty the pandemic's geographic genesis.

There have been statements that the epidemic originated in the United States.

The interior of an Army barrack at the University of Pittsburgh during World War I.

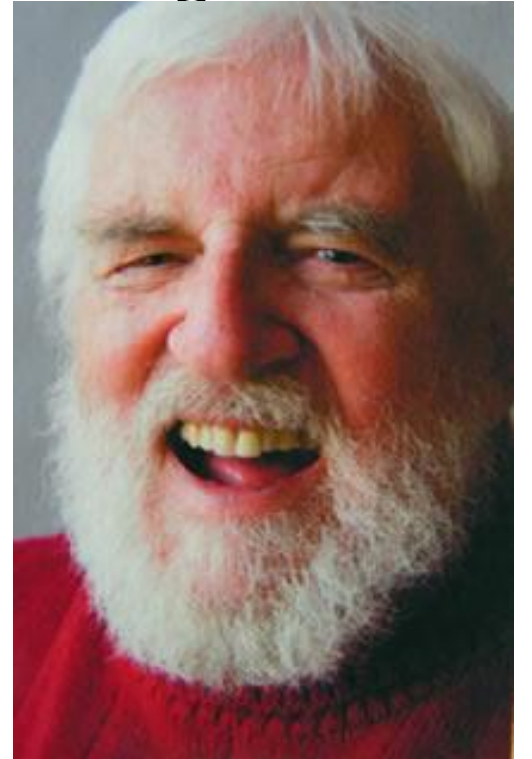


Genesis.2

Alfred W. Crosby, Professor Emeritus of History, Geography, and American Studies at Harvard University, the University of Helsinki and the University of Texas at Austin, stated in 2003 that the flu originated in Kansas.

Also, popular author John M. Barry asserted, in a 2004 article, that a January 1918 outbreak in Haskell County, Kansas, was the point of origin.

Professor Emeritus Crosby:



Genesis.3

- As Professor of Ecology and Evolutionary Biology at the University of Arizona (2011-present), Michael Worobey, uses an evolutionary approach to investigate the emergence of pathogens, in particular RNA viruses, and retroviruses such as HIV and influenza viruses.
- He combines fieldwork and theory in the analysis of gene sequences relating to the evolutionary development and diversification of a species or group of organisms.
- This includes studying tissue slides and medical reports.

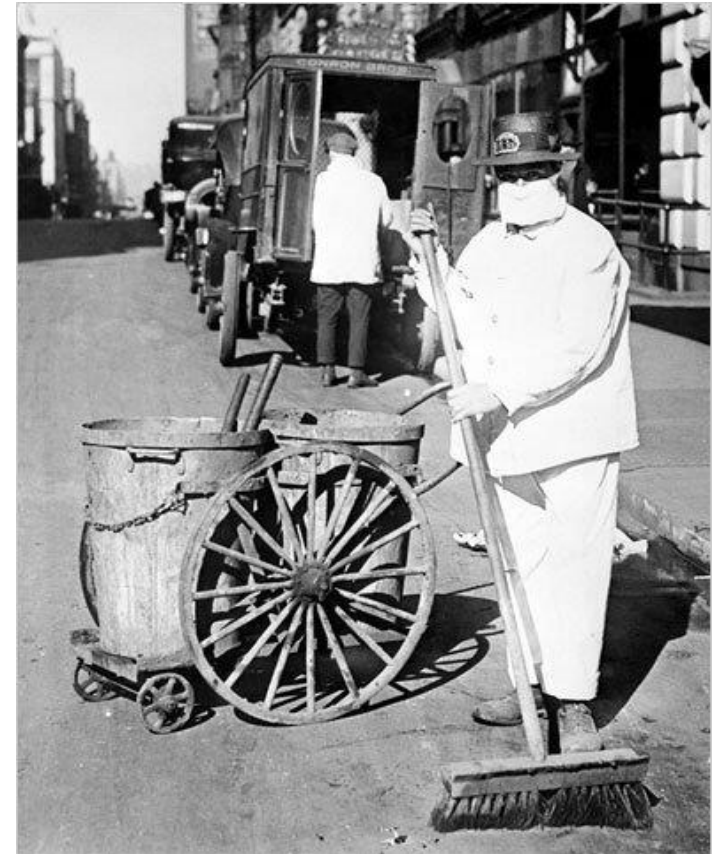


Genesis.4

In a 2018 study of tissue slides and medical reports, during which he led a research group, evidence against the disease originating in Kansas, was established.

Kansas cases were milder and resulted in a lower proportion of deaths, compared with the situation in New York City, in the same time frame.

New York City sweeper in 1918:

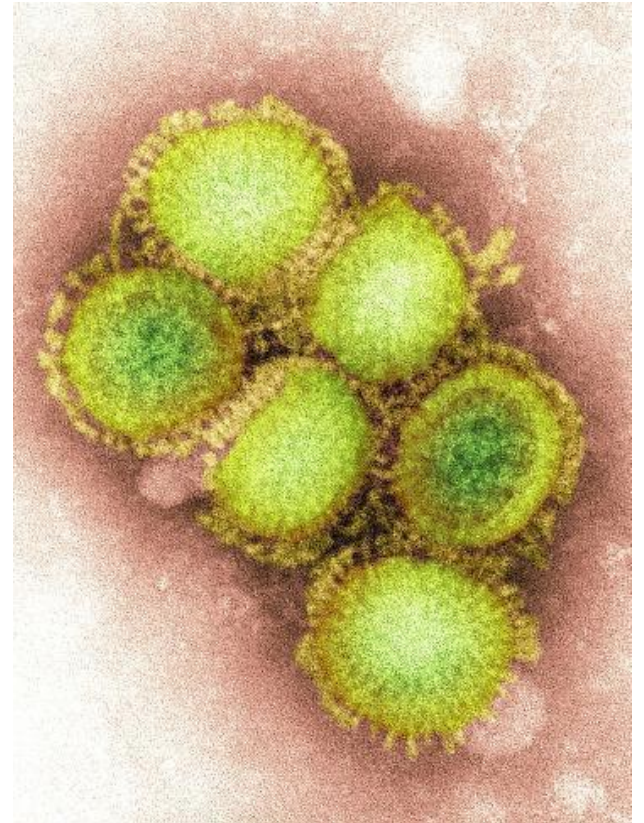


Genesis.5

Professor Michael Worobey's study did find evidence, by genetic analysis, that the virus probably had a North American origin, but the evidence is not conclusive.

In addition, the glycoprotein found on the surface of the virus, which is integral to its infectivity, suggests that it was around well before 1918, and other studies suggest that the mutation of the H1N1 virus, to be a lethal strain, probably occurred about 1915.

The H1N1 virus that was also responsible for the swine flu pandemic in 2009(Tunnelling Electron Micrograph):



Genesis.6

In 1999 a British team, led by virologist John Oxford, published research that stated that the epicentre of the pandemic was in France.

Étaples in France was an army hospital installation and a significant staging site for British troops during World War I.

The overcrowded camp and hospital produced ideal conditions for the spreading of a respiratory virus.

The hospital treated thousands of victims of chemical attacks, and other casualties of war, and 100,000 soldiers passed through the camp every day.



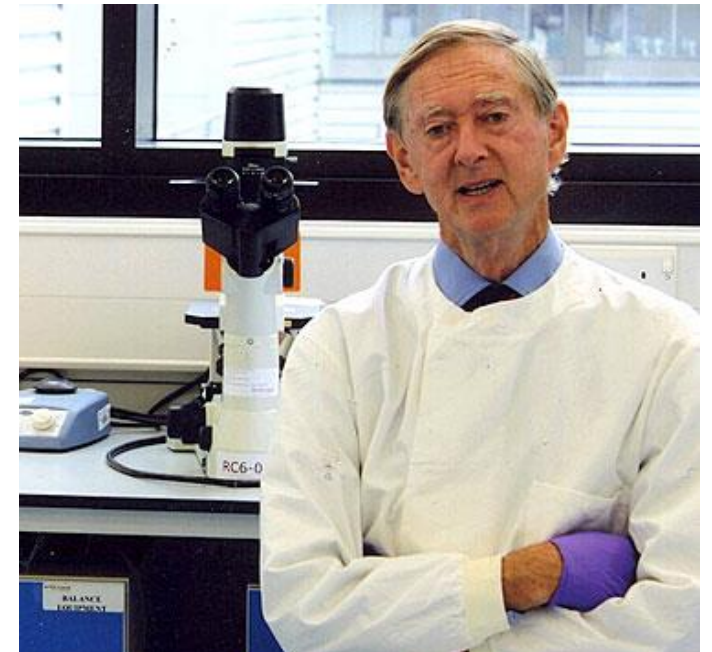
Genesis.7

In late 1917, military pathologists reported the onset of a new disease, with high mortality, that they later recognized as the flu.

