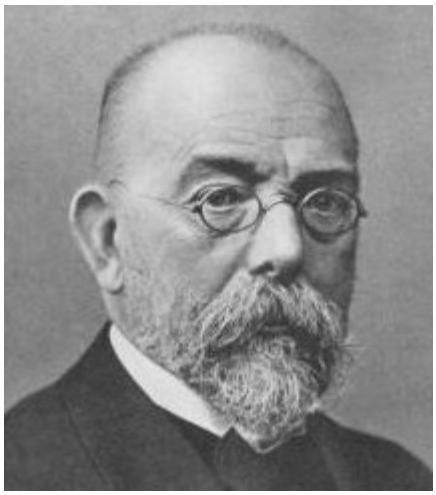
Lecture: Koch



Alive from:

Country of Origin:

Education/Training: Medicine

Employment:

Contributions/Accomplishments:

- worked with anthrax (found in soil, infects grazing animals and by accident or design, people)

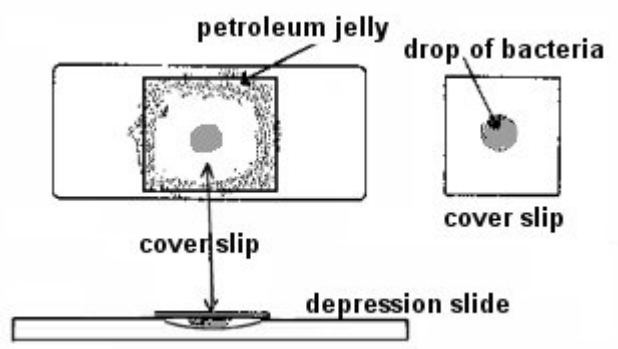
- he saw "_____" which were rods and chains of rods

- he discovered that these "sticks and threads" were alive and were the bacteria that caused anthrax ( )

- he discovered that it produces spores (a tough, highly resistant dormant structure that turns back into a live bacterial cell under ideal conditions like a warm animal's body)

- Koch discovered the causative agents for cholera ( ) and tuberculosis, known back then as "consumption", ( )

- he created the "hanging drop slide" technique



- Koch created ways to make pure cultures of separate organisms using solid media (potato slices first, then gelatin, and eventually agar which is the standard medium used today)

- Koch contributed to the Germ Theory of Disease ( )

- 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 organism must be isolated from the diseased host and grown in culture. (not always possible – growth requirements for all pathogens are not known)

3. The disease must be reproduced when a pure culture of the organism is introduced into a healthy, susceptible host. ( )

4. The same organism must be reisolated from the experimentally infected host.

- as you can see there are several problems with Koch's postulates especially when it comes to viruses which Koch did not know about at that time

Modified postulates have been suggested for viruses (after Thomas Milton Rivers)

1. The specific virus is present and can be isolated from all diseased hosts, and is not present in healthy individuals.

2. The virus isolated from diseased individuals can be cultivated in host cells in the laboratory.

3. Proof of filterability (helps establish that the infectious agent is the size expected of a virus)

4. When an original host species or a related species is inoculated with the virus isolated from diseased hosts, it develops a comparable disease.

5.

6. A specific immune response can be detected in the inoculated hosts.

Reaction/Response:

- Although there was some controversy and opposition to the discovery that M. tuberculosis caused TB, there seems to have been little else controversial with Koch.

- Koch and Pasteur did not like each other and they fought frequently

Lecture: Spallanzani

Alive from: 1729-1799

Country of Origin:

Employment:
- professor of logic and metaphysics ( )

Education/Training:
- Catholic priest, biologist and physiologist

- encouraged to pursue science by his cousin Laura Bassi; one of the first women to be awarded a doctorate, first woman to be given a teaching position/professorship ( ) at age 21! She was also the first woman in Europe to earn a professorship in physics (she taught Newtonian mechanics), and she had 8 (12?) children!

Contributions/Accomplishments:
- he determined that digestion was a chemical process not simply a mechanical one

- echolocation in bats (they use sound and hearing to navigate in total darkness)

- showed eggs and sperm are both required for animal reproduction (fist to use in vitro fertilization using frogs and artificial insemination with dogs!)

- most famous accomplishment was disproving spontaneous generation in favor of biogenesis

    - example of spontaneous generation: many believed that rotting animal carcasses ( ) could create flies, maggots, even bees!

    - this was easily disproved by Francisco Redi
        - rotting meat was placed into jars. Some jars were open; others were covered with fine netting. Open jars developed maggots because flies were able to lay eggs in the meat. Jars covered with fine netting prevented flies from laying eggs in the meat, but the "vital/vegetative force" could get into the meat; however no maggots ever developed

    - "Can living things arise spontaneously, or does every living thing have to have parents?" ( )

    - there was no vegetative/vital force needed for microbes to be created

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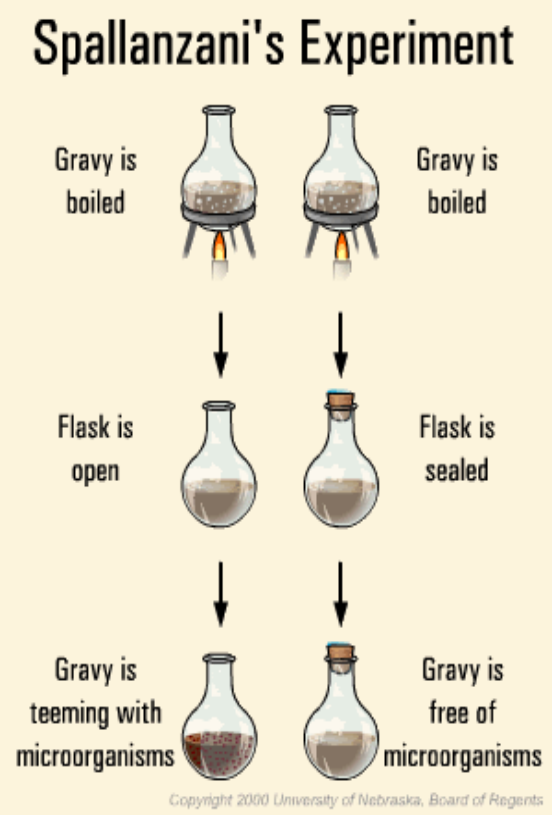

Reaction/Response/Controversy:

- at this time the Inquisition was not as dangerous

- the Invisible College became more " "

- scientists were now able to question religious teachings and dogma (Pope Benedict XIV supported scientific research!)

- devout believers in spontaneous generation refused to accept biogenesis even though Spallanzani repeatedly disproved John Needham's experiment

Study Objectives

1. **Know where Koch and Spallanzani were born.**

2. **Describe the scientific training, if any, possessed by Koch and Spallanzani.**

3. **Explain the Germ Theory of Disease.**

4. **What were the three diseases and the pathogens that cause them discovered by Koch?**

5. **Describe Koch's postulates and explain the problems with them.**

6. **Describe the new modified postulates suggested for use with viruses.**

7. **Why do you think Koch's original postulates may not work that well for viral diseases?**

8. **Describe the 4 major accomplishments made by Spallanzani.**

9. **Compare and contrast biogenesis with spontaneous generation. What experiments were performed by Redi, Needham, and Spallanzani? Which hypothesis do the results of those experiments support – biogenesis or spontaneous generation? Why or why not?**

10. **Using your knowledge from question #9, explain the following statement:** "Can living things arise spontaneously, or does every living thing have to have parents?"