THE GHOST MAP

THE STORY OF LONDON'S MOST TERRIFYING EPIDEMIC-
AND HOW IT CHANGED SCIENCE, CITIES, AND THE MODERN WORLD

BY STEVEN JOHNSON
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AUM Connected Poster and Logo Design by Will Fenn
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History and Goals

In 2012, Auburn University at Montgomery initiated its first Common Reading Program with the book *The Immortal Life of Henrietta Lacks* by Rebecca Skloot. The program included campus-wide discussions, lectures, and even a field trip for AUM students to the Legacy Museum at Tuskegee Institute. Now, in its fourth year, the AUM Common Reading Program, “AUM Connected,” has selected *The Ghost Map* by Steven Johnson for the 2015-2016 academic year. All incoming freshman will be required to read *The Ghost Map* in their UNIV 1000 courses, but upperclassmen (and women) are encouraged to participate as well. The goals of AUM Connected are:

1) to engage students in a common academic and social experience that helps to create a sense of connection to the university and to faculty and peers through a new campus tradition

2) to introduce students to college-level discussion in a non-threatening setting and to demonstrate the relevance of participating in an academic experience outside of class

3) to provide students, faculty, staff, and members of the local community with opportunities to interact in meaningful conversations relating to contemporary social and cultural issues

Selection Process

In September of each year, the AUM Connected committee seeks nominations from the campus, including faculty, staff, and students. The committee asks that the nominators consider the following elements: 1) availability – A nominated book must be in print, in paperback and digital formats, and it should be something that students are unlikely to have read in high school, and unlikely to read in basic college classes; 2) engaging and accessible – A nominated book must be of reasonable length (no more than 350 pp.), and appeal to a wide range of students and disciplines; 3) good writing – A nominated book must demonstrate good writing; 4) relevance – A nominated book must have themes that are relevant to students and can evoke meaningful discussions of social and cultural issues; and, 5) potential for year-long programming. The committee then carefully reviews all nominated books and narrows the list to no more than six possible selections. This list is then put forward for a campus-wide vote in January.

Social Media

AUM Connected has a website ([http://www.aum.edu/academics/common-reading-program](http://www.aum.edu/academics/common-reading-program)), a Facebook page (AUM Connected Common Reading Program) and a Twitter account (@AUMConnected). We encourage the campus to use the hashtag #warhawkbook in their social media posts.
FALL 2015 AUM CONNECTED EVENTS

AUGUST 19 – 11 A.M. – 1 P.M. - ZOMBIE BASH – TAYLOR CENTER 230
- PIZZA, SNACKS, DOOR PRIZES, AND A SHOWING OF “I AM LEGEND,” STARRING WILL SMITH

AUGUST 20 – 7 P.M. - JESSE MEUSE CONCERT – AUM GYM – MEET AND GREET TO FOLLOW IN TAYLOR CENTER 230

AUGUST 28 – 2:30-3:30 P.M. – DOCUMENTARY ON THE GHOST MAP
GOODWYN HALL 112

SEPTEMBER 9 – 4 P.M. – LECTURE BY DR. STEVE LOBELLO, PSYCHOLOGY, “PELLAGRA: NOT AN ITALIAN DISH!” - GOODWYN HALL 109

SEPTEMBER 28 – 6:30 – LECTURE BY TERRY WINEMILLER, SOCIOLOGY AND GIS, “THE GHOST MAP, THEN AND NOW” – TAYLOR CENTER 221

OCTOBER 28 – ALL DAY – CONTAGION GAME – STUDENTS, FACULTY AND STAFF WILL GET “INFECTED” WITH A STICKER AND WILL HAVE TO VISIT THE CELT OFFICE (800 LIBRARY TOWER) TO GET “CURED” – WE WILL ALSO BE TWEETING TRIVIA QUESTIONS FOR PRIZES FROM @AUMCONNECTED

5:00 PM – MOVIE “CONTAGION” – TAYLOR CENTER 223

NOVEMBER 3 – 12 P.M.-2 P.M. – MOVIE “OUTBREAK” – INTRODUCTION BY DR. CHELSEA WARD, BIOLOGY) – GOODWYN HALL 112

Students who attend three (3) AUM Connected events during the 2015-2016 academic year will receive a free t-shirt, while supplies last.
Introduction to *The Ghost Map*

**Book Summary**

It is the summer of 1854. Cholera has seized London with unprecedented intensity. A metropolis of more than 2 million people, London is just emerging as a one of the first modern cities in the world. But lacking the infrastructure necessary to support its dense population - garbage removal, clean water, sewers - the city has become the perfect breeding ground for a terrifying disease no one knows how to cure.

