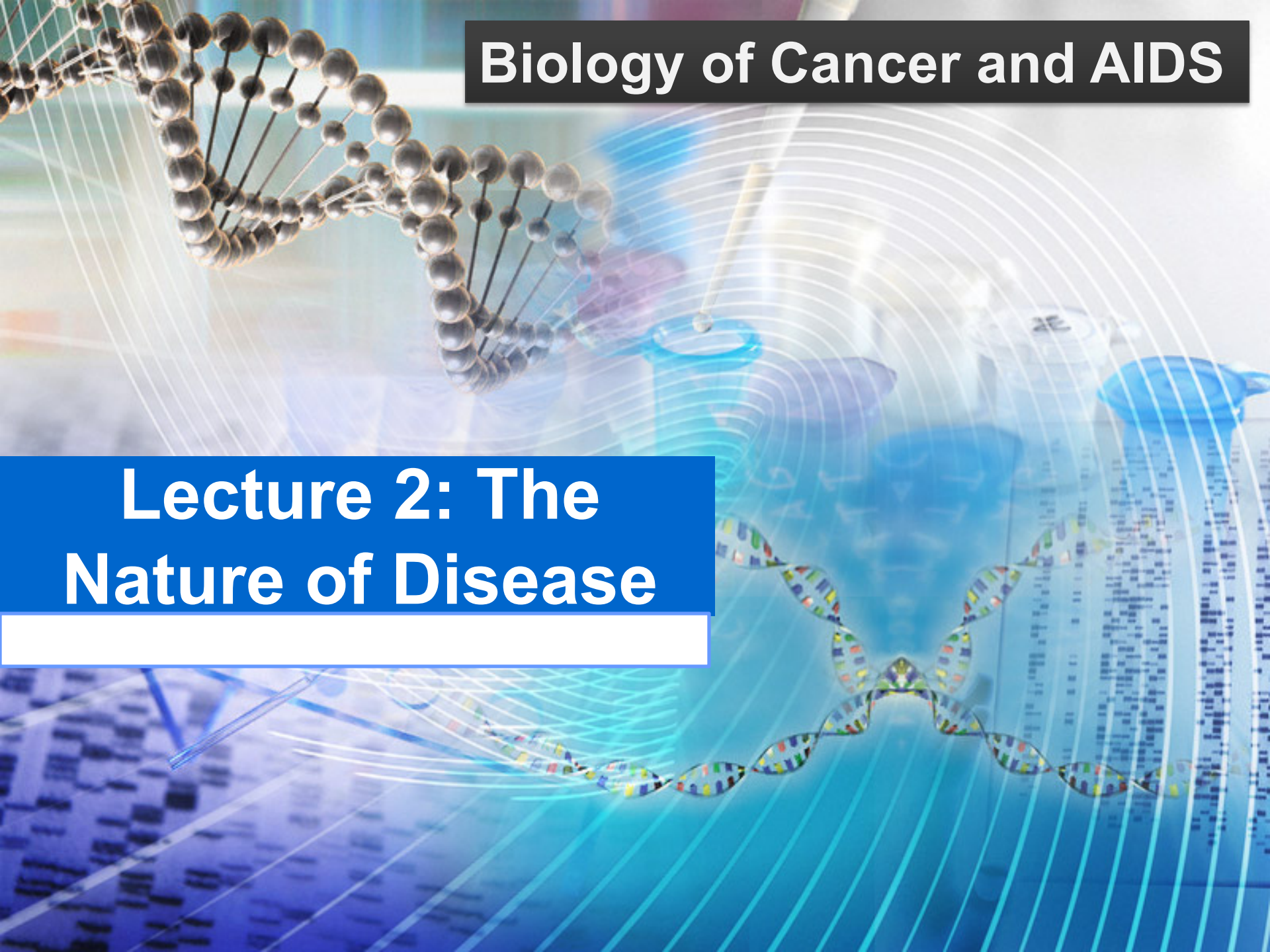


Biology of Cancer and AIDS



Lecture 2: The Nature of Disease

Are These Real Diseases?



Obesity was a status symbol in renaissance culture: "The Tuscan General Alessandro del Borro", attributed to Charles Mellin, 1645. It is now generally regarded as a disease.

Drunkenness Is a Disease and Can be Cured.

