

Medical Microbiology

E. coli as an All-Rounder



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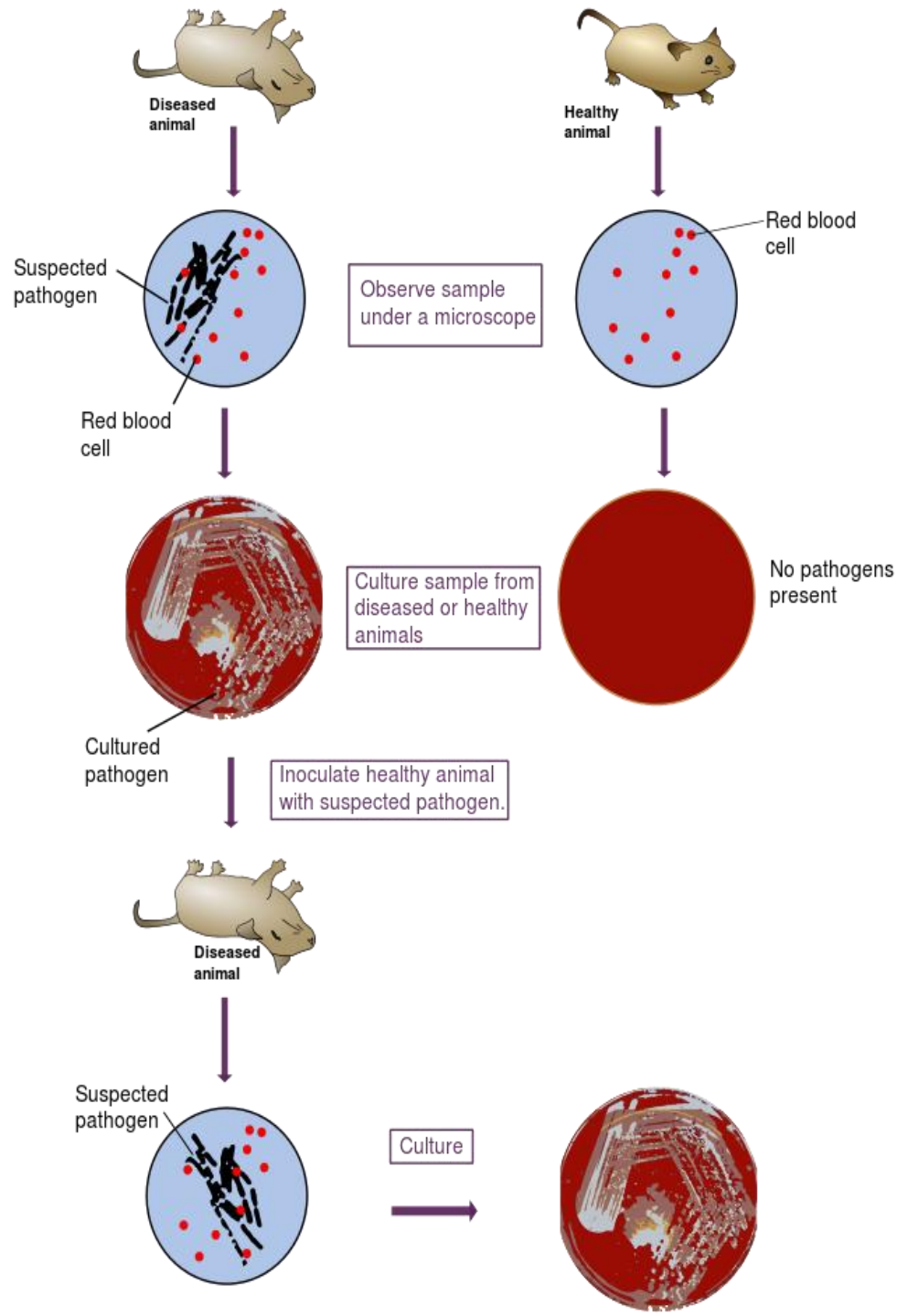
Koch's Postulates:

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.