As their neighbors begin dying, two men are spurred to action: the Reverend Henry Whitehead, whose faith in a benevolent God is shaken by the seemingly random nature of the victims, and Dr. John Snow, whose ideas about contagion have been dismissed by the scientific community, but who is convinced that he knows how the disease is being transmitted. In a riveting day-by-day account, *The Ghost Map* chronicles the outbreak’s spread and the desperate efforts to put an end to the epidemic - and solve the most pressing medical riddle of the age.

*The Ghost Map* is the chilling story of urban terror, but it is also a story of how scientific understanding can advance in the most hostile of environments. In a triumph of dynamic, multidisciplinary thinking, Steven Johnson examines the epidemic from the microbial level to the human level to the urban level. Brilliantly illuminating the intertwined histories of the spread of disease, the rise of cities, and the nature of scientific inquiry, Johnson presents both vivid history and a powerful, provocative explanation of how it has shaped the world we live in.

**About the Author**

Steven Johnson is the bestselling author of *Everything Bad Is Good for You*, *Mind Wide Open*, *Emergence*, and *Interface Culture*. He is a Distinguished Writer in Residence at New York University’s Department of Journalism and the founder of several influential websites, including FEED, Plastic, and, currently, outside.in. He lives in Brooklyn with his wife and their three sons.
Facts about John Snow

Dr. John Snow (1813-1858) was a famous physician, widely recognized as a leading pioneer in the development of anesthesia in Britain, as well as one of the founding fathers of epidemiology.

His first piece of scientific work was on the use of arsenic in the preservation of bodies (this work was abandoned due to the toxic effects on the medical students). From his studies in toxicology, John Snow developed an interest in anesthesia and cholera (hence his theory on the transmission of the cholera ‘poison’ in water supplies).

John Snow was a vegetarian and a teetotaler who campaigned for temperance societies (though he drank a little wine in later life). He first encountered a cholera epidemic in Newcastle in 1831-32 when he was sent there by the surgeon to whom he was apprenticed at the time.

In October 1841 John Snow presented his first paper entitled “Asphyxia and the Resuscitation of New-born Children.”

In 1849, John Snow published his best-known work On the Mode of Communication of Cholera. It cost him £200 to produce but his income was only £3.12s. Journals dismissed Snow's book. "There is, in our view, an entire failure of proof that the occurrence of any one case could be clearly and unambiguously assigned to water". The reviewer later concludes, "Notwithstanding our opinion that Dr. Snow has failed in proving that cholera is communicated in the mode in which he supposes it to be, he deserves the thanks of the profession for endeavoring to solve the mystery. It is only by close analysis of facts and the publication of new views, that we can hope to arrive at the truth". (London Medical Gazette, 1849)

In 1846, John Snow heard about the use of anesthesia in the USA. It was not well-received in the UK initially, due to the mode of administration but John Snow spotted how to improve this. On 7 April 1853, John Snow administered obstetric anesthesia to Queen Victoria on the birth of Prince Leopold, and again on the birth of Princess Beatrice (14 April 1857).

John Snow's views were still not accepted in Germany at the time of the Gelsenkirche Typhoid Epidemic, in 1901.
The appearance presented by the streets of London an hour before sunrise, on a summer’s morning, is most striking... There is an air of cold, solitary desolation about the noiseless streets which we are accustomed to see thronged at other times by a busy, eager crowd, and over the quiet, closely-shut buildings, which throughout the day are swarming with life and bustle, that is very impressive.

The last drunken man, who shall find his way home before sunlight, has just staggered heavily along, roaring out the burden of the drinking song of the previous night: the last houseless vagrant whom penury and police have left in the streets, has coiled up his chilly limbs in some paved corner, to dream of food and warmth.

There’s an unearthliness about London before the sun is up—it’s quiet, eerie. You might hear a lone voice of someone who was over-served the night before, and sadly, you might stumble across huddled clumps of humans without homes hoping to sleep a bit before being jostled awake and moved along. In modern London, we would see the sun start to peek over the skyscrapers. In 19th century London, you would see “the spires of churches and the roofs of the principal buildings faintly tinged with the light of the rising sun.”

In modern London, you might begin to hear an increase in car and foot traffic, the rattling of keys opening the doors of shops, rolling up safety bars, or the sound of voices coming near as people began to fill the streets. In 19th century London, there were no cars, but much the same awakening happened.