It is now a well-known fact to the medical fraternity and the laity, that Drunkenness is a disease of the entire nervous system, and it is curable, the same as any other malady.

We have at very great expense, discovered a SURE and INFALLIBLE cure for this curse, having found it by many years of constant study and research. This treatment is not to be compared with the worthless quack cures advertised at so much per package, or "Free," &c. It is a different matter from all this to perfect a course of thorough, special treatment that

WILL REALLY DO THE WORK AND CURE forever. This remedy can be given with or without the knowledge of the patient, and can be placed in any food or liquids that the person uses. It is PERFECTLY HARMLESS.

We have and are curing thousands, and we have thousands of grateful testimonial letters on file, speaking of the wonderful cures through the means of this remarkable remedy. WE PAY 500 DOLLARS FOR ANY CASE THAT WE CANNOT CURE. 87,000 used our cure during 1902, and we have yet to hear of one that was not perfectly satisfied. WE WANT THE WORST CASES ONLY. If yours is the worst case, by all means write at once, and save the downfall. All correspondence is held sacredly confidential, no names of patients being published or made public without written consent. Consultation FREE. All correspondence and packages without name and marks to indicate contents.

OVER THIRTY YEARS A CONQUEROR OF DISEASE.

Treatment and Medicines only 21/-

Send us complete history of case: age, amount drunk a day, what kind drunk, weight of person, how long drinking, &c., together with 21/-, and we will send all necessary medicines, directions, &c., leaving you in position to commence treatment at once.

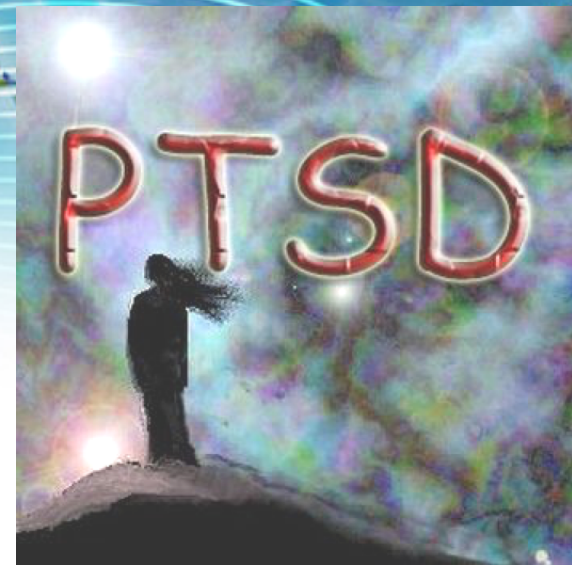
FREE BOOK! FREE BOOK! FREE BOOK!

Dr. Saunders' latest treatise on the causes, various types, successful treatment of the Liquor habit, "A CURSE AND ITS CURE," mailed free in a plain, sealed envelope, to any address for 1/- in stamps to pay the cost of postage. Remember postage to U.S. is 24d., and all letters must be fully prepaid. Address:

Dr. W. H. SAUNDERS & Co.,

Box 1453, Englewood Sta., CHICAGO,
ILL., U.S.A.

A 1904 advertisement labeling alcoholism a "disease".



Post-traumatic stress disorder



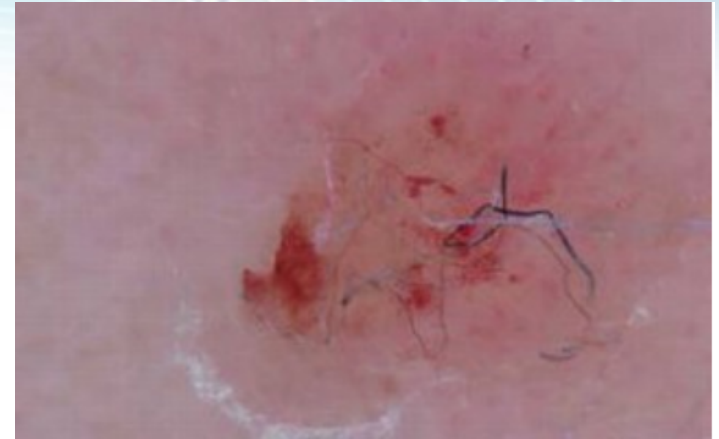
Los Angeles Times / Luis Since via AP

PTSD accelerates HIV disease progression.
PTSD increases risk of heart disease



DISPUTED DISEASES

- Chronic Fatigue Syndrome
- Adult ADHD
- Chronic Lymes Disease
- **Morgellons** Delusional parasitosis?
 - formication, the sensation that bugs are crawling under one's skin,
 - can be caused by allergies, mites, stimulant drug abuse, dementia and mental retardation, and more



