



A COURT FOR KING CHOLERA.

Good proposed explanations (hypotheses) are...

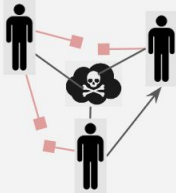
1. Mechanistic: Connects A and B
 - a. Characteristics are not mechanisms!
2. Measurable: We can test with experiments
3. Distinguishable: Leads to different predictions

Explanations for cholera (19th Century London)

- **Francis Moon, Lord Mayor of London**
- **Airborne-Poverty**: People get cholera after inhaling polluted air but also infect each other in severely overcrowded quarters with unsanitary conditions (improved sanitary conditions would reduce disease risk). (...)

Non-Contagious & Contagious

Certain situations temporarily promote person-to-person transmission by non-contagious victims.



4

CONTINGENTLY CONTAGIOUS

An atypical (contingent) suspension of non-contagion due to severe overcrowding and poor ventilation in filthy settings, correctable by sanitary improvements.

→ Primary non-contagionist explanation for incontestable instances of person-to-person transmission for most of the century.

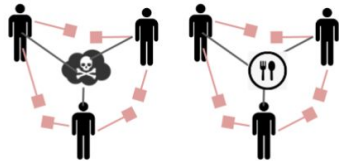


Explanations for cholera (19th Century London)

- **Edwin Chadwick, Sanitation Commissioner, General Board of Health**
- **Locally Airborne - Non-contagious:** People get sick by inhaling locally polluted air (e.g. coming from the pest field: move away from pest field) or ingesting something that was air-polluted. (...)

Non-contagious:

Since atmospheric changes produce the morbid cholera matter that people may inhale or ingest, they cannot communicate it to each other.



LOCAL ATMOSPHERE



Breathing air in filthy localities causes blood disorders characteristic of cholera.

→ proposed in 1830s for all non-contagious epidemic diseases; widely accepted for cholera from 1849-90s.

5



Blood absorbs morbidly contaminated food and drink from the stomach.

→ began during 1849 epidemic, increasingly accepted by localists until end of century.

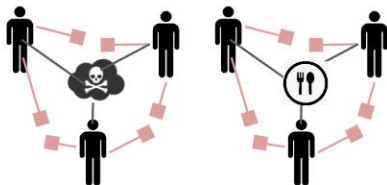


Explanations for cholera (19th Century London)

- **A Night-Soil Man**
- **Generally Airborne-Noncontagious:** People get cholera by inhaling generally polluted air (source is somewhere from earth's surface: hard to avoid unless you leave the area). (...)

Non-contagious:

Since atmospheric changes produce the morbid cholera matter that people may inhale or ingest, they cannot communicate it to each other.



GENERAL ATMOSPHERE



Earth exudes mysterious organic matter that contaminates the upper atmosphere and spreads via prevailing winds.

→ Generally rejected after evaluating evidence from 1831–32 cholera epidemic.



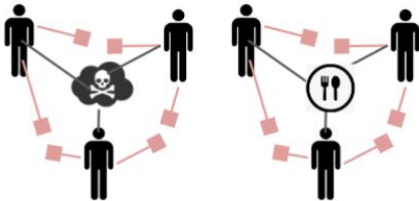
"Night Soil Man" from Dunston, Lincolnshire. He took away human waste to be used as fertiliser (1872). Photo credit: Professor Frank McDonough

Explanations for cholera (19th Century London)

- **William Farr, Registrar General of London**
- **Airborne-Elevation:** People get cholera after inhaling polluted air that settles in low elevation areas (move out of low-elevation areas). (...)

Non-contagious:

Since atmospheric changes produce the morbid cholera matter that people may inhale or ingest, they cannot communicate it to each other.