Cabs, with trunks and band-boxes between the drivers’ legs and outside the apron, rattle briskly up and down the streets on their way to the coach-offices or steam-packet wharfs; and the cab-

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1 In 1833, Charles Dickens started to publish his observations about London. He’d spent most of his youth walking the streets, listening to the people, mimicking their speech, and learning how to survive. What follows are my thoughts intermingled with his words, his descriptions (excerpts in italics or quotes) from his earliest writings, collected as Sketches by Boz, Illustrative of Every-Day Life and Every-Day People (1836).
drivers and hackney-coachmen who are on the stand polish up the ornamental part of their dingy vehicles....The shops are now completely opened, and apprentices and shopmen are busily engaged in cleaning and decking the windows for the day. The bakers' shops in town are filled with servants and children waiting for the drawing of the first batch of rolls.

But, in what feels like the blink of an eye, the sun starts to fade and the sounds change from a yawning and embracing of the day, to a headlong rush to a night life—the sound of crowds eager to eat, dance, drink, enjoy the riches of the big city. At night in a theater district of the 21st century London, you might have heard similar sounds to those heard after a show in the 19th century.

Parties returning from the different theatres foot it through the muddy streets; cabs, hackney-coaches, carriages, and theatre omnibuses, roll swiftly by; watermen with dim dirty lanterns in their hands, and large brass plates upon their breasts, who have been shouting and rushing about for the last two hours, retire to their watering-houses, to solace themselves with the creature comforts of pipes and purl; the half-price pit and box frequenters of the theatres throng to the different houses of refreshment; and chops, kidneys, rabbits, oysters, stout, cigars, and 'goes' innumerable, are served up amidst a noise and confusion of smoking, running, knife-clattering, and waiter-chattering, perfectly indescribable.

Then it all begins again, with a cat snoozing on a step, a policeman walking down a street, a lone voice singing or shouting, the honk of a horn, you might hear a baby cry, or the barking of a dog, the rattle of a carriage or a cab, the sound of a small group laughing in the distance, doors closing. You might see lights dimmed and twinkling, and even in summer, you might feel “an air of cold, solitary desolation about the noiseless streets which we are accustomed to see thronged at other times by a busy, eager crowd.”
What is cholera?

Cholera is an intestinal infection caused by the bacterium *Vibrio cholerae*.

How important is cholera as a disease in modern times?

An estimated 3-5 million cases and over 100,000 deaths occur each year around the world. Outbreaks can occur when disasters disrupt safe water supplies or in countries that do not have safe drinking water supplies. Cholera is not common in the United States or other industrialized countries.

How do you get it?

People become infected with cholera by swallowing water or food contaminated with the cholera bacteria or by coming into contact with the stool or vomit of a person infected with cholera. Anyone can get cholera, but those at greatest risk are international travelers visiting countries where cholera is common (parts of Latin America, Africa and Asia). The cholera bacterium is usually found in water or food sources that have been contaminated by feces (poop) from a person infected with cholera. Cholera is most likely to be found and spread in places with inadequate water treatment, poor sanitation, and inadequate hygiene.

The cholera bacterium may also live in the environment in brackish rivers and coastal waters. Shellfish eaten raw have been a source of cholera, and a few persons in the U.S. have contracted cholera after eating raw or undercooked shellfish from the Gulf of Mexico.

What are the symptoms?

A person infected with cholera may have no symptoms, or they may have mild diarrhea and abdominal cramping. People with severe cholera will have very severe watery diarrhea, vomiting and leg cramping. This rapid loss of fluid may cause dehydration and shock. Approximately one in 10 (5-10%) infected persons will have severe cholera. Without treatment, death can occur within hours.
**How soon do infected people get sick?**

People who develop symptoms will become sick either from a few hours after exposure to as long as 5 days. Usually people will get sick in 2-3 days.

**What should I do if I think I have been exposed to cholera?**

Treatment is necessary in severe cases, and rapid fluid replacement is the treatment of choice. If you are having symptoms of cholera and you have recently traveled to other countries where cholera is common, you should contact your doctor. People who require rapid fluid replacement may need to be hospitalized. Antibiotics can be used but they are not as important as fluid replacement.

**How can we prevent cholera?**

The risk for cholera is very low for people visiting areas with epidemic cholera. When simple precautions are observed, contracting the disease is unlikely.

All travelers going to countries where cholera has occurred should observe the following recommendations:

Drink only boiled or carbonated, bottled water and eat only foods that have been thoroughly cooked and still hot, avoid salads. Avoid tap water, fountain drinks, and ice cubes. Eat only fruit that you can peel yourself. Avoid raw or undercooked fish and shellfish. Do not buy food or beverages from street vendors. Wash your hands thoroughly with soap and safe water before eating or drinking. Remember to use safe water when brushing your teeth.