Broad Categories of Diseases

☐ Infectious Disease

- Pathogen-mediated
- Specific organism or combination of organisms

☐ Genetic Disease

- disease caused by abnormalities in an individual's genetic material (genome) e.g. Klinefelter's syndrome, Down syndrome , Turner Syndrome

☐ Environmental disease

- Molds
- Cigarette smoke
- Radon
- Lead poisoning

- What kind of disease is cancer?



How do you get cancer ?

- **Genetic**
- **Environmental exposure (smoking, diet)**
- **Contagious**
 - (viral) hepatitis/liver, cervical, throat, stomach
 - (cellular) DFTV Devil Facial Tumor Disease
 - canine transmissible venereal tumor (CTVT)



The Meat Maggot Experiment.: Exploring the Scientific Method

Observation/Question: Where do the flies at the butcher shop really come from? Does rotting meat turn into or produce the flies?

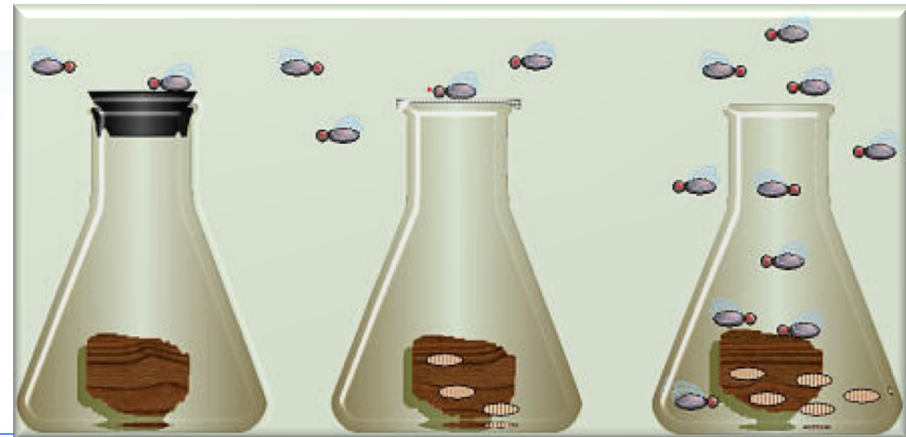
Hypothesis: Rotten meat does not turn into flies. Only flies can make more flies.

Prediction: If meat cannot turn into flies, rotting meat in a sealed (fly-proof) container should not produce flies or maggots.

