



THE GIST MAP

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- CREATE SOLUTIONS
- BECOME AN EVERYDAY HERO
IN YOUR COMMUNITY

**UNDERSTAND THE PAST,
DISCOVER YOUR FUTURE**



The Ghost Map

Introduction (by Tara Coleman)

The purpose of KSBN is to provide incoming students with a shared academic experience that they can discuss with professors, staff, administrators, and other students when they arrive on campus. We believe *The Ghost Map* by Steven Johnson will do just that. *The Ghost Map* is a true account of a terrifying outbreak of cholera and how two every day heroes -- Dr. John Snow and Reverend Henry Whitehead -- use their knowledge of the disease and the city to map the pandemic.

This book will introduce students to a disease that may be unfamiliar to them but not uncommon to millions of people around the world whose living conditions and sanitation practices are not that different from those described in the book. The book is applicable in a wide array of disciplines, including history, science, engineering, geography, sociology, and many others.

About the Book

By the mid-nineteenth century, London had emerged as one of the first truly modern cities, but it severely lacked necessary sanitation services, including garbage removal, clean water, and sewers. The city thus became a breeding ground for an outbreak of a rapidly-spreading disease, whose cause and cure were unknown to these Londoners.

As the cholera outbreak spreads across the densely-populated city, it is up to Dr. John Snow and Reverend Henry Whitehead to use their knowledge of the disease and the city to map the pandemic, its cause, its widespread implications, and ultimately, the interventions that stopped the devastating spread of the disease.

The Ghost Map is a riveting historical illustration of the intertwined histories of cholera, cities, and modern scientific inquiry. Yet the ideas and lessons in *The Ghost Map* are not simply about the nineteenth-century but also about our own contemporary problems from urban sprawl to bioterrorism and much more.

Book Reviews & Articles about *The Ghost Map*:

- *The New York Times* - "A Drink of Death" by David Quammen
- *The New Yorker* - "Sick City" by Steven Shapin
- *Los Angeles Times* - "Plotting Death" by Mark Coleman
- *The Wall Street Journal* - "Lost in a Time of Cholera" by Ferdinand Mount
- *USA Today* - "'Ghost Map' Traces Cholera's Legacy" by Thomas Mullen
- *Publisher's Weekly* - Starred Review
- *Salon* - "History as written by a 'SimCity' Freak" by Scott Rosenberg
- *James Randi Educational Foundation* - "Review: The Ghost Map" by Naomi Baker

Resources for *The Ghost Map*:

- *The Ghost Map* website
- TED Talk video of Steven Johnson speaking about *The Ghost Map*
- An animated introduction to *The Ghost Map*
- Video interview with Steven Johnson about *The Ghost Map*

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.

Resources:

- Steven Johnson's website
- TED Talk profile on Steven Johnson

General Discussion Questions:

History & English

- Johnson describes the book as having four protagonists: Doctor John Snow, Reverend Henry Whitehead, the *Vibrio cholerae* bacteria, and the city of London. What does he mean by including London as a "character" in the book? How does he achieve that? And is it effective?
- Johnson draws our attention to the fact that Whitehead was relegated to the role of Snow's apprentice by popular Victorian reports. Johnson's own opinion is that Whitehead's "engaged amateurism" was so important as to make his role virtually equal to that of Snow's in solving the mystery of cholera. What is your assessment?
- Johnson debunks several popular misconceptions about Snow's actual map, principally that the map itself led to the end of the outbreak. Yet he still names his book after the map. Why? Given Johnson's take on the map's limited practical role concerning this particular cholera outbreak, do you accept his contention for its continued significance?
- *The Ghost Map* reads like a thriller at times. How does Johnson create suspense despite the known facts of cholera's trigger and remedy?
- *The Ghost Map* is filled with historical and scientific tangents—for instance, readers learn about the biological role of fermentation and alcohol in the development of Western Civilization. How do these details enrich the storytelling and reading experience? Do they distract more than they help?
- Consider how Johnson uses Charles Dickens' works in this book. Why does Johnson invoke a work of fiction alongside scientific and historical data?