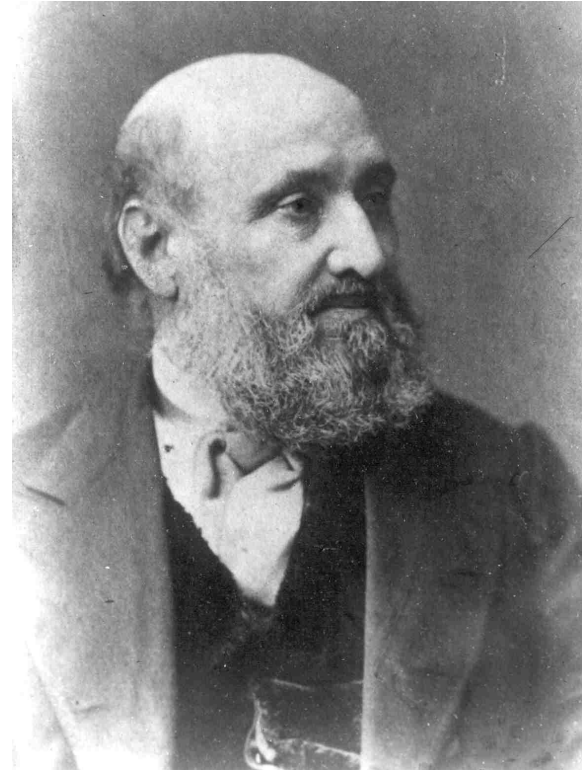


ELEVATION



(Farr's theory) Cholerine (choleraic morbid matter) on water surfaces evaporates and eventually settles in greatest quantities at lowest elevations.

→ Modified after 1866 to accommodate Snow's theory.

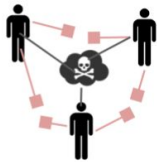


Explanations for cholera (19th Century London)

- **Dr. William Rogers**
- **Locally Airborne - Non-contagious:** People get sick by inhaling locally polluted air (e.g. coming from sewage through gullies: avoid inhaling air from sewers). (...)

Non-contagious:

Since atmospheric changes produce the morbid cholera matter that people may inhale or ingest, they cannot communicate it to each other.

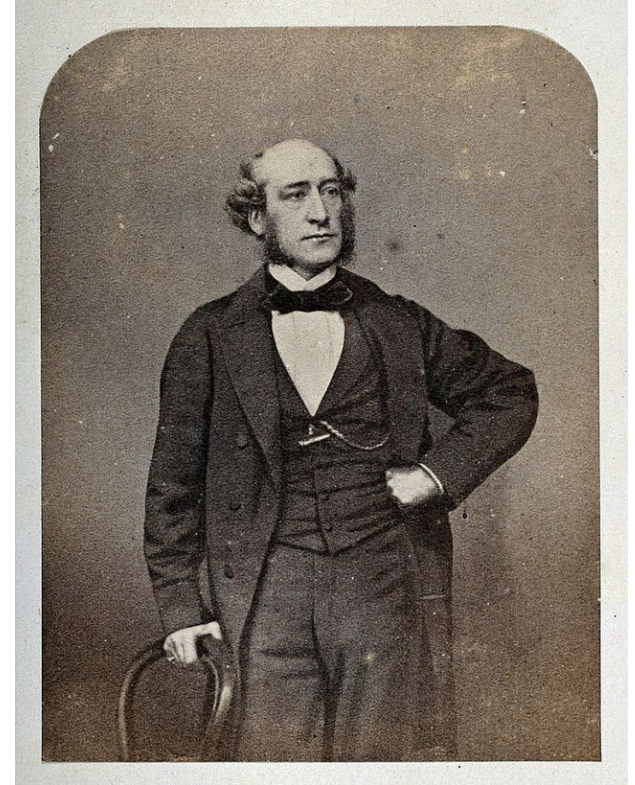


LOCAL ATMOSPHERE



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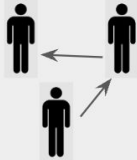


Explanations for cholera (19th Century London)

- **Blanche Smith, Wife of a Brass Finisher**
- **Airborne-Contagious:** People infect each other through the air (students will find this familiar because of covid: greater distancing would reduce risk). (...)

Contagious:

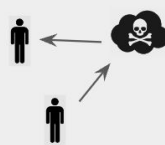
Victims reproduce the morbid matter/poison in their bodies, so they are able to transmit the disease to others.



