

EVOLUTION OF THE CONCEPT OF THE INFECTION

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11.10.2022



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Miasma & Germ

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stars**

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Final Remarks



Throughout History



- Epidemics of infectious diseases have been documented throughout history.
- The morbidity and mortality of infections profoundly shaped politics, commerce and culture.
- From the earliest times, people have sought to understand the natural forces and risk factors affecting the patterns of illness and death in society.

MIASMA THEORY

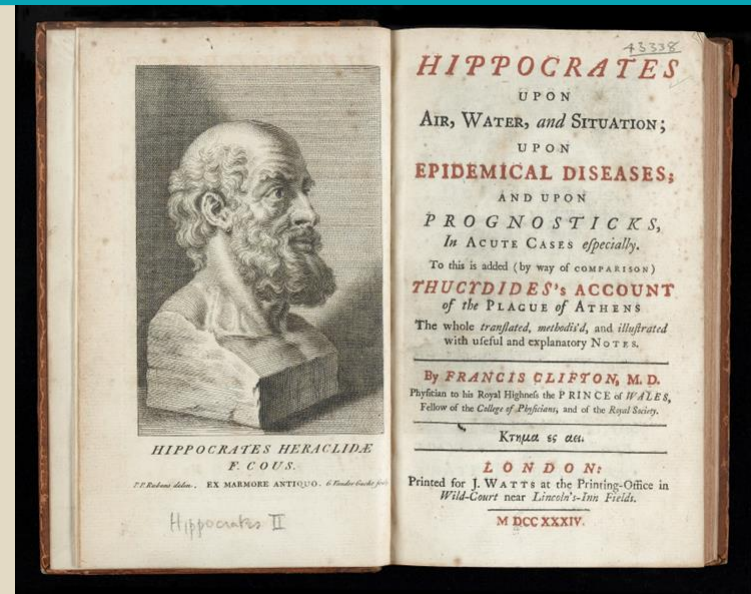


CHOLERA "TRAMPLES THE VICTOR & THE VANQUISH'D BOTH."

Hippocrates

(5th-4th century BCE)

- In his treatise «Airs, Waters, and Places», he dismissed supernatural explanations of disease and instead attributed illness to characteristics of the climate, soil, water, mode of life, and nutrition.
- Endemic versus epidemic



Plague of Athens

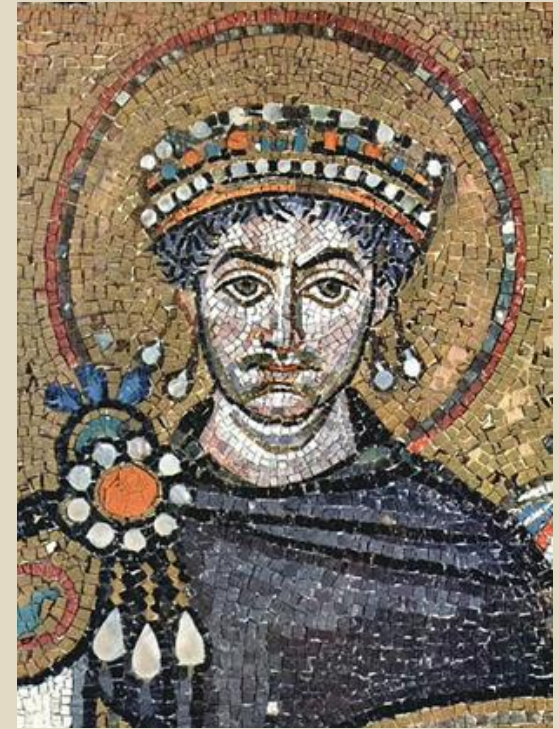
(430 BCE)



- Epidemics have destroyed populations and significantly altered economic, social, intellectual, and political aspects of life.
- The Greek historian Thucydides, in his History of the Peloponnesian War told how a lethal contagious disease afflicted the Athenians while Spartans lay siege to their city. The symptoms included fever, painful skin rash, and great thirst (typhus? smallpox?). No treatment was effective. Physicians, who were quickly exposed to many cases, died first; even birds and animals disappeared. The few survivors were considered immune.