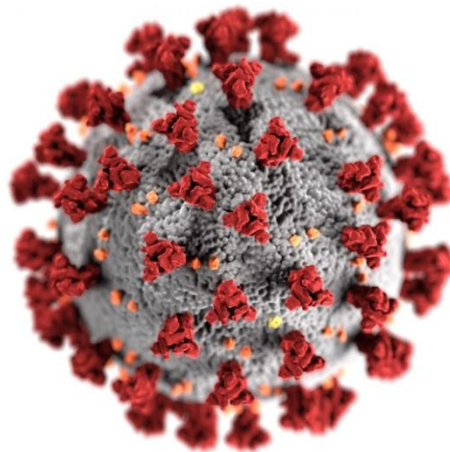
Robert

Hermann Koch

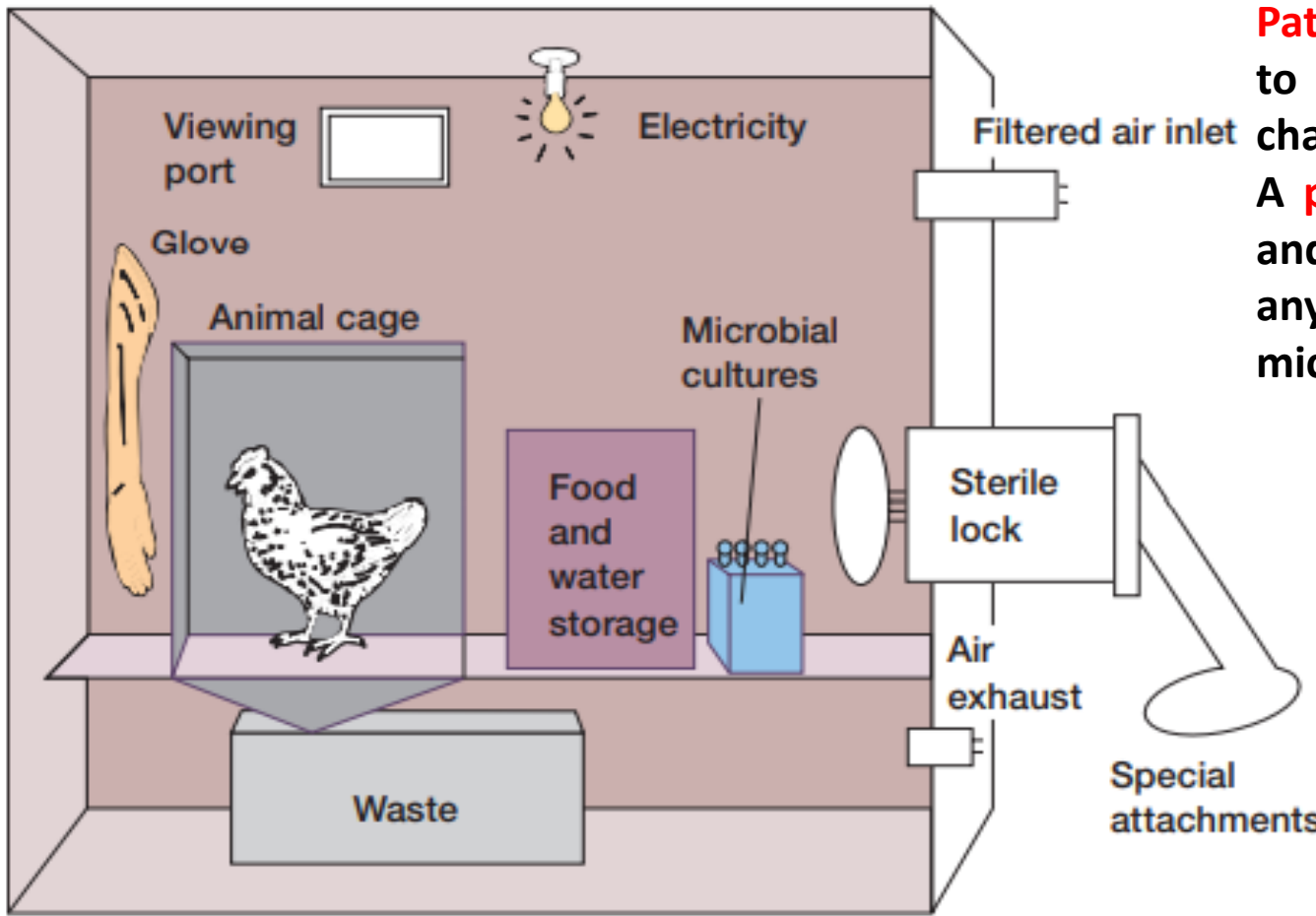
(11 December 1843
– 27 May 1910)