The site in France had its own piggery, and chickens were brought in from surrounding villages on a regular basis, as food supplies

Oxford and his team postulated that a significant virus carried by the poultry, mutated and then migrated to the pigs and finally to humans.

Professor John Oxford is Scientific Director of Retroscreen Virology Ltd., and Professor of Virology at various hospitals.



Genesis.8

A report published in 2016 in the Journal of the Chinese Medical Association found evidence that the 1918 virus had been circulating in the European armies for months and possibly years before the 1918 pandemic.

This report may have been a reaction to other reports and speculation (next slides).



Genesis.9

The year 1918 was during the Warlord Period of China, so there is scant reliable data about events in the country at that time.

It has been stated that China was one of the few regions of the world **seemingly** less affected by the 1918 flu pandemic.

Also China **may** have had a comparatively mild flu season in 1918.

A number of studies indicate that there were relatively few deaths from the flu in China compared with other regions of the world.



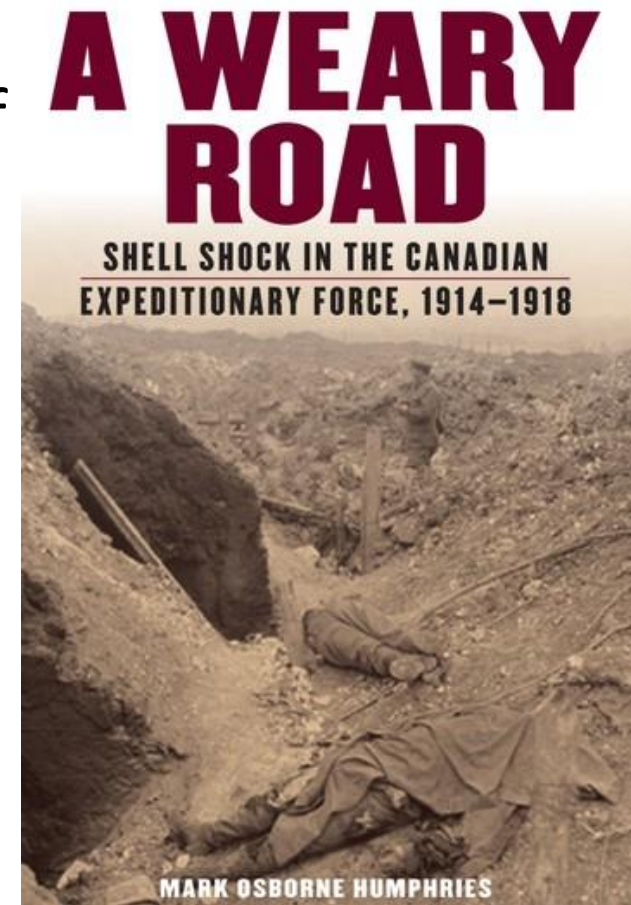
Genesis.10

- This has led to speculation that the 1918 flu pandemic originated in China.
- The relatively mild flu season and lower rates of flu mortality in China in 1918 may be explained due to the fact that the Chinese population had already possessed acquired immunity to the flu virus.



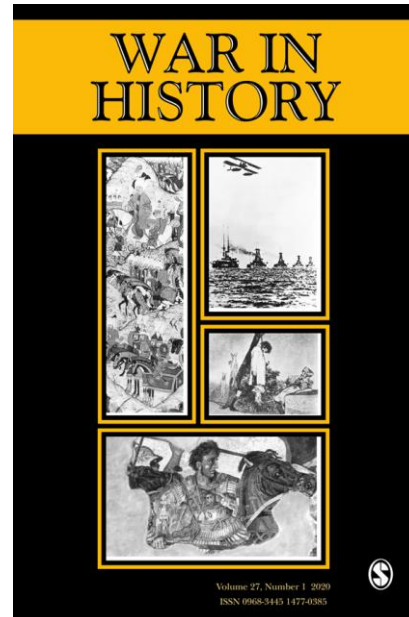
Genesis. 11

- Military historian Mark Osborne Humphries of Canada's Memorial University of Newfoundland, and author of "The Last Plague: Spanish Influenza and the Politics of Public Health in Canada," writes that victims of a mysterious respiratory disease that broke out in northern China in November 1917 suffered many of the same symptoms as those of the "Spanish flu."
- Humphries has written 11 books related to WWI.



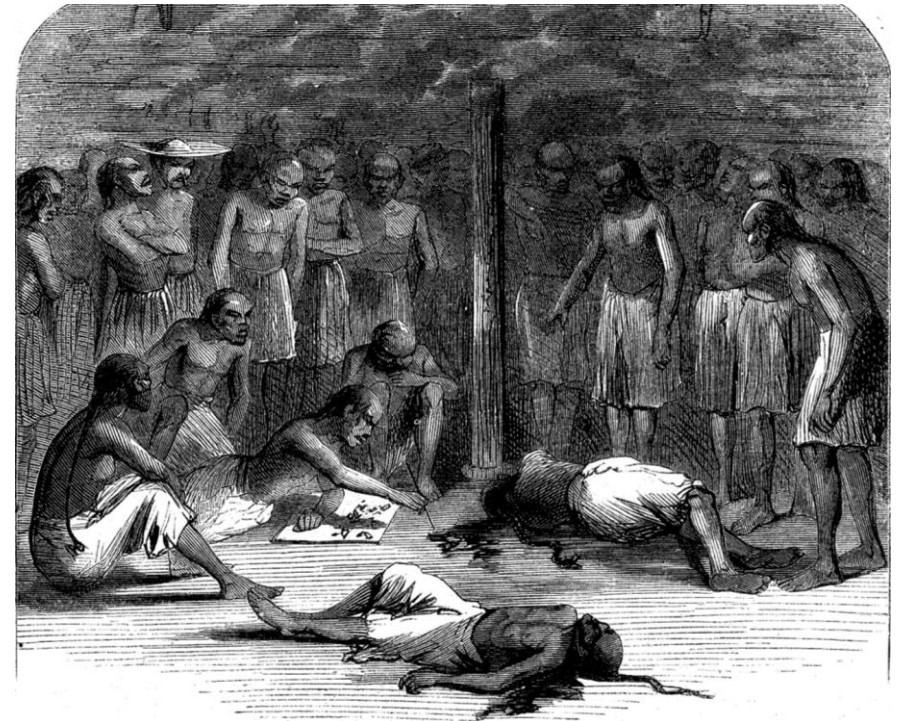
Genesis. 12

- According to a new article published in the January 2014 issue of the journal War in History, Humphries asserts that the flu was carried from China by the shipment of 94,000 laborers from northern China to southern England and France to free up able-bodied British and French citizens to fight on the front lines of the Western Front.



Genesis. 13

- During the winter of 1917, upwards of 20,000 workers a month from the plague-infected area of China arrived in the British-leased port city of Weihaiwei to become part of the Chinese Labour Corps that was shipped to Europe.
- They were packed into crowded barracks, which were breeding grounds for influenza.
- Although the British were aware of the outbreaks at their barracks, they still shipped the Chinese workers to Europe.



Genesis. 14

- The Chinese Labour Corps was originally transported around Africa or by way of the Suez Canal, but as resources were diverted to troop transports, the British needed an alternative route to Europe.
- Canada gave its assent for the Chinese labourers to land in Vancouver, travel across the country by train and depart for Europe from the Atlantic port of Halifax.