Plague of Justinian (6th century)

- First historically recorded, major outbreak of plague (*Yersinia pestis*)
- Originated in Egypt, hit the capital Constantinople
- Reoccurred in western Eurasia and North Africa over the next two centuries
- Caused tens of millions of deaths throughout the Mediterranean world



Black Death

(14th century)

- Bubonic plague in Europe
- Travelled from Asia in ships and seemed to begin with the arrival of Genoese vessels at the Sicilian port of Messina in October 1347.
- From there, the disease marched rapidly north, fanning across Europe to reach Moscow by 1351.
- The symptoms were fever, swollen and oozing nodes (buboes), dehydration, and death.
- Plague remained in Europe and returned in successive waves for centuries; major epidemics ravaged Italy in 1630 and 1656, England in 1665, and southern France in 1720.



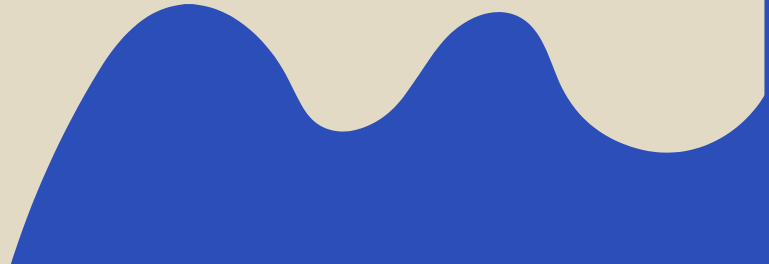
Plague doctor

- Whatever its remote origin, plague was perceived to be contagious.
- Physicians sometimes wore 'protective covering,' consisting of a gown, gloves, and a mask with mica goggles and a beaklike snout to contain healthful, fragrant herbs.



Quarantine

- Since travellers were potential carriers of the disease, states enacted laws of quarantine.
- From the Italian quaranta, meaning 'forty'
- The ships were required to wait forty days before unloading cargo or releasing passengers.
- The first of which can be traced to the town of Ragusa (now Dubrovnik) in 1377 and to Venice in the early fifteenth century



Cause of plague?

- Paris faculty of medicine attributed plague to atmospheric alterations resulting from a rare conjunction of planets in the constellation Aquarius in March 1345.
- Others saw it as divine punishment for the corruption of priests.
- Still others blamed minorities, strangers, and travellers. Village idiots, vagrants, beggars, 'witch' women, and Jews were tortured for confessions, driven away, or burned alive.



Leprosy



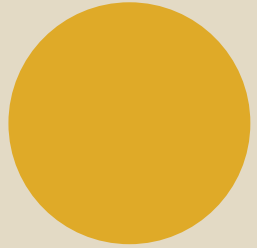
- Leprosy denoted physical and moral impurity and punishment for sin. Sufferers were forced to live in colonies and wear special clothes or bells to announce their presence.
- 'lazaretto', 'leprosarium'
- The disease is only mildly contagious. Regulations probably had more to do with protecting the healthy rich from having to confront the dreadful mutilations of the disfigured poor.



Syphilis

(end of the 15th century)

- A virulent outbreak, apparently without precedent, afflicted the French armies and their Spanish mercenaries during a siege of Naples in the mid-1490s.
- Syphilis was called the 'great pox,' but it has also been called the 'French disease' by the Italians, the 'English disease' and the 'Spanish disease' by the French, and the 'Neapolitan disease' by the Spaniards.
- The prevailing view is that syphilis was transported to Europe from the Americas.



Transmission of syphilis

- Girolamo Fracastoro suggested that contagious diseases were caused by 'seeds' (seminaria) transmitted by people and objects. He concluded that these seeds must be alive, able to divide and multiply; without this property, he reasoned, they would diminish to negligible quantities through transmission.
- He also understood that this new disease was spread by sexual contact.



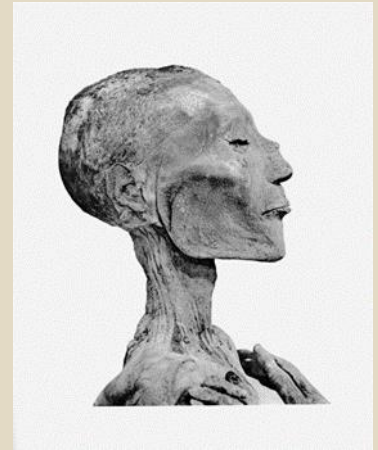
Malaria

- «mal»: bad, «aria»: air in Italian.
- 1630: Peruvian bark (cinchona) was imported into Europe for the treatment of malaria.
- Its active ingredient, quinine, was the first specific treatment for the disease.
- In 1717, G.M. Lancisi theorized that swamps produced two kinds of emanations capable of producing disease: inanimate (miasma) and animate (mosquitoes).
- Malaria parasite was discovered in 1880; in 1898, it was found that the germinal rods were packed in the salivary glands of mosquitoes.