Molecular Koch's Postulates (Today)

1. The phenotype or property under investigation should be associated significantly more often with pathogenic strains of a species than with nonpathogenic strains.
2. Specific inactivation of the gene or genes of interest associated with the suspected virulence trait should lead to a measurable decrease in virulence.
3. Restoration of pathogenicity or full virulence should accompany replacement of the mutated allele with the original wild-type gene.



Gnotobiotic Animals (Greek *gnotos*, known, and *biota*, the flora and fauna of a region)



Pathogenicity is the ability to produce pathologic changes or disease.

A **pathogen** [Greek *patho*, and *gennan*, to produce] is any disease-producing microorganism.

Resistant to *Entamoeba histolytica*

Germfree animals possess poorly developed lymphoid tissue, a thin intestinal wall, an enlarged cecum, and a low antibody titer, require high amounts of vitamin K and the B complexes, have reduced cardiac output and lower metabolic rates.

Epidemiology

JOHN SNOW

Epidemiology [Greek *epi*, upon, and *demos*, people or population, and *logy*, study] is the science that evaluates the occurrence, determinants, distribution, and control of health and disease in a defined human population.



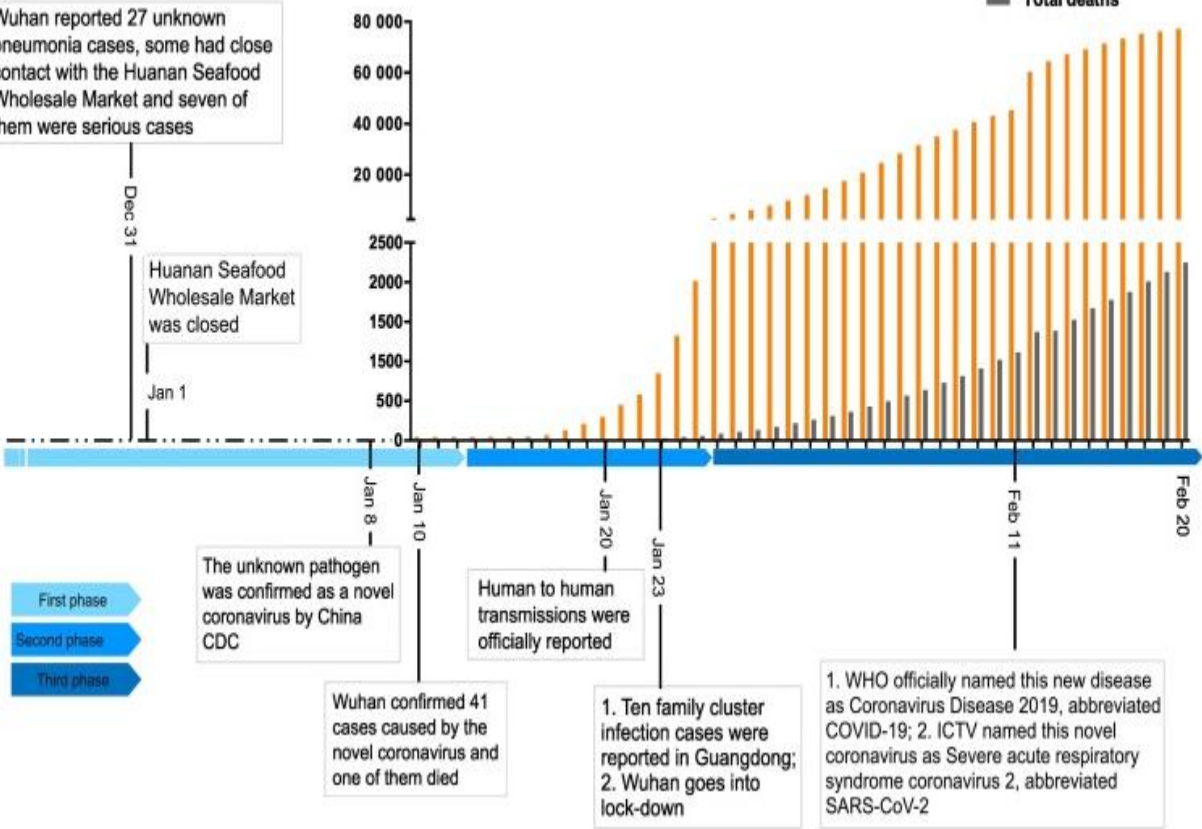
John Snow (15 March 1813 – 16 June 1858) was a British physician and a leader in the adoption of **anaesthesia** and medical **hygiene**. He is considered to be one of the fathers of **epidemiology**, because of his work in tracing the source of a **cholera outbreak in Soho, England, in 1854**.