**Where can I get more information on cholera?**  [www.cdc.gov](http://www.cdc.gov)

Source of information: Centers for Disease Control and Prevention (CDC)
Timeline of *Ghost Map* Events (and 19th Century)
By Dr. Lee A. Farrow, History & CELT Director

1780’s – Industrial Revolution begins in England

1798 – Publication of “An Essay on the Principle of Population” by Thomas Malthus, which fueled the debate about the size of the population in Britain

1813 – Birth of John Snow

1831-32 – Cholera outbreak in London kills over 6500 people

1837 – Queen Victoria took the throne at age 18

Charles Dickens publishes *Oliver Twist*, drawing attention to Britain's poor

1845 – Beginning of Irish Potato Famine

1848 – Public Health Act in England creates Board of Health and local boards of health, largely due to the efforts of Edwin Chadwick

Publication of *The Communist Manifesto* by Karl Marx and Friedrich Engels

1848-1849 – Cholera outbreak in London kills over 14000 people

1850 – California became the 31st state

1851 – Great Exhibition in London (Crystal Palace), showing off the successes of the Industrial Revolution

1852 – Publication of *Uncle Tom’s Cabin*

1853-1856 – Crimean War (Russia vs. Ottoman Empire, Great Britain and France)

1854 – Cholera outbreak near Broad Street pump

1854 – U. S. Republican Party founded

1858 – Death of John Snow

1859 – Publication of Darwin’s *On the Origin of Species*

Big Ben, the enormous clock at the north end of the Palace of Westminster in London, rings out for the first time.

1861-1865 – American Civil War
**Alphabetical Glossary for The Ghost Map**

**Consilience** - Consilience is the linking together of principles from different disciplines, especially when forming a comprehensive theory. John Snow exhibited consilient thinking. He drew upon his broad background and used insights from many different disciplines to form his ideas and hypotheses.

**Effluvia** - Effluvia are invisible emanations, especially in relation to an offensive exhalation or smell. Effluvia are detected by the olfactory system (sense of smell) and were often cited as the cause of all sickness by miasmists. This was the scientific understanding that John Snow’s evidence in support of the “germ theory of disease” sought to overturn.

**Empiricism** - Empiricism, in relation to the natural sciences, is the practice of relying on observation, data collection, and experimentation. John Snow was a particularly adamant follower of empiricism, especially in regard to his work with chloroform and in his other scientific pursuits, including his famous work involving cholera.

**Epidemiology** - Epidemiology is the study of the incidence, prevalence, and source of disease in large populations. It investigates both epidemic (i.e. episodic) and endemic (i.e. always present) diseases. Epidemiology focuses on groups rather than individuals and often takes a historical perspective. It is a major field of medical research today. However, in Victorian London, the field was in its infancy and John Snow was an early practitioner.

**Index Case** - The index case is the first case of a disease in a group or population. It usually serves to call attention to the presence of the disease. Finding the index case for the Soho outbreak of 1854 was very important to John Snow as it helped him support his theory of waterborne transmission of cholera. The location of the index case was in a house whose residents fouled (contaminated) a popular well from which Soho residents drew water.

**Maverick** - A maverick is a person who thinks independently. The term can refer to an intellectual, artist, scientist, politician or anyone who takes a stand that is apart or different from his or her associates. It might be applied to John Snow who regularly did not let the popular scientific ideas or the mindset of his time deter him from making scientific inquiries based on different assumptions.

**Miasma** - Miasma was a word used to describe foul smelling air, or an oppressive or unpleasant atmosphere that surrounds or emanates from something, also known as "night air." The miasma theory (also called the miasmatic theory) argued that diseases such as cholera, chlamydia or the Black Death were caused by a miasma. The theory held that the origin of epidemics was due to a miasma, emanating from rotting organic matter.
**Paradigm** - Broadly defined, paradigms are philosophical or theoretical frameworks within which theories, laws, experiments, and generalizations are formed. In science they can be seen in the sets of assumptions and practices that define a scientific discipline during a particular period of time. John Snow, worked against the dominant paradigm, the miasma theory of disease, and refused to let it fully define his understanding or structure his observations and data collection. Snow’s efforts helped bring about a new paradigm.

**Symbiosis** - Symbiosis is the association of two dissimilar organisms living together. The relationship may be mutually beneficial or one organism may gain a benefit while the other does not. The concept describes a bacteria which needs a human host to provide a food source (think Vibrio cholerae) as well as the human body which utilizes bacteria (e.g. some strains of e. coli) as part of its digestive processes.
Vocabulary List by Chapter

By Dr. Lee A. Farrow, History & CELT Director

This list has been compiled to help instructors highlight words that students may not know. We recommend that instructors provide students with this list and ask them to look up these words before they begin reading.