Test



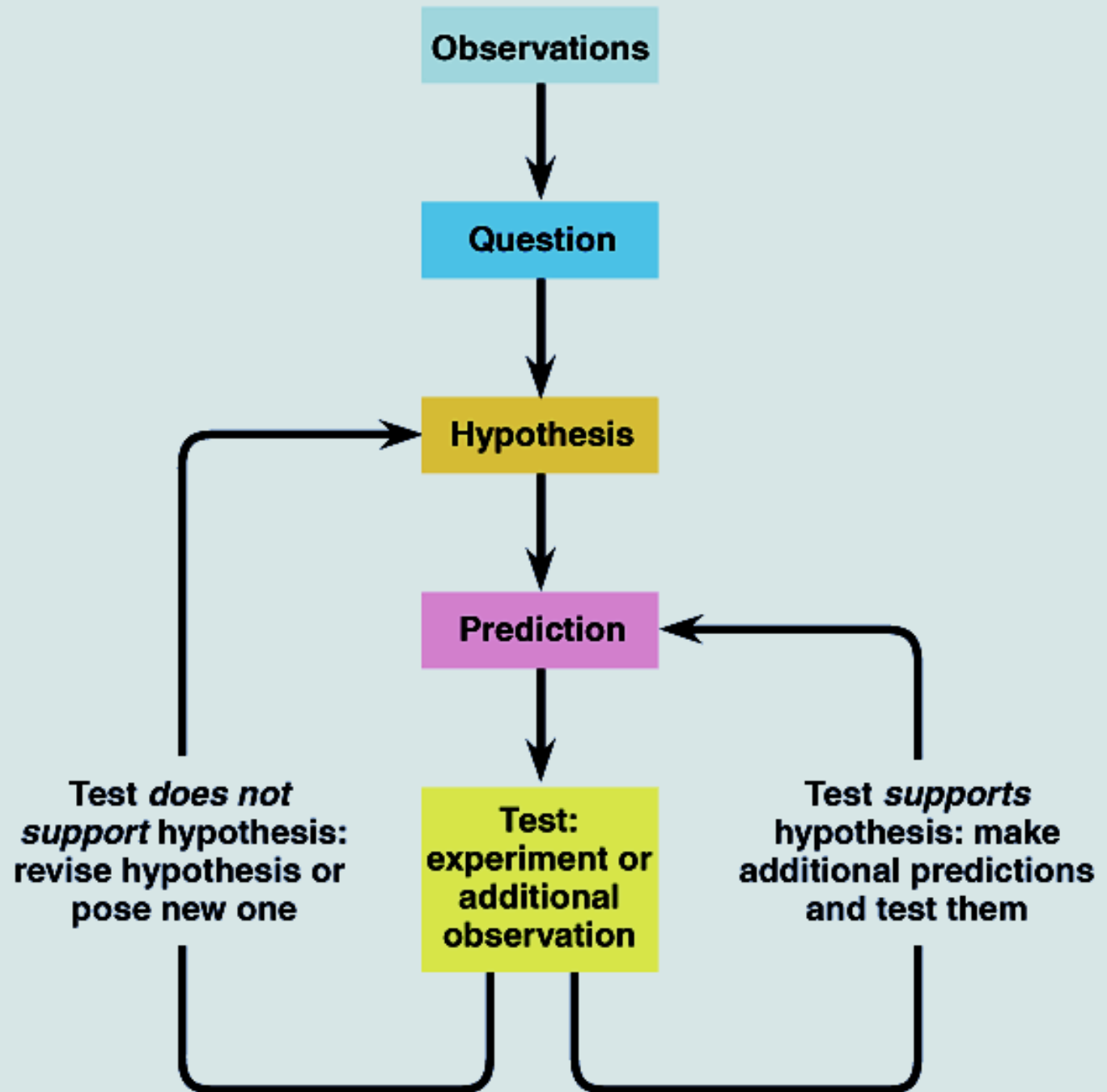
Francesco Redi



Data: *Control jars*; flies seen entering the jars. Later, maggots, then more flies seen on meat. *Gauze-covered jars*: no flies seen in the jars, but were observed on gauze, maggots in jar. *In the sealed jars*, no maggots or flies were ever seen on the meat.

Conclusion(s): Only flies can make more flies. In the uncovered jars, flies entered and laid eggs on the meat; maggots hatched grew into more adult flies. In the sealed jars, no flies, maggots, nor eggs could enter, thus none were seen. Maggots arose only where flies were able to lay eggs. This experiment disproved the idea of spontaneous generation for *larger organisms*.