Health is the condition in which the organism (and all of its parts) performs its vital functions normally or properly.

A **disease** is an impairment of the normal state of an organism or any of its components that hinders the performance of vital functions. (temperature, $>38^{\circ}\text{C}/100.4\text{F}$ or $<36^{\circ}\text{C}/96.8\text{F}$; heart rate, 90 beats per min; leukocyte count, $>12,000$ cells per ml^3)

(A)

Wuhan reported 27 unknown pneumonia cases, some had close contact with the Huanan Seafood Wholesale Market and seven of them were serious cases

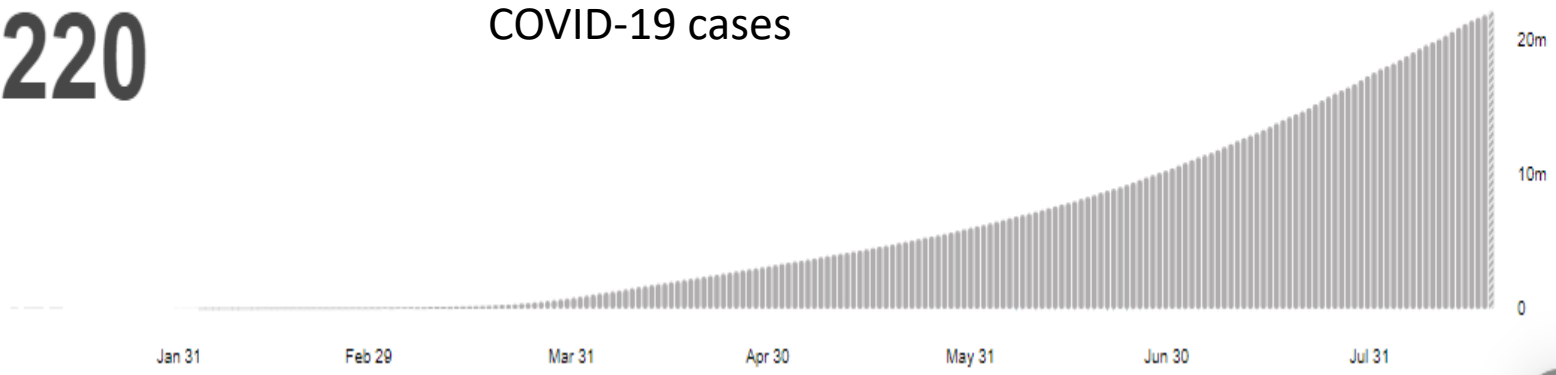


Global Situation

22,256,220
confirmed cases

As of **20 August 2020**
COVID-19 cases

Daily
 Weekly



Epidemics of infectious disease are often compared with forest fires. Once fire has spread through an area, it does not return until new trees have grown up. Epidemics in humans develop when a large population of susceptible individuals is present.

—Andrew Cliff and Peter Haggett

Books

- **Sherris Medical Microbiology**
- **Kayser, Bienz, Eckert, and Zinkernagel Medical Microbiology**
- **Jawetz, Melnick, and Adelberg's Medical Microbiology**
- **Gillespie and Bamford Medical Microbiology**