Smallpox

- was prevalent in Old World since Antiquity
- Variolization: introducing the pus from smallpox vesicles directly under the skin to induce immunity; published first by Timoni; introduced by Lady Mary Wortley Montagu, wife of the British ambassador (1717).
- Vaccination: Edward Jenner conducted an experiment to demonstrate that milkmaids who had contracted cowpox (the mild pustular eruption from infected cows) were immune to smallpox (1798).

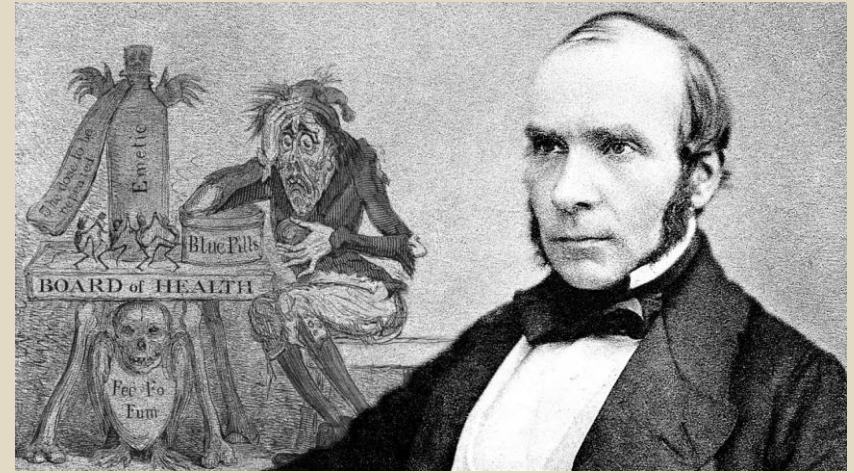


**Winter
is
coming**



The father of epidemiology

- The Broad Street cholera outbreak-1854
- Soho, London, England – 616 lives
- Broad Street Pump was the origin of infected water
- significant improvement in general public health around the world



Contagion and Germ theory

- Thucydides 5th century BC
- Marcus Terentius Varro – Poet Lucretius 1st century BC
- Bergamali Galen – seeds of diseases
- Ibn-i Sina – transmission of tuberculosis
- Ibn-i Hatime – minute bodies 14th century
- Girolamo Fracastoro – seminaria morbi
- Leeuwenhook – microscope
- Nicolas Andrey – smallpox via warms - 1700
- Richard Bradley – poisonous bugs -1720
- Marcus Antonious von Plenciz – every disease has different origin – 1762
- Agostino Bassi de Lodi – parasites – 1808
- Kützing, Latour, Schwann – yeast cells 1836
- Schwann and cell theory
- Virchow – cellular pathology

Koch's Legacy: The Discoverers of the Main Bacterial Pathogens

Year	Disease	Organism	Discoverer
1877	Anthrax	<i>Bacillus anthracis</i>	Koch, R.
1878	Suppuration	<i>Staphylococcus</i>	Koch, R.
1879	Gonorrhoea	<i>Neisseria gonorrhoeae</i>	Neisser, A.L.S.
1880	Typhoid fever	<i>Salmonella typhi</i>	Eberth, C.J.
1881	Suppuration	<i>Streptococcus</i>	Ogston, A.
1882	Tuberculosis	<i>Mycobacterium tuberculosis</i>	Koch, R.
1883	Cholera	<i>Vibrio cholerae</i>	Koch, R.
1883	Diphtheria	<i>Corynebacterium diphtheriae</i>	Klebs, T.A.E., Loeffler, F.
1884	Tetanus	<i>Clostridium tetani</i>	Nicholaier, A.
1885	Diarrhea	<i>Escherichia coli</i>	Escherich, T.
1886	Pneumonia	<i>Streptococcus pneumoniae</i>	Fraenkel, A.
1887	Meningitis	<i>Neisseria meningitidis</i>	Weischselbaum, A.
1888	Food poisoning	<i>Salmonella enteritidis</i>	Gaertner, A.A.H.
1892	Gas gangrene	<i>Clostridium perfringens</i>	Welch, W.H.
1894	Plague	<i>Yersinia pestis</i>	Kitasato, S., Yersin, A.J.E. (independently)
1896	Botulism	<i>Clostridium botulinum</i>	van Ermengem, E.M.P.
1898	Dysentery	<i>Shigella dysenteriae</i>	Shiga, K.
1900	Paratyphoid	<i>Salmonella paratyphi</i>	Schottmüller, H.
1903	Syphilis	<i>Treponema pallidum</i>	Schaudinn, F.R., and Hoffmann, E.
1906	Whooping cough	<i>Bordetella pertussis</i>	Bordet, J., and Gengou, O.