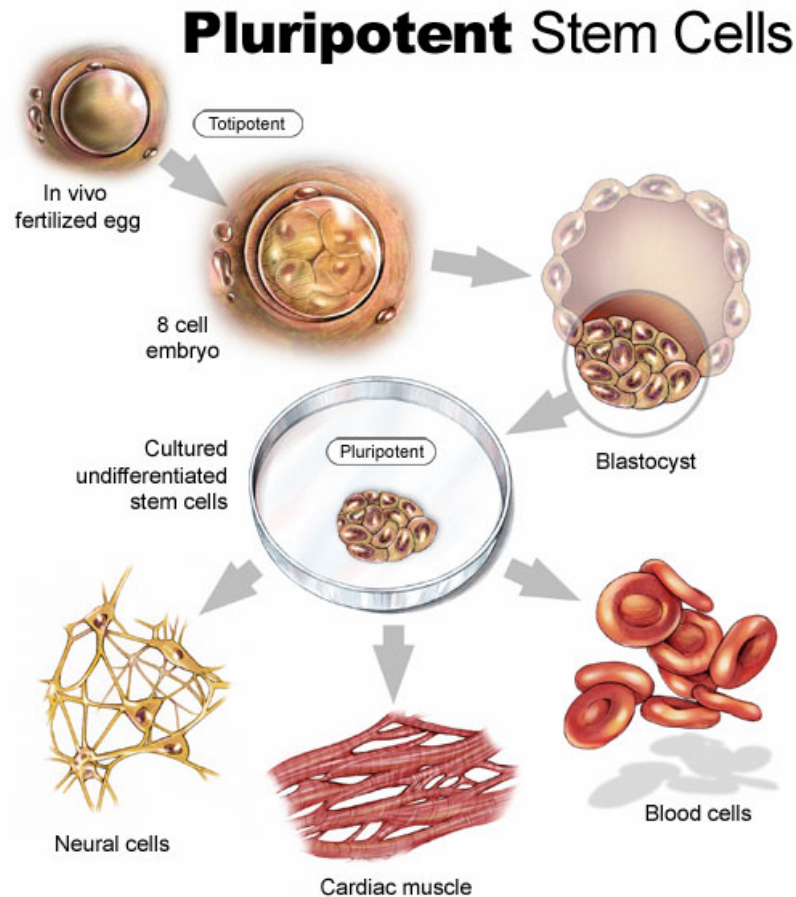
The way one gets at the truth



Important Milestones in The Cell Theory Development

- ❑ **Aristotle:** Living things can come from nonliving things. This concept is known as *spontaneous generation*
- ❑ **Jean Baptist Van Helmont** (1580-1640): mice come from dirty rags/ rotting grains
- ❑ **Francesco Redi** (1620-1690): challenged the idea of spontaneous generation, setting up the 'meat/maggot' experiment.
- ❑ **Anton van Leeuwenhoek:** first person to make a single-lens microscope & observe single-celled organisms.
- ❑ **Robert Hooke** (1630-1703): first person to design a compound microscope & coined the term 'cell'.

Cells Make More Cells



Every cell has the same DNA.

Different sets of Genes/proteins are **EXPRESSED** in different cell types.

EX. Muscle cells VS Retinal cells

Miasma theory of disease



Merriam-Webster SINCE 1828 Dictionary

Simple Definition of MIASMA

: a heavy cloud of something unpleasant or unhealthy

Source: Merriam-Webster's Learner's Dictionary

Editor's note: Did You Know? ▾

Full Definition of MIASMA

plural **miasmas** also **miasmata**   \-mə-tə\

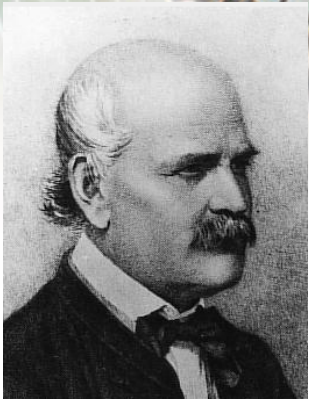
1 : a vaporous exhalation formerly believed to cause disease; also :

disease is caused by deadly vapors

Leading theory of disease from
1600s to 1800s

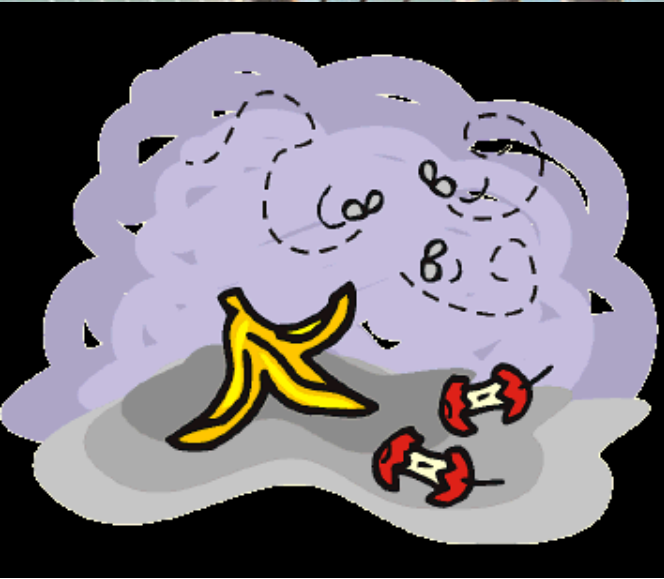
the Black Plague to Pasteur's time

Ignaz Semmelweis



- Introduces hand washing in chlorine solution to maternity wards
- Greatly reduces *Childbed fever* deaths rates which reached 30% in some wards
- Though clearly effective not widely accepted because it conflicted with Miasma theory.
- Died of bacterial sepsis after being beaten by asylum guards