Genesis. 15

However, with nativist feelings (the policy of protecting the interests of native inhabitants against those of immigrants) on the boil in wartime Canada, and concerns that the Chinese labourers might escape inside Canada, the Canadian government kept the operation secret.

The authorities banned coverage of the movements in the media

Chinese workers were kept in camps that were barricaded with barbed wire, and special army guards were sealed inside train cars.



Genesis. 16

- Humphries has found medical records indicating that more than 3,000 of the 25,000 Chinese Labour Corps workers transported across Canada, beginning in 1917, ended up in medical quarantine, many with flu-like symptoms.



Genesis. 17

According to Humphries, the influenza ripped through the Canadian guards and soon took root in North America.

“Ethnocentric fears—both official and popular—facilitated its spread along military pathways that had been carved out across the globe to sustain the war effort on the Western Front,” Humphries wrote.



Genesis. 18

- Hundreds of the Chinese who continued on to Europe died there of respiratory illness, and the influenza they brought with them “mutated and then exploded along the sinews of war,” according to the journal article.
- Three Alberta farmers wear masks during the influenza epidemic:



Genesis. 19

According to Humphries: The flu outbreak that came from China boomeranged back to North America and then across the Pacific Ocean.

This deadly wave of 1918, however, proved much less lethal in China than the mysterious illness that broke out in 1917, which Humphries points to as potential proof that it was the epicentre of the outbreak because it suggests “some immunity was at large in the population because of earlier exposure to the virus.”



Genesis. 20

- The mystery of the origins of the “Spanish flu,” is not totally solved, admits Humphries.
- “Only DNA testing of samples from these earlier outbreaks can truly confirm or deny the theory,” he acknowledges.



Genesis. 21

- In the report(mentioned above) published in 2016 in the Journal of the Chinese Medical Association, a study suggested that the low flu mortality rate (an estimated 1/1000) found among the Chinese and Southeast Asian workers in Europe meant that the deadly 1918 influenza pandemic could not have originated from those workers.



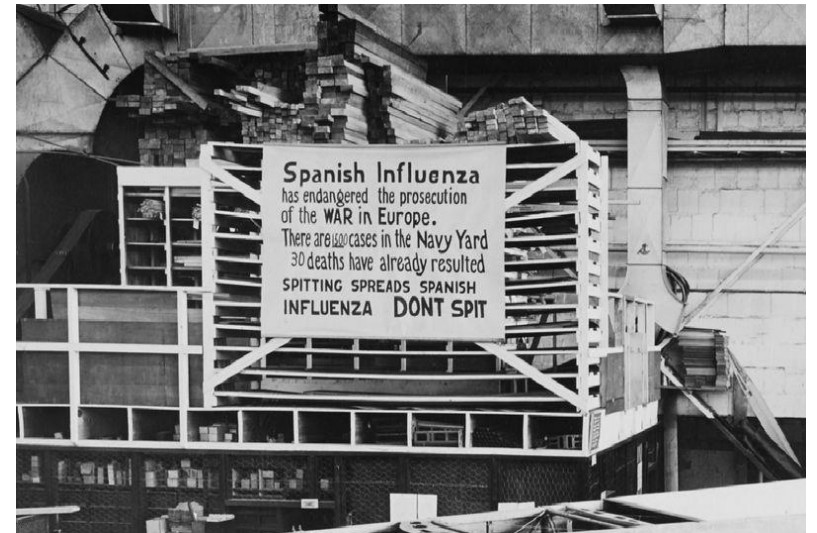
Genesis. 22

- The 2018 study of tissue slides and medical reports led by evolutionary biology professor Michael Worobey (discussed above) also found evidence against the disease being spread by Chinese workers, noting that workers entered Europe through other routes that did not result in detectable spread, making them unlikely to have been the original hosts.



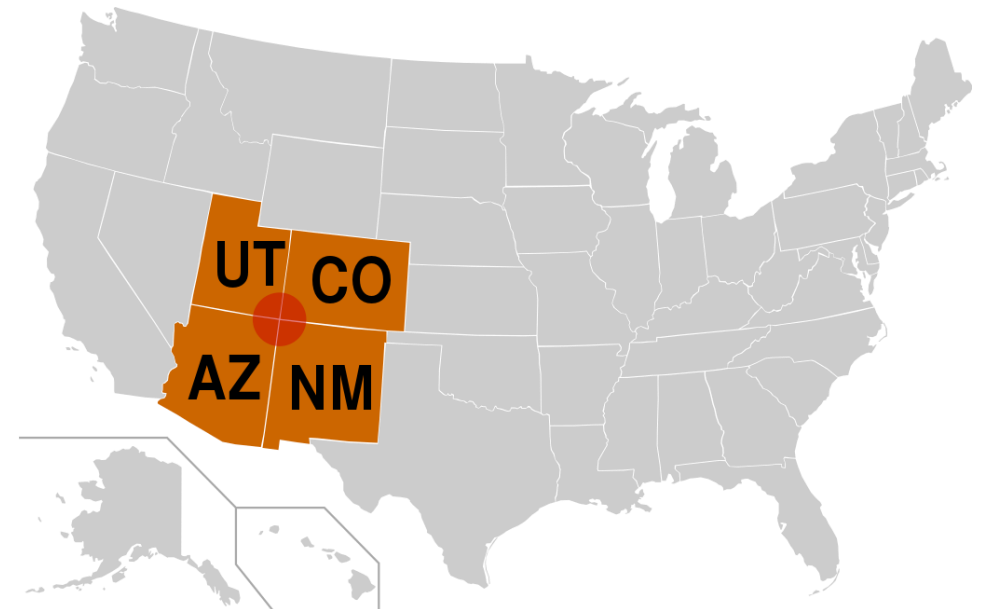
HUMAN COST OF THE PANDEMIC. 12

- Library of Congress entry: US CASES: The first official cases of the 1918 Spanish flu pandemic were recorded at the US Army's Camp Funston, Kansas.
- According to official records, the Spanish flu killed some 675,000 Americans.
- In some communities, many adults died and orphaned children had to fend for themselves.



HUMAN COST OF THE PANDEMIC. 13

- Native American tribes were particularly hard hit.
- In the Four Corners area, there were 3,293 registered deaths among Native Americans.
- Entire Inuit and Alaskan Native village communities died in Alaska.
- In Canada, 50,000 died.
- The Four Corners area is the red circle at the meeting of the four states.
- By Drainbrain0000.



HUMAN COST OF THE PANDEMIC. 14

- From The National Museum of Australia: despite a swift quarantine response in October 1918, cases of Spanish flu began to appear in Australia in early 1919.
- About 40 per cent of the population fell ill and around 15,000 died as the virus spread throughout Australia.
- Women wearing surgical masks during the influenza epidemic, Brisbane, 1919.
- John Oxley Library, State Library of Queensland 108241.



HUMAN COST OF THE PANDEMIC. 15

- The first line of defence was to try to prevent the virus reaching the Australian mainland.
- The Australian Quarantine Service monitored the spread of the pandemic and implemented maritime quarantine on 17th October 1918 after learning of outbreaks in New Zealand and South Africa.



HUMAN COST OF THE PANDEMIC. 16

- The first infected ship to enter Australian waters was the Mataram, from Singapore, which arrived in Darwin on 18 October 1918.
- Over the next six months the service intercepted 323 vessels, 174 of which carried the infection.
- Of the 81,510 people who were checked, 1102 were infected.
- I don't know if this is the original Mataram:



HUMAN COST OF THE PANDEMIC. 17

- At a conference of state health ministers, the directors-general of their health departments, and British Medical Association, it was agreed that the federal government would take responsibility for proclaiming which states were infected along with organising maritime and land quarantine.
- The states would arrange emergency hospitals, vaccination depots, ambulance services, medical staff and public awareness measures.



HUMAN COST OF THE PANDEMIC. 18

- Quarantine camps like the one in Wallangarra, Queensland, were set up to treat and contain the illness.