Ignaz Semmelweis

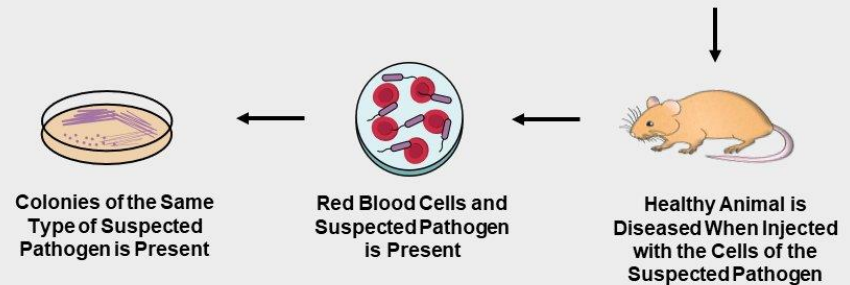
- Saviour of mothers
- Puerperal fever
- Vienna general hospital-1847
- «unable to endure further frustrations in dealing with the Viennese medical establishment»
- 1865 – died in asylum



Koch postulates

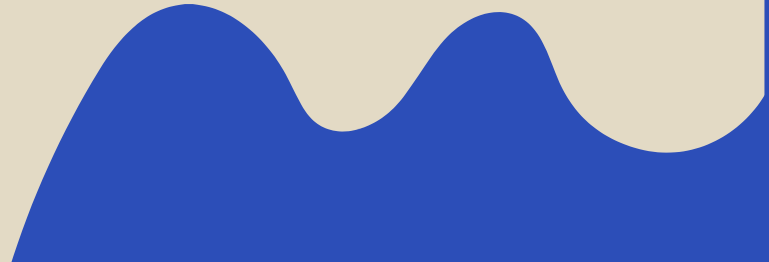
1. The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms.
2. The microorganism must be isolated from a diseased organism and grown in pure culture.
3. The cultured microorganism should cause disease when introduced into a healthy organism.
4. The microorganism must be reisolated from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent.

Koch's Postulates



Tuberculosis

- In the late 19th century, tuberculosis was the single most important cause of adult death, a distinction it held for more than a century.
- Sufferers were isolated or quarantined in sanatoria.
- 1882: Robert Koch identified its bacterial cause as he established germ theory.
- An effective vaccine using the less aggressive *Bacillus Calmette-Guérin* (BCG) was developed in the early 1920s.