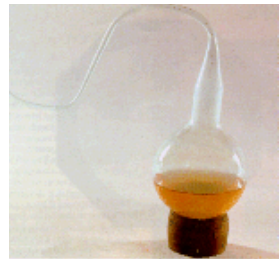
Theory of Spontaneous Generation



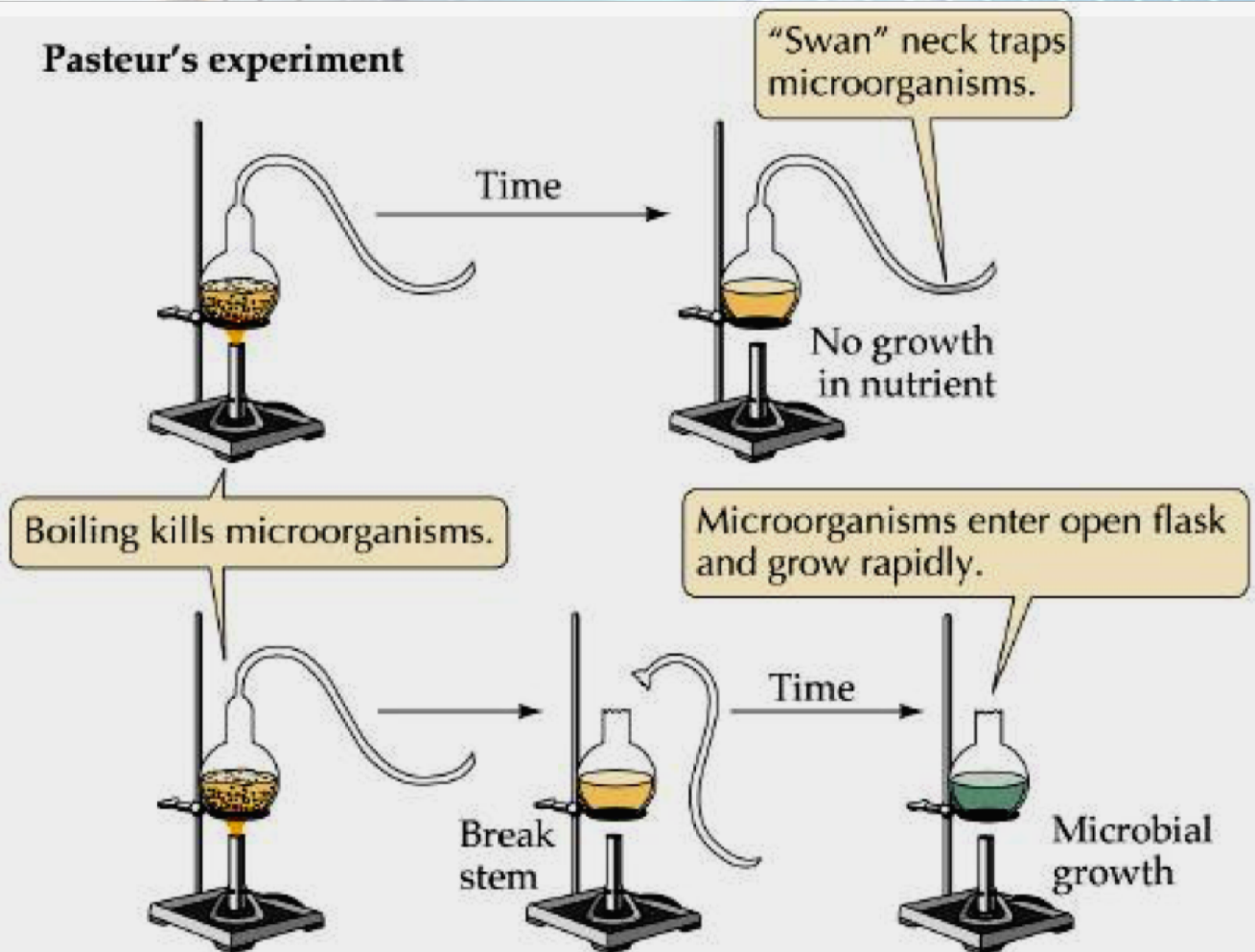
- ❑ From around the 4th century BC, people believed that simple living organisms could come into being by spontaneous generation
- ❑ Spontaneous generation was the idea that non-living *objects* can give rise to living *organisms*
- ❑ **Louis Pasteur:** disproved spontaneous generation overall, forming the **germ theory** of disease and inventing the process of pasteurization

The Germ Theory of Disease

The **germ theory of disease**, also called the **pathogenic theory of medicine**, proposes that microorganisms are the cause of many diseases



Pasteur's experiment



What is an Infectious Disease?