Engineering

- Why did the Elizabethan infrastructure of London fail to provide clean water?
- What role did engineering play in discovering physical proof that Baby Lewis infected the Broad Street pump?
- Nineteenth-century London has much in common with cities in the developing world, such as New Delhi or Brasilia: they lack sewer systems or reliable sources of clean water. What strategies have contemporary engineers and social entrepreneurs found to solve these issues? What physical and social structures need to be in place to provide clean water at low costs?
- *Math*: Four forms of quantitative reasoning (geometry, statistics, modeling and networks) are apparent in the book. Discuss how these methods are used. Which one is the most successful for this problem? For more information, see *Incorporating Quantitative Reasoning in Common Core Courses: Mathematics for The Ghost Map*.

Public Health

- How was the Board of Health both a positive and negative force as London evolved into a modern city?
- The profession of a physician was clearly a very different one in 1854 than it is now, particularly as John Snow practiced it. What do you see as the major differences? Given both Snow's practical and theoretical work, what professions and fields in today's world, if any, might be more similar to what John Snow did?
- Like the role of physician, the role of the church in people's lives is also different today. Do you think the role of the Reverend, as Henry Whitehead fulfilled it, has changed as much as the role of the doctor has changed since 1854?
- What prompts the Board of Health and other powerful people in London to change their perspective on disease and its transmission? Does viewing an epidemic or disease as unhygienic change the public's willingness to find a cure? Are there contemporary diseases that face a similar challenge of public perception as cholera faced in London in 1854?

City Life

- What problems did London's rapid expansion cause, and how did it contribute to the outbreak?
- Given the relative living conditions, the cultural life, the economic opportunities, and any other costs and benefits, would you have chosen to live in London during 1854, the Victorian Era? Why do you think John Snow and others who could presumably afford to live elsewhere chose to live in a city that apparently seemed to always be on the brink of collapse into pure squalor?
- Why did so many people stay in London once the disease became an epidemic?

Contemporary Connections

- What kind of infrastructure problems do rural areas in Kansas face? How do health-related obstacles in rural areas compare to the ones Londoners faced in the book?
- Snow had to work harder to disprove the miasmatists with his analysis of the Lambeth and S&V water supply case because the data showed that the subdistricts that relied on the polluted water source also happened to be in less desirable industrial zones. Discuss modern examples of how socio-geo-economic issues can influence scientific and medical assessments.
- With the invention of GPS, do maps still have any value?
- We are used to seeing the medical community clash with religious leaders on issues from genetic research to euthanasia. Is partnership on some level between the medical and religious communities sometimes necessary for progress today, as it was in Snow's and Whitehead's time?
- What is the likelihood that a widespread event like the cholera outbreak could happen in North America today? Where might it start, and what conditions would need to exist?
- Since the earthquake in 2010, Haiti has been experiencing the worst outbreak of cholera in recent history. How does Johnson's history in *The Ghost Map* help us understand this current epidemic and help us resolve it?
- What is the next cholera-like disease, and what are we doing about it?
- Johnson says that cities without clean water are a very severe problem in the world- perhaps the single most serious and reprehensible. Do you agree?
- During the outbreak, the London Times and Morning Chronicle were filled with a plethora of dubious remedies from a variety of unqualified sources. Compare the Internet of today with the London Times of 1854. Has information literacy improved such that the average citizen can distinguish trustworthy advice from chicanery on the Web?
- Change management is a principle of modern business. How did Victorians handle change management? How do we see modern ideas of capitalism working in *The Ghost Map*?