HUMAN COST OF THE PANDEMIC. 19

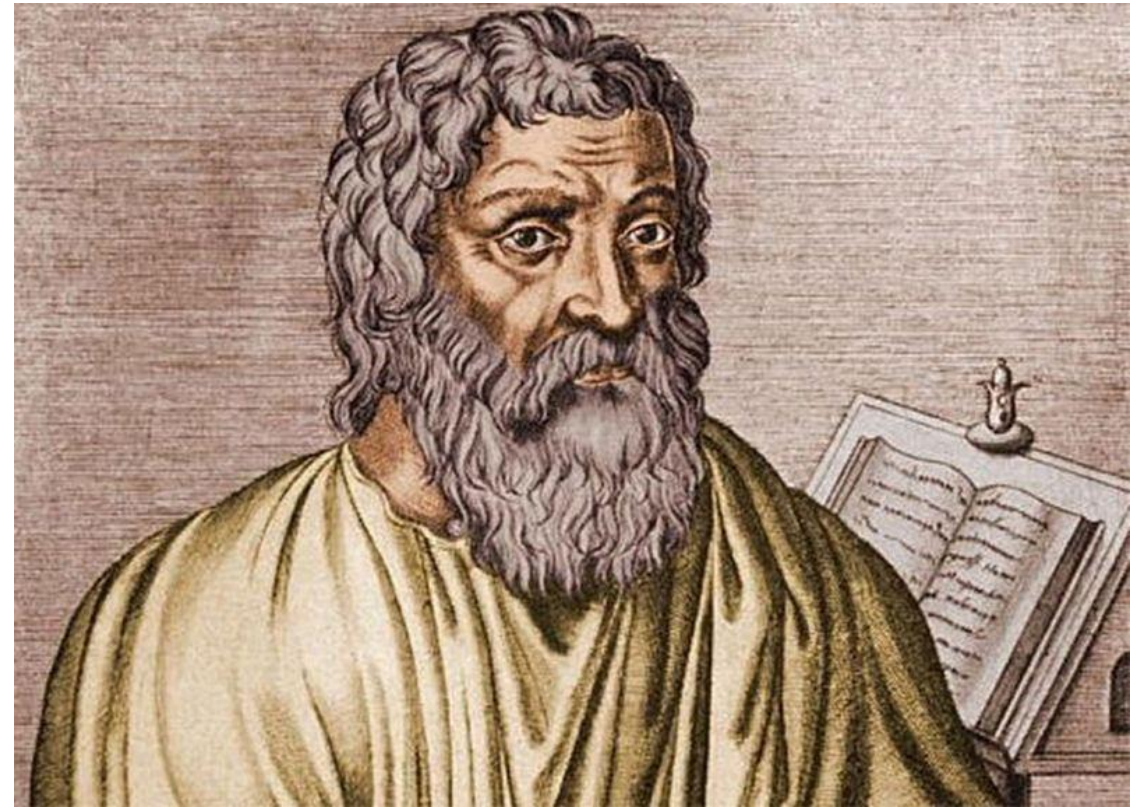
Maritime quarantine contained the spread of the virus until its virulence lessened, and restricted its eventual introduction into Australia to a single entry point.

The first case of pneumonic influenza appeared in Melbourne, on 9th or 10th January 1919.



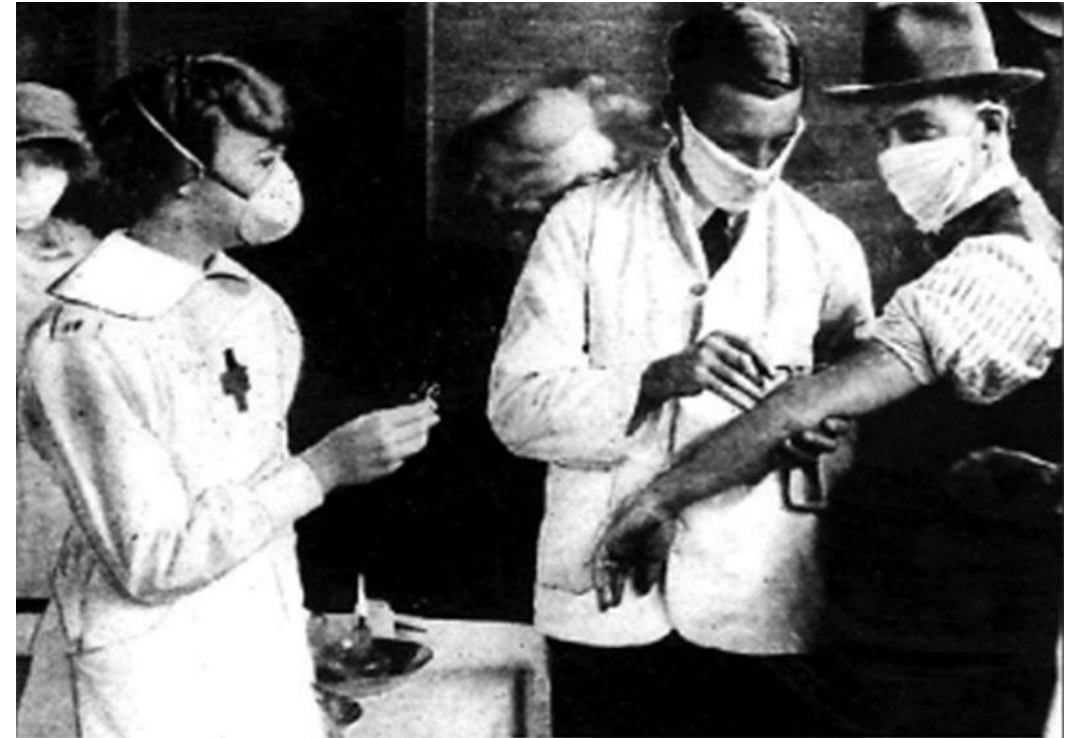
HUMAN COST OF THE PANDEMIC. 20

- Early cases were so mild, however, that there was initially confusion about whether the virus was the Spanish flu, or simply a continuation of the seasonal flu virus from the previous winter.
- Hippocrates, known as the "Father of Medicine", recorded the first known influenza epidemic in 412 BCE.



HUMAN COST OF THE PANDEMIC. 21

- Tasmania implemented strict quarantine measures for boats arriving on its shores — it required all passengers and crew to be isolated for seven days.
- When the infection penetrated the island in August 1919, medical officers reported that it was a milder infection than that on the mainland.
- The death rate in Tasmania was one of the lowest recorded worldwide.



HUMAN COST OF THE PANDEMIC. 22

- In 1916 the Commonwealth Vaccine Depot (1911-1916) became the Commonwealth Serum Laboratories to alleviate Australia's dependence on imported vaccines.
- In 1918 it developed its first, experimental vaccine in anticipation of pneumonic influenza reaching mainland Australia.
- 'Special Influenza Vaccine' as prepared by the Commonwealth Serum Laboratories in Australia in 1918 and used for the crew of HMAS Encounter during operations in Samoa:



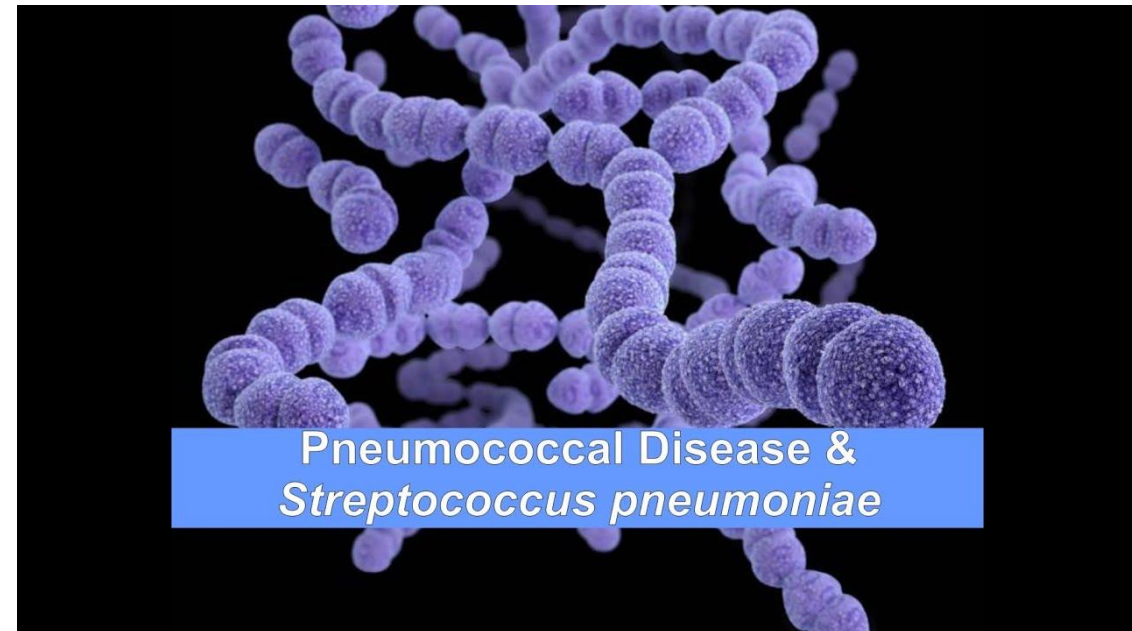
HUMAN COST OF THE PANDEMIC. 23

Between 15th October 1918 and 15th March 1919, CSL produced three million free doses for Australian troops and civilians.

It later evaluated the vaccines to be partially effective in preventing death in inoculated individuals.

Researchers did not know what caused influenza, but produced a vaccine that addressed the more serious secondary bacterial infections that were likely to cause death.

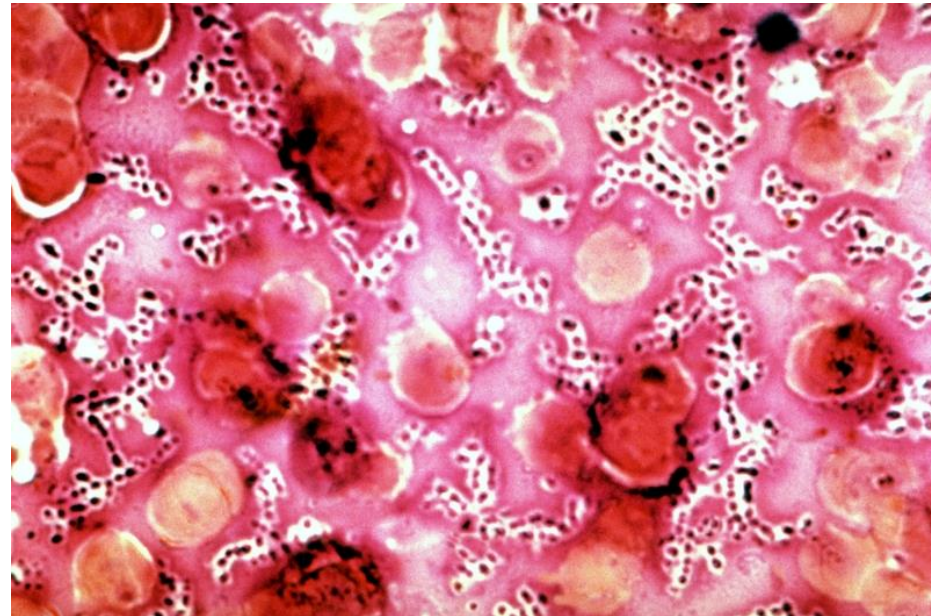
Streptococcus pneumoniae bacteria (“pneumococcus”).



Pneumococcal Disease &
Streptococcus pneumoniae

HUMAN COST OF THE PANDEMIC. 24

- These bacteria can cause many types of illnesses, including: pneumonia (infection of the lungs), ear infections, sinus infections, meningitis (infection of the covering around the brain and spinal cord), and bacteraemia (blood stream infection).



HUMAN COST OF THE PANDEMIC. 25

In Brazil, 300,000 died, including president Rodrigues Alves.

In Britain, as many as 250,000 died.

In France, more than 400,000.

In New Zealand, 8,573 died which was a fatality rate of 0.7%.

Māori were 8 to 10 times as likely to die as Pakeha, because of their relative poverty, more crowded housing, and lower immunity to disease.



HUMAN COST OF THE PANDEMIC. 26

Several Pacific island territories were hit particularly hard.

The pandemic reached them from New Zealand, which was too slow to implement measures to prevent ships, such as the *SS Talune*, carrying the flu, from leaving its ports.

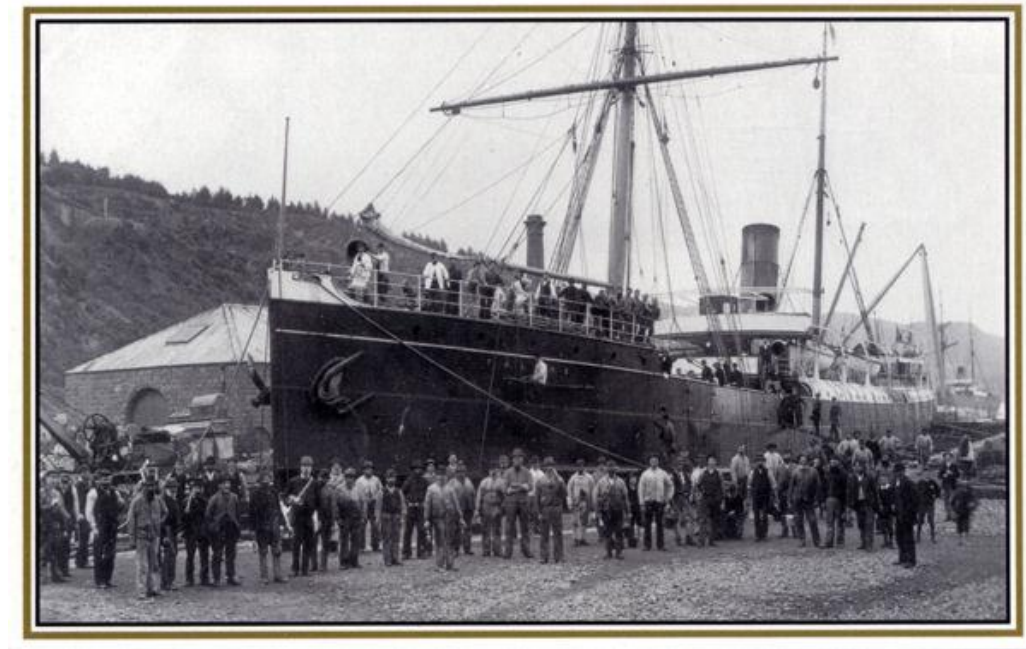
From New Zealand, the flu reached:

Tonga (killing 8%)

Nauru (16%),

Fiji (5%, 9,000 people).

SS Talune in Port Chalmers, New Zealand,
c 1890s.



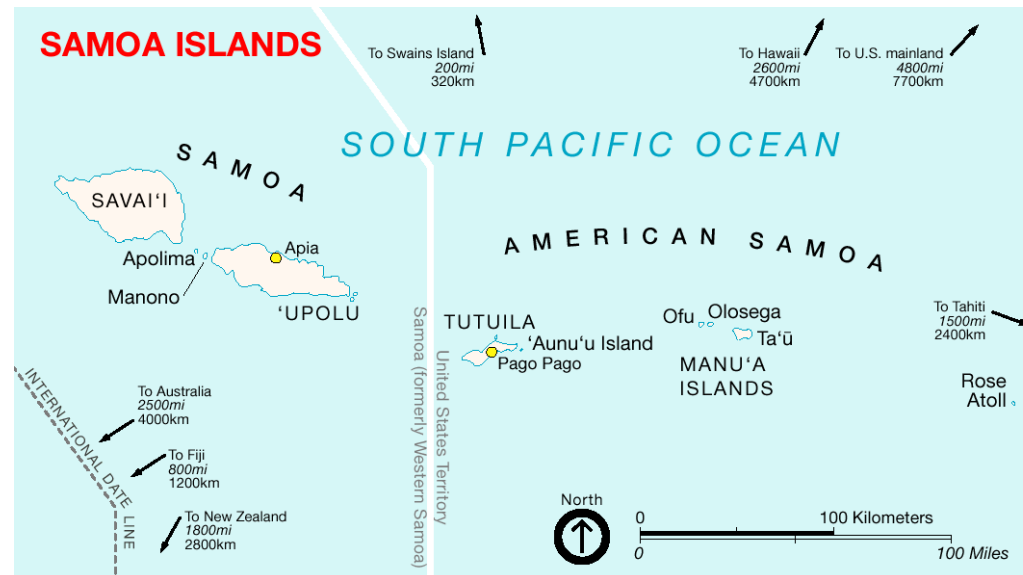
HUMAN COST OF THE PANDEMIC. 27

- IT CAME BY SHIP: The second wave of the global influenza pandemic came to Western Samoa on board an island trader, the Talune, on 4th November 1918



HUMAN COST OF THE PANDEMIC. 28

- Worst affected was Western Samoa, formerly German Samoa, which had been occupied by New Zealand in 1914.
- About 90% of the population was infected; 30% of adult men, 22% of adult women, and 10% of children died.