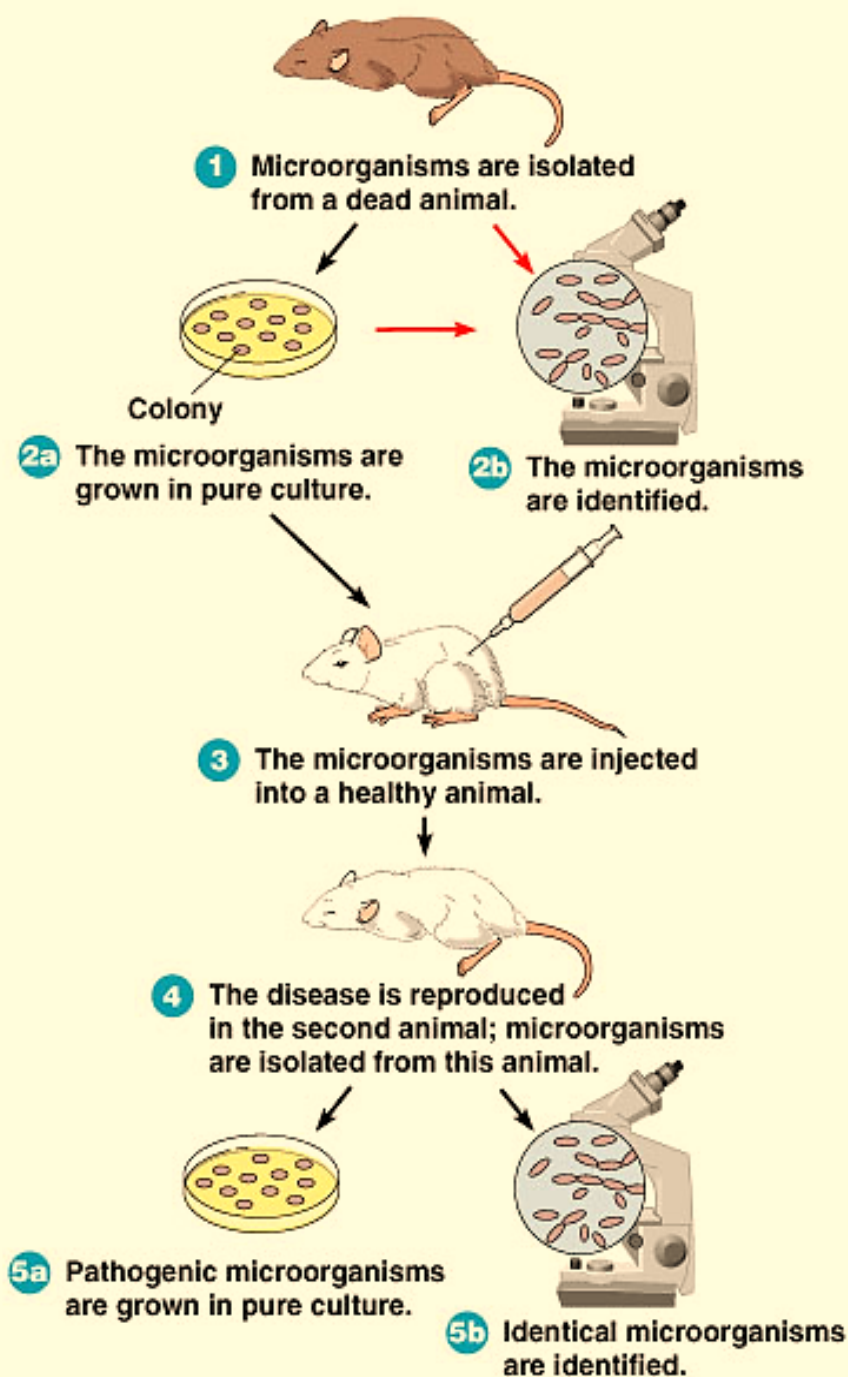


- ❑ An **infectious disease** is one in which detrimental changes in the health of the host occurs as a result of damage caused by a pathogenic organism
- ❑ It wasn't until 1876 that a microbe was unequivocally proven to cause disease
- ❑ Robert Koch showed that *Bacillus anthracis* caused anthrax.
- ❑ Koch used a set of criteria to demonstrate that the specific cause (etiology) was a microbe