Science

- Discuss how the process of hypothesis, formulation of methods, implementation, and review is presented in this books. How does Snow use hypotheses, formulation of methods, and review? How do Victorian methods differ from current scientific methods?
- Whitehead was effective as an independent researcher in part because he had intimate knowledge of Soho and its residents and was not timid about asserting and building on his knowledge. He stood his ground on the issue of an “index case,” for example, which led to the reexamination of the Broad Street well. How did his neighborhood knowledge help solve the case? How might his social status have added weight to his influence over events? What if a similarly independent, civic-minded midwife or journalist had been in his role?
- Johnson writes about the pervasiveness of the miasma theory, emphasizing that even some of the most brilliant medical minds rejected the notion of waterborne contagions despite evidence to the contrary. What were some of the factors that contributed to this massive mental block?

Sustainability

- In the latter part of the book, Johnson makes a case for urbanization as the most significant trend of the modern era—highlighting the fact that as of 2007, over 50% of the world’s population lives in cities. Johnson views this as a positive trend, an irreversible trend, and ultimately a necessary trend for the future of the planet because of the ecological implications of urban living. Do you agree with his positive assessment? Does reading a story like that of *The Ghost Map* make you feel more or less positive about cities and urbanization?
- In his epilogue, Johnson posits that our survival as a “city-planet” relies on our willingness to embrace science and improve public health systems in the developing world. What do you see as the role of developed societies in this scenario? How do high profile philanthropists such as Bill and Melinda Gates fit into the picture?
- Johnson cites the continued unavailability of clean water in many parts of the world as the single-most serious—and perhaps the most reprehensible—issue facing the world today. Do you share that assessment? Do you think the world will need to relive crises equivalent to the cholera outbreak of 1854 to achieve solutions that are equivalent to the construction of London’s modern sewer system? Or will technology and the highly-connected state of the world accelerate solutions?

Agriculture/Food Production

- Discuss current water issues here in Kansas. How can we relate to the panic created with this disease?
- Think about the Republican River lawsuit with Nebraska and Colorado. How can Kansans relate to the geographical problems that created this situation to problems in the book?
- Could there potentially be a threat to our national water supply with cholera? What are specific safety measures we could take to avoid these issues?
- Compare nineteenth-century London with cities in the developing world that lack sewer systems or clean water (New Delhi or Brasilia). How does this affect sanitation and food safety?
- How does the current fertilizer industry compare to London’s night soil men and their profession? Do we have jobs in the agricultural industry comparable to toshers, mud-larks, and bone collectors?
- Consider how the high price of removing human waste created the disastrous sewage situation in London. How have high prices of essential services affected the agricultural industry today?

Suggested Activities:

Extra Curricular

- Attend the events held on the K-State campus throughout the 2014-2015 school year. See a list of events [here](#).

Classroom Activities

- Creating opportunities to teach *The Ghost Map* is simple. The following activities can be tailored to your course content and to the time you have available. They are a great way to build community. You could start with them to get students thinking actively, or end with them if your regularly scheduled discussion and activities go faster than what you had planned. The discussion questions listed above will easily fit with the following activities.

FACULTY ANNOUNCEMENT

Time: 5 min or less

Benefits:

- Students build community outside of the classroom.
- Students can bring in this content to enrich classroom discussions

Directions: Encourage Students to attend author event or other KSBN-related events. Create a meeting place at the venue so students can meet up there before the event and sit together.

TWO CIRCLES

Time: 4-5 minutes per question

Benefits:

- Students discuss specific questions
- Students build community through one-on-one interaction with their peers
- Students are more confident to speak up in class because their partner can save them if they can't articulate their answer

Directions: Split the class in half. Half the students form a circle on the outside of the room facing in. The other half pairs up with this outside circle, forming an inside circle. Give students a question, they discuss, discuss as a big group, have inside circle move counter clockwise. Repeat.