HUMAN COST OF THE PANDEMIC. 29

By contrast, Governor John Martin Poyer prevented the flu from reaching neighbouring American Samoa by imposing a blockade.

The disease spread fastest through the higher social classes among the indigenous peoples, because of the custom of gathering oral tradition from chiefs on their deathbeds; many community elders were infected through this process.

John Martin Poyer was the twelfth Naval Governor of American Samoa, from March 1, 1915 to June 10, 1919.

He held the longest term of any American governor appointed by the United States Government:



HUMAN COST OF THE PANDEMIC. 30

China, being in the Warlord period, may have experienced a relatively mild flu season in 1918 compared to other areas of the world because of reduced movement between Warlord areas.

Some reports from its interior suggest that mortality rates from influenza were perhaps higher in at least a few locations in China in 1918.

However, there is little evidence that China as a whole was seriously affected by the flu compared to other countries in the world.



HUMAN COST OF THE PANDEMIC. 31

In Japan, 257,363 deaths were attributed to influenza by July 1919, giving an estimated 0.4% mortality rate; much lower than nearly all other Asian countries for which data are available.

The Japanese government severely restricted sea travel to and from the home islands when the pandemic struck.



HUMAN COST OF THE PANDEMIC. 32

The death toll in Russia has been estimated at 450,000, though the researchers who suggested this number called it a "shot in the dark".

If it is correct, Russia lost roughly 0.4% of its population, meaning it suffered the lowest influenza-related mortality in Europe.

Another study considers this number unlikely, given that the country was in the grip of a civil war, and the infrastructure of daily life had broken down; the study suggests that Russia's death toll was closer to 2%, or 2.7 million people.



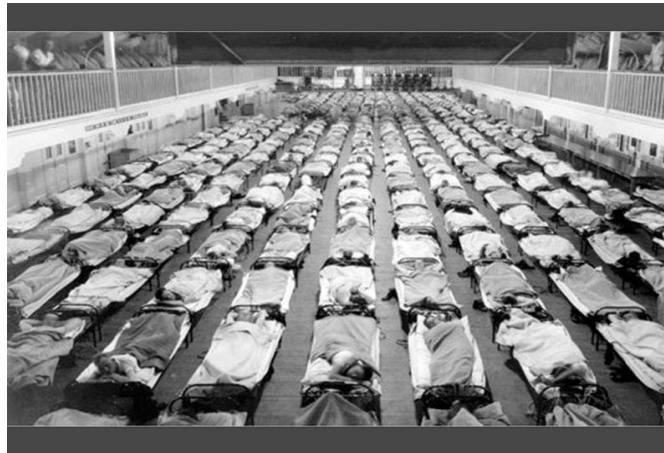
HUMAN COST OF THE PANDEMIC. 33

- SAVED BY REMOTENESS (caption for this photo)
- The French territory of New Caledonia in the South Pacific did not experience an outbreak until July 1921, again escaping with just a mild form of the disease.



HUMAN COST OF THE PANDEMIC. 34

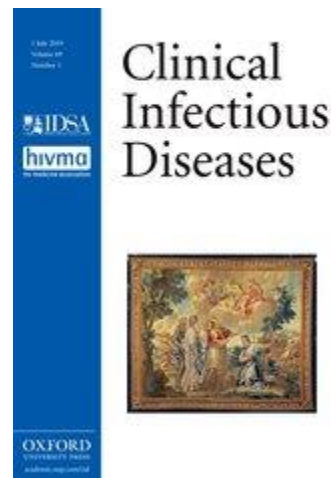
- In places like Alaska, the Spanish flu exacted a terrible toll.
- In some communities, including some of the worst hit areas of Bristol Bay, up to 90% of the population died and the mortality rates were some of the highest in the world.
- More people per capita died from influenza in Alaska than almost anywhere else in the world.



HUMAN COST OF THE PANDEMIC. 35

In a 2009 paper published in the journal Clinical Infectious Diseases, Karen Starko M.D.(an infectious disease specialist) proposed that aspirin poisoning contributed substantially to the fatalities.

She based this on the reported symptoms in those dying from the flu, as recorded in the post mortem reports still available, and also the timing of the big "death spike" in October 1918.



HUMAN COST OF THE PANDEMIC. 36

The spike occurred shortly after the Surgeon General of the U.S. Army and the Journal of the American Medical Association both recommended very large doses of 8 to 31 grams of aspirin per day as part of treatment.

These levels will produce hyperventilation in 33% of patients, as well as lung edema in 3% of patients.



HUMAN COST OF THE PANDEMIC. 37

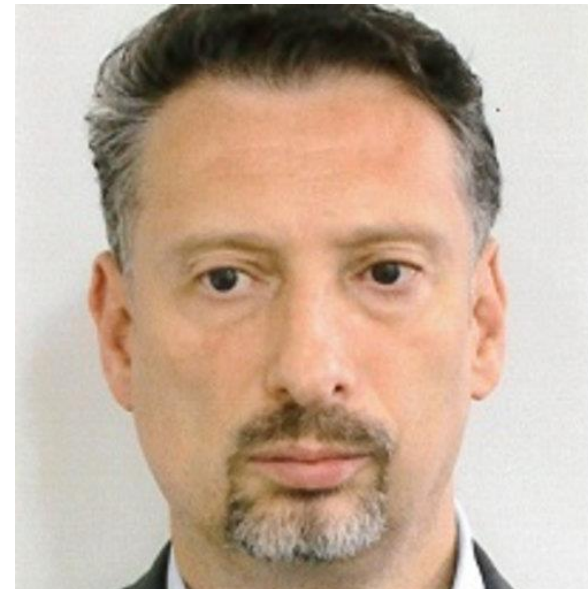
Starko also noted that many early deaths showed "wet", sometimes haemorrhagic lungs, whereas late deaths showed bacterial pneumonia. She suggests that the wave of aspirin poisonings was due to a "perfect storm" of events: Bayer's patent on aspirin was ignored, so that many companies rushed in to make a profit and greatly increased the supply; this coincided with the Spanish flu; and the symptoms of aspirin poisoning were not known at the time.



