

History of infectious disease & introduction to epidemiology

- Goals and requirements for Bio067
- Germ-theory of disease: A 350 year epic
- Scientific methods
- Epidemiology and public health
- Environmental vs. mechanistic explanations of disease

Bio 067 course website

Explore, use and contribute!

<http://www.bowdoin.edu/faculty/a/amcbride/courses/bio067>

Goals for Biology 067

- Understand the biology behind infectious diseases
 - What are infectious agents?
 - How do they interact with hosts?
- Learn how scientific research leads to the identification and understanding of infectious agents
- Explore factors that contribute to the spread of disease
- Become skilled at asking questions and determining how they can be addressed

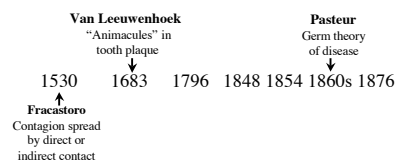
Goals for Biology 067

- Learn to analyze sources of information about infectious diseases
- Practice working collaboratively with colleagues
- Improve communication skills

Requirements for Biology 067

- Midterm & Final
- Group project
- Laboratory work
- CLASS PARTICIPATION
 - Class activities, discussions of readings, asking questions

Germ theory of disease: Timeline



Pictures from Encyclopedia Britannica
<http://search.eb.com>

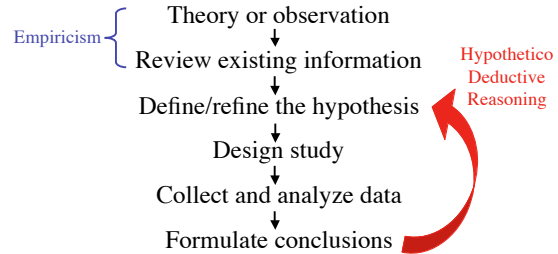
Scientific Methods

Empiricism: Way to gain knowledge primarily guided by experience and observation

“Hypothetico-deductive” reasoning:
Hypothesis generation, testing, and refinement of hypothesis

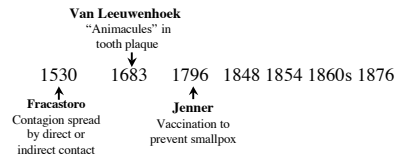
Adapted from Gerstman “Epidemiology Kept Simple” (1998), Chapter 1

Scientific Methods



Adapted from Gerstman “Epidemiology Kept Simple” (1998), Chapter 1

Germ theory of disease: Timeline



Pictures from Encyclopedia Britannica
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Edward Jenner

1798

"An inquiry into the causes and effects of the variolae vaccinae, a disease discovered in some of the western counties of England, particularly Gloucestershire, and known by the name of The Cow Pox"

in Milestones in Microbiology, ed. T. Brock
Semmelweis museum Budapest, Hungary (1961), (Washington, DC: ASM Press) pp. 121-125.

Jenner's observations

- During smallpox outbreaks, dairy-maids had lower incidence of smallpox than others.
- When servants milked cows with cowpox-infected udders, "inflamed spots" appeared on their hands.
- When these subjects received smallpox inoculations, they did not show symptoms.

(Jenner, E., 1798, p. 121)

Hypothesis

People with minor cases of cowpox become resistant to smallpox.

Test

May 14, 1796: Inserted "matter" from an infected dairy-maid's hand into "superficial incisions" in the arm of William Summers.

May 23, 1796: Summers "was perceptibly indisposed."

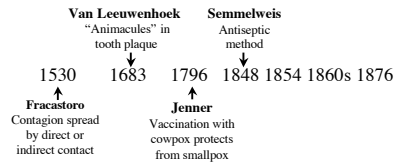
July 1, 1796: Inserted "variolous matter" from a smallpox patient into "slight punctures and incisions" Summers' arms.

Result

"No effect was produced on the constitution" of Summers following smallpox inoculation.

(Jenner, E., 1798, p. 123)

Germ theory of disease: Timeline



Pictures from Encyclopedia Britannica
<http://search.eb.com>

Ignaz Semmelweis 1818-1865

- Assistant, obstetric clinic Vienna, 1844
- Hospital childbirth mortality rate 25-30% (puerperal fever)
- Hypothesis: Students carrying infection to mothers
- Test: Wound transmission

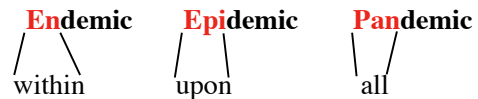
<http://c.lending.kumc.edu/dc/pc/semmelweis01.jpg>

Solution for Puerperal Fever

Handwashing

Semmelweis museum Budapest, Hungary

Diseases in populations



Demios = the people

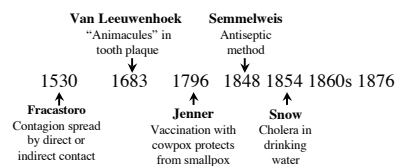
Epidemiology and Public Health

Epidemiology: The study of the causes, transmission, incidence, and prevalence of disease and health-related events in populations

Public Health: Organized community effort to prevent disease and promote health

From Gerstman "Epidemiology Kept Simple" (1998), p. 3.

Germ theory of disease: Timeline



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<http://search.eb.com>

John Snow's map of the 1854 cholera epidemic

See Fig. 1.2 and Table 1.4 in Gerstman Ch. 1

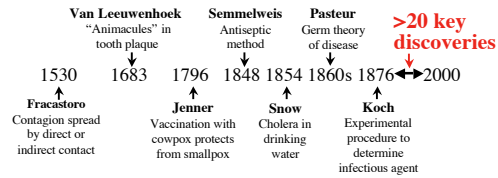
<http://www.nationalgeographic.com/resources/ngo/education/ideas912/912choleraho3.html>

Environmental vs. mechanistic views of disease

Environmental/non-mechanistic view:
Diseases are caused by environmental conditions and can therefore be controlled by improving the environment

Mechanistic view: Diseases are caused by specific microbes and can therefore be controlled by fighting the microbe

Germ theory of disease: Timeline



Pictures from Encyclopedia Britannica
<http://search.eb.com>

Information I will request by email

Name	Year	Major (potential)
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Home town

Science background (Bowdoin & before)

Why are you taking Bio 067?

What do you want to learn this semester?

What question(s) do you have about emerging infectious diseases?