STUDENT-LED DISCUSSION

Time: 5-8 minutes per group

Benefits:

- Teaching content is often the best way to learn it
- Students gain public speaking and leadership skills
- Instructor can gauge what concepts the students understand and which concepts they struggle with
- Students meet and develop working relationships with others in their major/academic interests

Directions: Break students in groups determined by their major or academic interests. Assign each group a topic or group of discussion questions related to their academic interests (see earlier in the guide). Have students lead discussion

THINK, PAIR, SHARE

Time: 10 min

Benefits:

- Students interact with the text individually and collectively.

Directions: Choose questions from the question guide. Have students free write their response, then pair up and share responses. Gather students back together and ask for pairs to volunteer their answers, or go around the room and have all pairs share.

Games for *The Ghost Map*

- Games are an excellent tool to add an element of play to your discussion. This is just one example, but for a complete list of *The Ghost Map*-inspired games, please contact ksbn@ksu.edu.

SPINNING YARNS

Objective:

In the tradition of “talking sticks” used in talking circles, the aspiration of “Spinning Yarns” is to stimulate discussion and foster involvement by only allowing players to speak when they hold the ball of yarn. The implied purpose of the game is to demonstrate the “connectedness” of the players through play, and when possible, through the questions asked.

Number of Players:

- At least 10

Duration:

- 10 to 40 minutes (depending on the number of questions asked)

Materials:

- One ball of yarn (avoid rolling the ball too tightly)

Prep:

- The game facilitator will generate a series of questions to pose to the class. The discussion questions listed above could work well.

How to Play:

1. Ask students to raise their hands to be called on to answer questions. Stress that only students holding the ball of yarn may answer questions. Make sure that all players understand that they are to toss the ball of yarn, not throw it aggressively. This is supposed to be a fun experience for everyone.
2. Ask the first question, hold one end of the the ball of yarn, then gently toss the ball to a student with a raised hand. If that student gets the answer correct, they may hold onto the strand of yarn
3. Ask the next question. The player with the correct answer from the previous question may choose the next person who raises a hand to answer the next question. If the student holding the ball of yarn did NOT answer the question correctly, they do NOT get to hold onto the strand of yarn and become a part of the chain at that time – instead, they will toss the ball of yarn back to the person who had it before them (if they answer a question correctly later, they can join the web of yarn later).
4. Continue to ask questions until you have finished you question list, run out of yarn, or have run out of time.
5. Review any overarching concepts that may have been brought forward by the line of questioning.
6. Have students gently pass the strands of yarn to one side. And gather up the loose strands yarn.

Tips and Tricks:

- List of questions that progressively reveal a narrative, line of thought, or an interrelated set of concepts work best with this game.
- It is often difficult to salvage a ball of yarn from the tangle created by playing this game. Be forewarned.
- The farther a ball is tossed, the more fun the game. But, be sure everyone is paying attention when the ball is being tossed or someone may be lightly injured.

Other Titles of Interest:

Pandemic and Medical Mystery Books

- *The American Plague: The Untold Story of Yellow Fever, the Epidemic that Shaped our History* by Molly Caldwell Crosby
- *The Family That Couldn't Sleep: A Medical Mystery* by D.T. Max
- *Polio: An American Story* by David M. Oshinsky
- *The Coming Plague: Newly Emerging Diseases in a World Out of Balance* by Laurie Garrett
- *Blood Work: A Tale of Medicine and Murder in the Scientific Revolution* by Holly Tucker
- *Beating Back the Devil: On the Front Lines with the Disease Detectives of the Epidemic Intelligence Service* by Maryn McKenna

Non-Fiction Books about London

- *Lights Out for the Territory: 9 Excursions in the Secret History of London* by Iain Sinclair
- *Night Haunts: A Journey Through the London Night* by Sukhdev Sandu
- *London's Rubbish: Two Centuries of Dirt, Dust and Disease in the Metropolis* by Peter Hounsell
- *London: Water and the Making of the Modern City* by John Broich