HUMAN COST OF THE PANDEMIC. 38

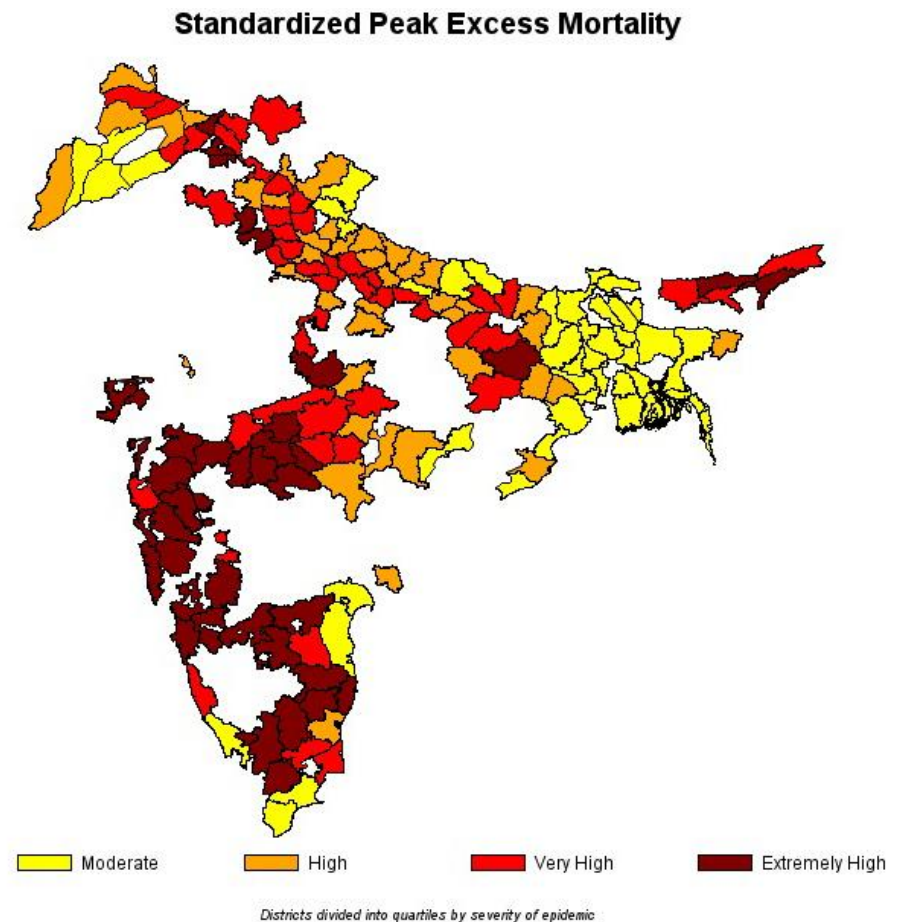
- As an explanation for the universally high mortality rate this hypothesis was questioned in a letter to the journal published in April 2010 by Andrew Noymer and Daisy Carreon of the University of California, Irvine, and Niall Johnson of the Australian Commission on Safety and Quality in Health Care.

Niall Philip Alan Sean Johnson PhD:



HUMAN COST OF THE PANDEMIC. 39

- They questioned the universal applicability of the aspirin theory, given the high mortality rate in countries such as India, (where **more than twelve million people died** and where there was little or no access to aspirin at the time), compared with the death rate in places where aspirin was plentiful.
- Map of mortality rates in India:



HUMAN COST OF THE PANDEMIC. 40

They concluded that "the salicylate [aspirin] poisoning hypothesis [was] difficult to sustain as the primary explanation for the unusual virulence of the 1918–1919 influenza pandemic".

Andrew Noymer and
Daisy Carreon of
the University of
California, Irvine:



HUMAN COST OF THE PANDEMIC. 41

- In response, Starko said there was **anecdotal** evidence of aspirin use in India and argued that even if aspirin over-prescription had not contributed to the high Indian mortality rate, it could still have been a factor for high rates in areas where other exacerbating factors present in India played less of a role (my comment: anecdotal “evidence” is not scientific).
- The “evidence” for ghosts is all anecdotal.



THE END OF THE PANDEMIC. 1

- After the lethal second wave had done its worst in late 1918, new cases dropped abruptly – almost to nothing after the peak in the second wave.
- In Philadelphia, for example, 4,597 people died in the week ending 16 October, but by 11 November, influenza had almost disappeared from the city.



THE END OF THE PANDEMIC. 2

- One explanation for the rapid decline in the lethality of the disease is that doctors became more effective in prevention and treatment of the pneumonia that developed after the victims had contracted the virus.



THE END OF THE PANDEMIC. 3

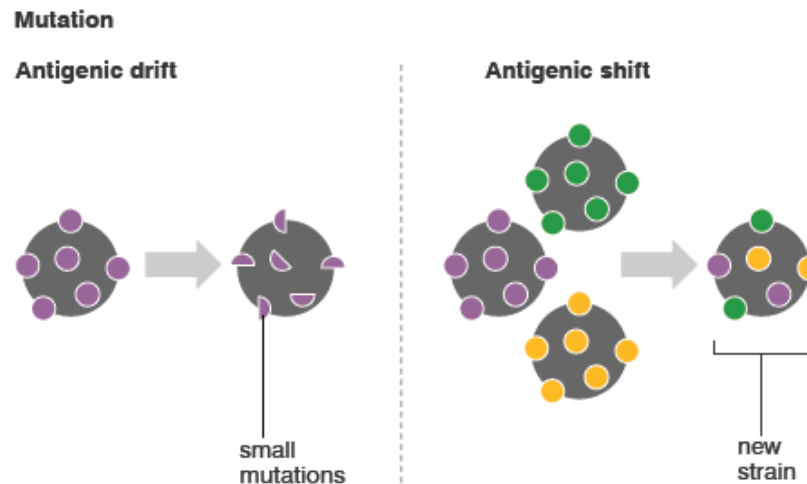
- However, John Barry stated in his 2004 book *The Great Influenza: The Epic Story of the Deadliest Plague In History* that researchers have found no evidence to support the better treatment theory.
- As an example he states: some fatal cases did continue into March 1919, killing one player in the 1919 Stanley Cup Finals.



THE END OF THE PANDEMIC. 4

Another theory holds that the 1918 virus mutated extremely rapidly to a less lethal strain.

Also there is a tendency for pathogenic viruses to disappear with time, as the victims of more dangerous strains tend to die out, and the lethal strain dies with them, while the less lethal strain persists in people who survive the infection.



A POSSIBILITY.

- Academic Andrew Price-Smith has made the argument that the virus helped tip the balance of power in the latter days of the war towards the Allied cause.
- He provides data that the viral waves hit the Central Powers before the Allied powers.
- This would seriously reduce their effective fighting force before it did so for the allies.



Genesis. 23

There were three waves of infection (1918 to 1920).

The fact that most of those who recovered from first-wave infections became immune showed that the waves were the same strain of flu.

This was most dramatically illustrated in Copenhagen, which escaped with 0.02% in the first wave and 0.27% in the second wave.



Genesis. 24

- Finally: Political scientist Andrew Price-Smith(1968 - 2019) published data from the Austrian archives suggesting the influenza began in Austria in early 1917.



HUMAN COST OF THE PANDEMIC. 1

- It is impossible to obtain accurate figures of the numbers infected and the numbers of fatalities, so bear this in mind while we look at the information that I have been able to access.
- Most influenza outbreaks disproportionately kill the very young and the very old, with a higher survival rate for those in between, but the Spanish flu pandemic initially resulted in a higher than expected mortality rate for young adults.



HUMAN COST OF THE PANDEMIC. 2

- One source states: In 1918–1919, 99% of pandemic influenza deaths in the U.S. occurred in people under 65, and nearly half of deaths were in young adults 20 to 40 years old (I am not convinced that this is a totally accurate source, since, in the next sentence the writer contradicts himself, but the information I have given is consistent with information from other sources).
- American Red Cross workers collecting victims of the 1918 flu in St. Louis.:



HUMAN COST OF THE PANDEMIC. 3

- However, it seems established that older people died at a greater rate in later waves (1920) in the pandemic.
- According to historian John M. Barry, the most vulnerable of all – "those most likely, of the most likely", to die – were pregnant women.



HUMAN COST OF THE PANDEMIC. 4

- Barry reported that in thirteen studies of hospitalized women in the pandemic, the death rate ranged from 23% to 71%.
- Of the pregnant women who survived childbirth, over one-quarter (26%) lost their babies.



HUMAN COST OF THE PANDEMIC. 5

- Apart from the unusual age distribution of fatalities, another unusual factor was that the outbreak was widespread in the summer and autumn (in the Northern Hemisphere); influenza is usually worse in winter.