THROUGH INHALATION

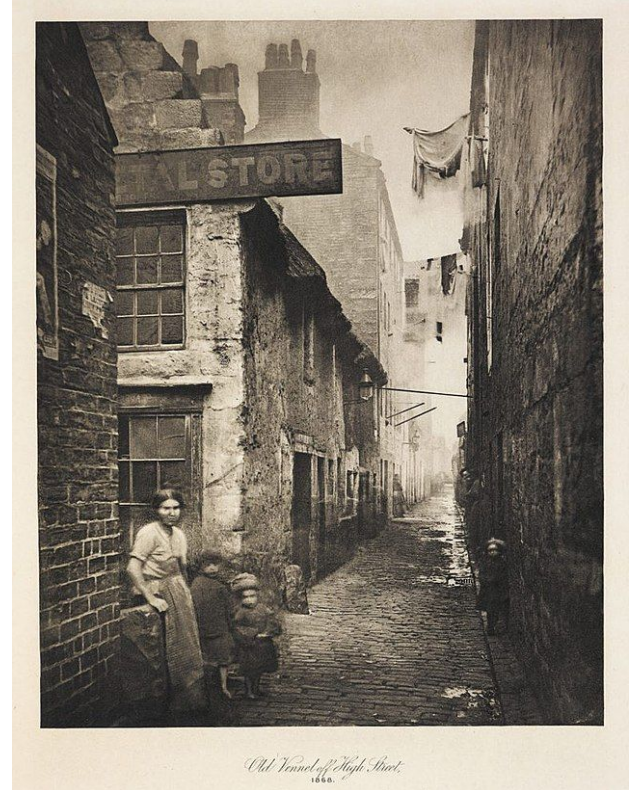
People infect each other through the air

Called infection at the time; victims may infect anyone who inhales the morbid matter emitted by their skin and breath.



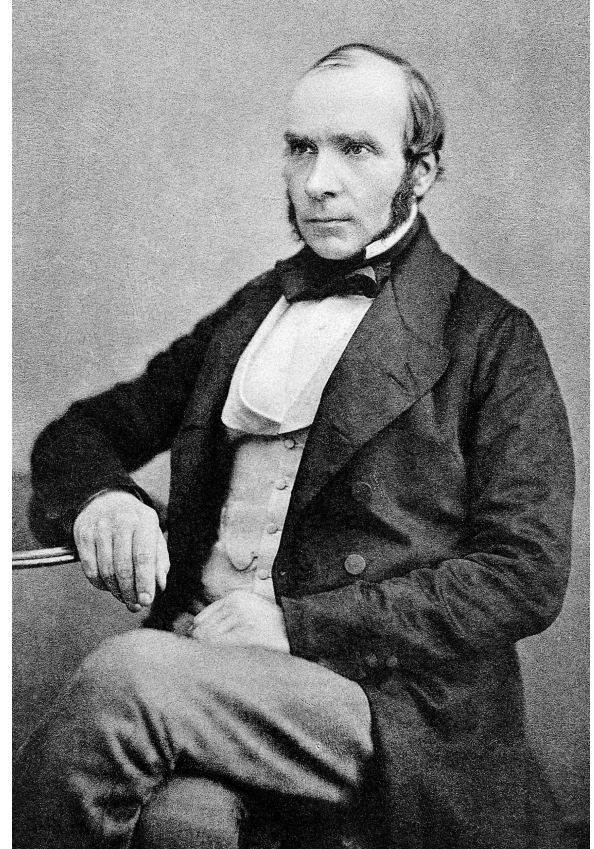
→ Phased out by early 20th century as advocates gradually switched to ingestion mode.

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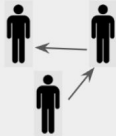
John Snow

- Doctor
- Noticed that cholera affected the gastrointestinal system (guts)
- Hypothesized that contaminated drinking water was the cause of cholera
- Not in the majority at the time (...)



Contagious:

Victims reproduce the morbid matter/poison in their bodies, so they are able to transmit the disease to others.



THROUGH INGESTION

People inadvertently pass morbid matter to others via ...

eg., by dirty hands; or if a victim's vomit or diarrhea contaminates food or water consumed by others..

→ (Snow's theory) gradually gains adherents who consider it the most plausible theory.



The Tale of Two Theories...

Airborne

Inhalation of a poison given off by dead or contaminated organic matter (like sewage) which enters the body through the lungs and poisons the blood.



Waterborne

Ingestion of “excretions of the sick” which contain a living organism which infects the gastrointestinal system (guts).



DATA SCIENCE REASONING FRAMEWORK