Fiction Books about London

- *Pastworld* by Ian Beck
- *A Mad, Wicked Folly* by Sharon Bigg Waller

Movies about Epidemics

- *Contagion* (2011)
- *Carriers* (2009)
- *The Happening* (2008)
- *Love in the Time of Cholera* (2007)
- *The Painted Veil* (2006)
- *28 Days Later* (2002)
- *Outbreak* (1995)
- *The Stand* (1994)

Additional Resources:

Other Universities' work with The Ghost Map

- University of Vermont's Summer Reading Program
 - For students
 - For faculty
- University of San Diego's Just Read! Program
- Westminster College's Summer Reading Program: Reading Guide

Goodreads' *The Ghost Map* discussion board

More on the Broad Street Cholera Outbreak in the 1854

- Frost's Meditations
- John Snow and Waterborne Diseases
- John Snow's data journalism
- UCLA Department of Epidemiology John Snow website
- The John Snow Archive and Research Companion
- TED Talk video of Steven Johnson speaking about the "web as a city"

More on diseases, cholera, and London

- Simulations on how quickly an epidemic would spread across the world
- Centers for Disease Control and Prevention's (CDC) cholera page
- World Health Organization:
 - Cholera overview
 - Global Health Observatory (GHO) cholera statistics
 - Interactive cholera charts
- Cholera and the Thames

Beyond the Book

- 2010 cholera epidemic in Haiti
 - “Nepalese Origin of Cholera Epidemic in Haiti” by R.R. Frerichs et. al.
 - “The 2012 Cholera Outbreak in Haiti” by Fabini D. Orata et. al.

Cast of Major Characters:

Dr. John Snow

(1813-1858), English physician known for his seminal studies of cholera and widely viewed as the father of contemporary epidemiology. His investigation of London's Broad Street pump outbreak and his “Grand Experiment,” a study comparing waterborne cholera cases in two regions of the city, led to the overthrow of the reigning miasma theory. Snow's innovative reasoning and approach to the control of cholera remain valid and are considered exemplary for epidemiologists throughout the world.

Rev. Henry Whitehead

(1825-1896) When the cholera outbreak of 1854 began in earnest, Whitehead became very concerned for his parishioners, many of whom were looking to the church for answers about the epidemic. In effort to calm his parishioners' fears, Whitehead began searching for answers to the outbreak. Whitehead's knowledge of Soho and the citizens there was crucial to his and Snow's investigation and the eventual overthrow of the miasma theory.

Cholera

An acute infection of the small intestine caused by the bacterium *Vibrio Cholerea* and characterized by extreme diarrhea with rapid and severe depletion of body fluids and salts. Cholera is a disease that can incite populations to panic and has been responsible for the deaths of millions, for economic losses of immense magnitude, and for the disruption of the very fabric of society in all parts of the world.

London

(1800s), By the mid-nineteenth century, London was emerging as one of the first modern cities in the world, but it lacked the public health infrastructure to support its exploding population. Due to the lack of a sewer system in the Soho district, much of the waste created by the citizens was dumped into the River Thames; however, the River Thames was also where peoples' drinking water came from. The lack of necessary sanitation services led to a series of cholera outbreaks in the nineteenth century, including the Broad Street cholera outbreak.

Sources: *Encyclopedia Britannica*, *UCLA Department of Epidemiology*, *Cholera and the Thames*, *Penguin Group Reading Guide*

Vocabulary (Glossary of Terms):

- **Symbiosis** (p. 6) 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.
- **Maverick** (p. 26) 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.
- **Consilience** (p. 67-68) 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.
- **Empiricism** (p. 68) 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** (p. 97) 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** (p.177) 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.
- **Effluvia** (p.184) 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.
- **Paradigm** (p. 202) 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.

Sources: *Westminster Summer Reading Glossary (The Merriam Webster Dictionary, FreeOnlineDictionary.com, Britannica Concise Encyclopedia, Sci-Tech Encyclopedia, and GoogleHealth)*