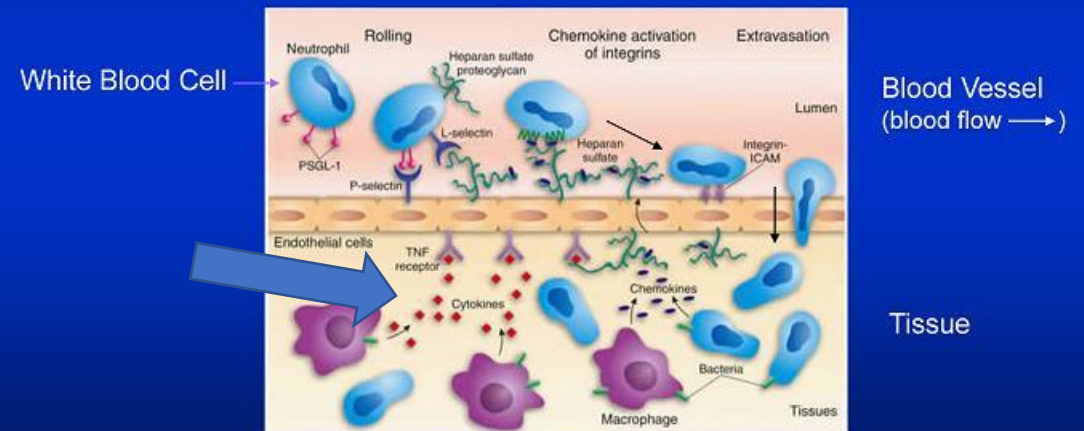
HUMAN COST OF THE PANDEMIC. 6

Scientists offer several possible explanations for the disproportionately high mortality rate of young adults in the 1918 influenza pandemic.

Some analyses have shown that the virus was particularly deadly because it triggered a cytokine storm, (which is an over-protection at the site of infection) by stimulating excessive antibodies, which turn on the stronger immune systems of young adults and ravages them.

Cytokine Storm Also Causes “Immune Confusion”

An injury or infection usually leads to the local production of cytokines. Normally, these cytokines allow white blood cells to home in on the infection and migrate from the blood stream into the affected area.



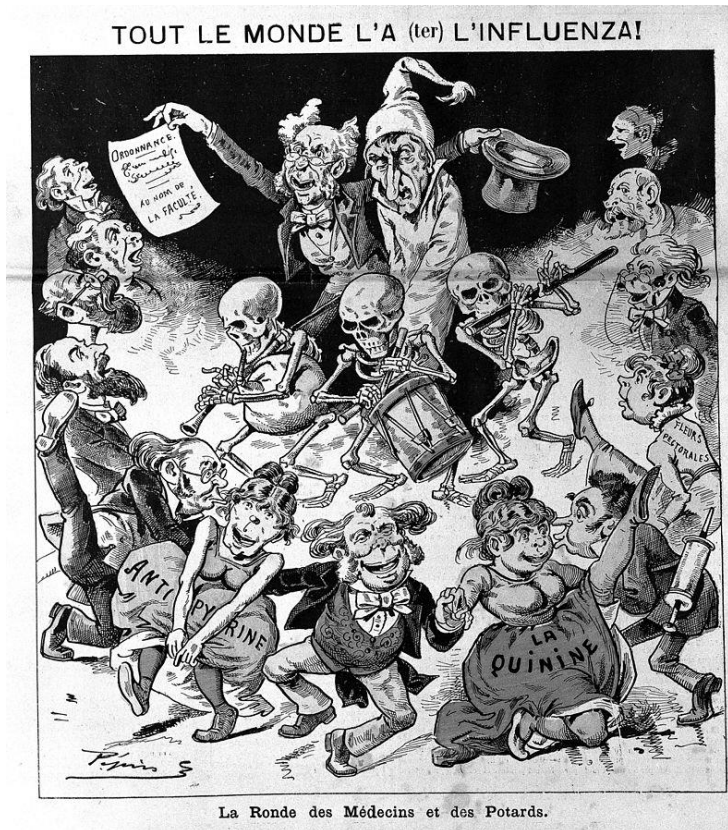
HUMAN COST OF THE PANDEMIC. 7

- When the infection is in the lungs, for example, this cytokine storm response can potentially block airways and result in suffocation.
- Medical researchers have identified the causes and stages of the reaction and are working on treatments to weaken an overactive immune response.



HUMAN COST OF THE PANDEMIC. 8

- The age bias may have been because, in 1918, older adults may have had partial protection caused by exposure to the 1889–1890 flu pandemic, known as the "Russian flu".
- The 12th January 1890, edition of the Paris satirical magazine *Le Grelot* depicted an unfortunate influenza sufferer bowled along by a parade of doctors, druggists, skeleton musicians and dancing girls representing quinine and antipyrine



HUMAN COST OF THE PANDEMIC. 9

The second wave of the 1918 pandemic was much more severe than the first.

By August, when the second wave began in France, Sierra Leone, and the United States, the virus had mutated to a much deadlier form.

The [www. history](http://www.history) site states that, with 195,000 Americans lives lost, October 1918 was the deadliest month of the whole pandemic (this is consistent with the graph on the next slide).

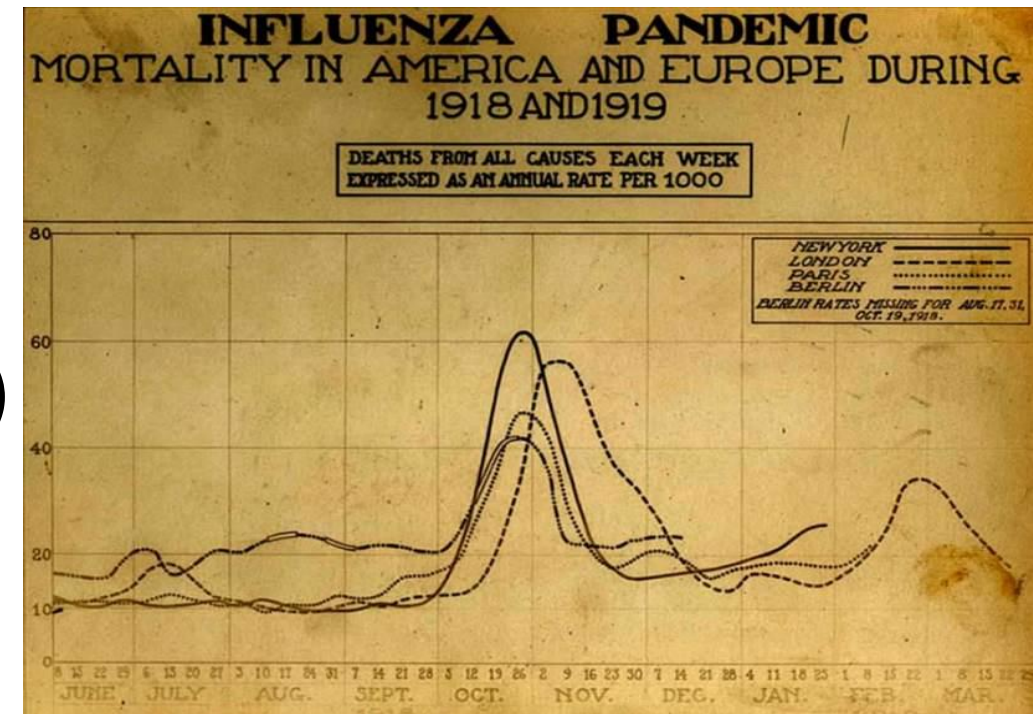


HUMAN COST OF THE PANDEMIC. 10

Symptoms in 1918 were unusual, initially causing influenza to be misdiagnosed as dengue, cholera, or typhoid.

The majority of deaths were from bacterial pneumonia, a common secondary infection associated with influenza.

The virus also killed people directly by causing massive haemorrhages and edema (= swelling and fluid retention) in the lungs.



HUMAN COST OF THE PANDEMIC. 11

In a 2007 analysis of medical journals from the period of the pandemic, researchers claimed that the viral infection was no more aggressive than previous influenza strains.

Consistent with the information on the previous slide, it claims that malnourishment, overcrowded medical camps and hospitals, and poor hygiene promoted **bacterial** superinfection.

This superinfection killed most of the victims, typically after a somewhat prolonged spell in bed.