Chapter 1 - “The Night-Soil Men”

Quagmire
Excrement
Fulminate
Itinerant
Fecundity
Pestiferous
Taylorite
The Lancet
Inexorable
Burgeoning
Trope
Opulent
Tony
Veritable

Chapter 2 – “Eyes Sunk, Lips Dark Blue”

Affable
Tumult
Eddies
Queue
Quotidian
Prodigious
Frenetic
Karyotic
Intractable
Purgative
Exacerbate
Orthodoxy
Platitude
Effusion
Incongruous
Superfluous
Empirical

Chapter 3 – “The Investigator”
Bildungsroman
Eschew
Garrulous
Taciturn
Bereft
Opine
Palliative
Apogee
Consilient
Nascent
Erroneous
Impunity

Chapter 4 – “That is to Say, Jo Has Not Yet Died”
Volition
Tenacity

Chapter 5 – “All Smell is Disease”
Visceral
Byzantine
Prolix
Offal
Canards
Inextricably
Dissipation

Chapter 6 – “Building the Case”
Aberration
Precipitous
Deleterious
Etiology
Polymath

Chapter 7 – “The Pump Handle”
Monograph
Efflorescence
Fortuitous
Fissures
Unequivocal

Chapter 8 – Conclusion – “The Ghost Map”

Inference
Apoplexy
Inculpate
Resource Guide:
Elizabeth Woodworth’s Ghost Map Blog, Books, Movies, Websites

Dr. Elizabeth Woodworth’s Ghost Map Blog

https://aumtheghostmap.wordpress.com/

Books

The American Plague: The Untold Story of Yellow Fever, the Epidemic that Shaped Our History

The Barbary Plague: The Black Death in Victorian San Francisco

Beating Back the Devil

Cholera, Chloroform and the Science of Medicine: A Life of John Snow

The Coming Plague: Newly Emerging Diseases in a World Out of Balance

The Family That Couldn't Sleep: A Medical Mystery

Flu: The Story Of The Great Influenza Pandemic of 1918 and the Search for the Virus that Caused It

The Great Mortality: An Intimate History of the Black Death, the Most Devastating Plague of All Time

The Knife Man: Blood, Body Snatching, and the Birth of Modern Surgery

London's Rubbish: Two Centuries of Dirt, Dust and Disease in the Metropolis
By: Peter Hounsell. 2014. ISBN-10: 144560227X.

Oliver Twist

The Strange Case of the Broad Street Pump: John Snow and the Mystery of Cholera
**Articles**


**Movies**


*Contagion* (2011) [http://www.imdb.com/title/tt1598778/?ref_=nv_sr_1](http://www.imdb.com/title/tt1598778/?ref_=nv_sr_1)


*Snow* (a short movie about Dr. Snow; 2011) [http://www.snowthemovie.com/](http://www.snowthemovie.com/)


**Videos**

[https://www.youtube.com/watch?v=a3icgNYaEB4](https://www.youtube.com/watch?v=a3icgNYaEB4) 58:30 minute video of Steven Johnson’s Google talk about *The Ghost Map*.

[https://www.youtube.com/watch?v=39X_qKkX8eI](https://www.youtube.com/watch?v=39X_qKkX8eI) 10:03 minute video “How *The Ghost Map* helped end a killer disease,” Steven Johnson, TED Talk.

[https://www.youtube.com/watch?v=3P8shnNEXb4](https://www.youtube.com/watch?v=3P8shnNEXb4) 6:26 minute video “Steven Johnson on *The Ghost Map*.”
https://www.youtube.com/watch?v=Pq32LB8j2K8 6:13 minute video “John Snow and the cholera outbreak of 1854 with Mike Jay, Medical London.”

Websites

http://www.ph.ucla.edu/epi/snow.html UCLA site on Dr. John Snow.
http://www.johnsnowsociety.org Site for Organization Dedicated to Dr. John Snow.
http://www.choleraandthethames.co.uk/ Website about Cholera in 19th-C. London.
http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1097&context=numeracy Online article about Math Classes and The Ghost Map.
http://www.stevenberlinjohnson.com/ Author’s Blog.
http://www.nhm.ac.uk/ London Natural History Museum.

Sources

http://www.thesghostmap.com/
http://www.k-state.edu/ksbn/ghostmap/Ghost%20Map%20Guide.pdf
http://www.johnsnowsociety.org/johnsnow/facts.html