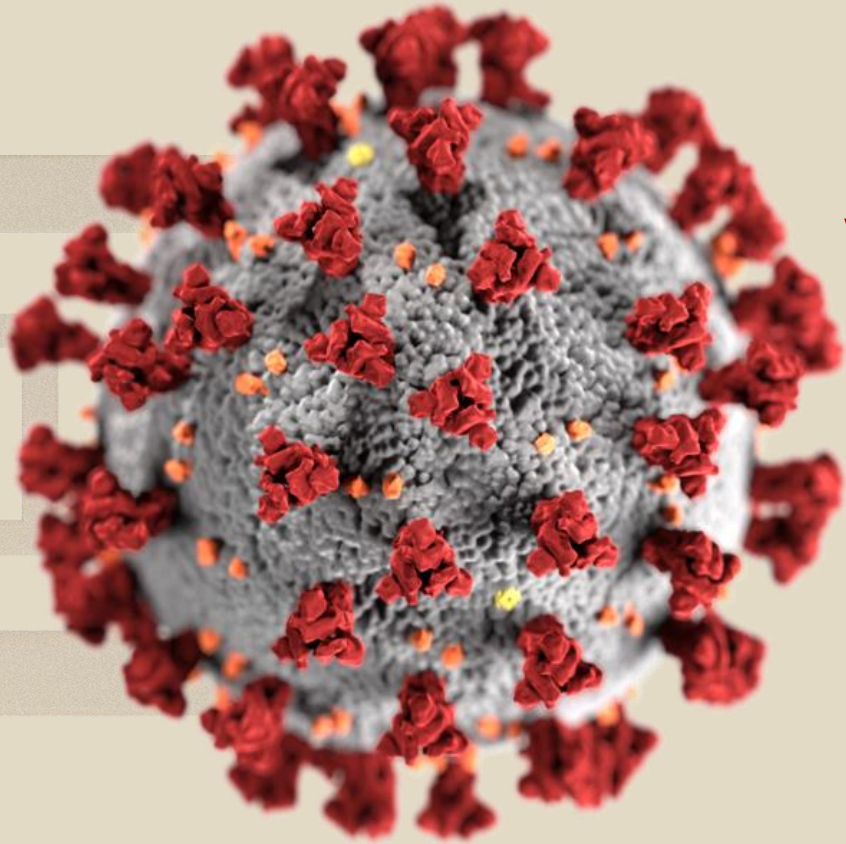
First antimicrobial drugs

- 1920's: new antimalarial drugs were synthesized by Bayer company; pamaquine (Plasmoquine) and quinacrine (Atabrine)
- 1932: anti-streptococcal activity of synthetic dyes was observed and sulfonamide drugs were developed (sulfanilamide, Prontosil: first systematically active antibiotic)
- 1942: Penicillin was purified and used (Fleming, 1928)
- 1952: first anti-TB drug was discovered (streptomycin)





FINAL REMARKS



www.covid19ethics.com



THANKS

Does anyone have any questions?



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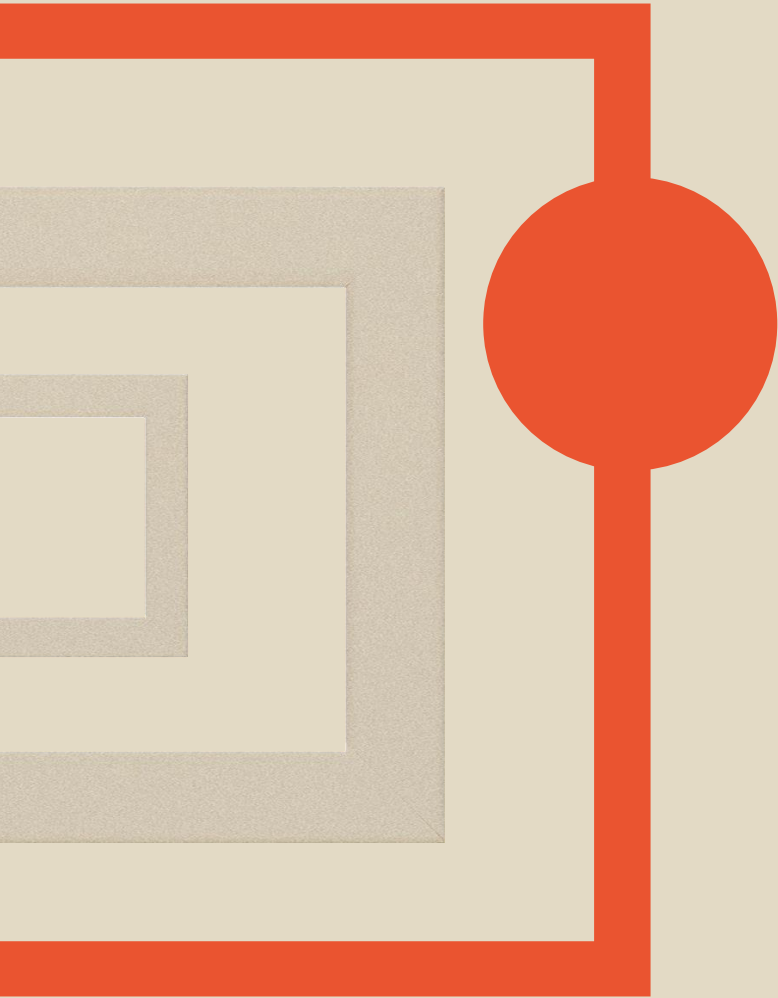
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