Koch's Postulates

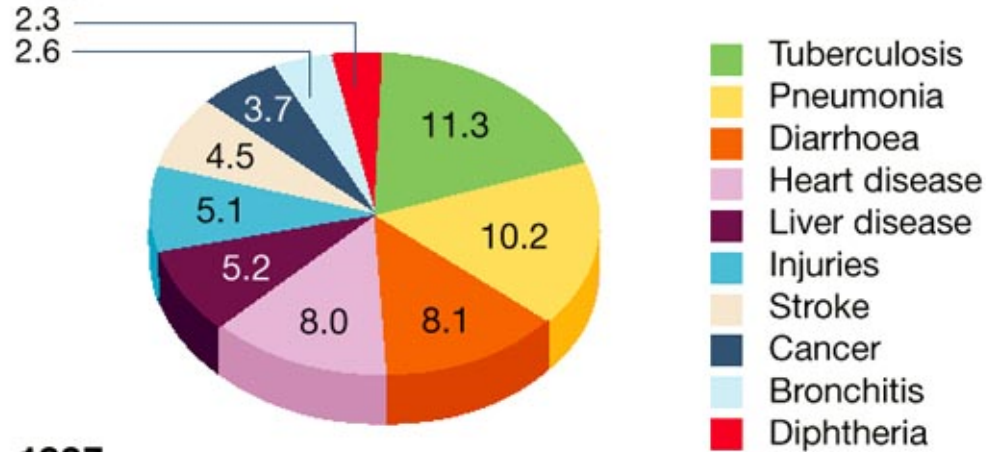
In 1876 Robert Koch provided definitive proof of the germ theory by isolating the cause of anthrax. From this came the development of Koch's Postulates, a set of rules for the assignment of a microbe as the cause of a disease.

1. Microorganism must be observed in every case of the disease
2. The pathogen must be isolated and grown in a pure culture
3. The pure cultures must cause the disease when inoculated into a healthy host
4. The same pathogen must be recovered from the diseased host

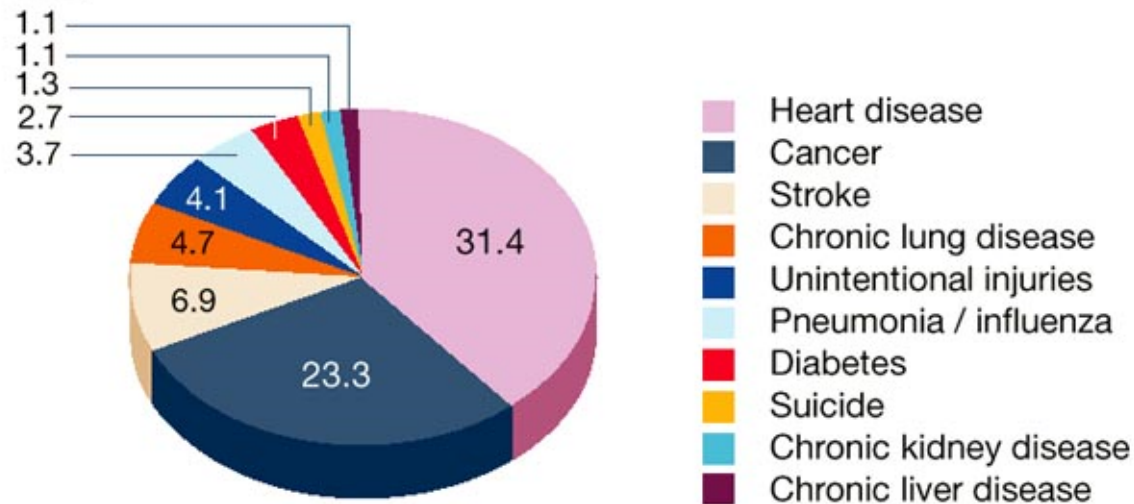


Changing patterns of infectious disease

1900



1997



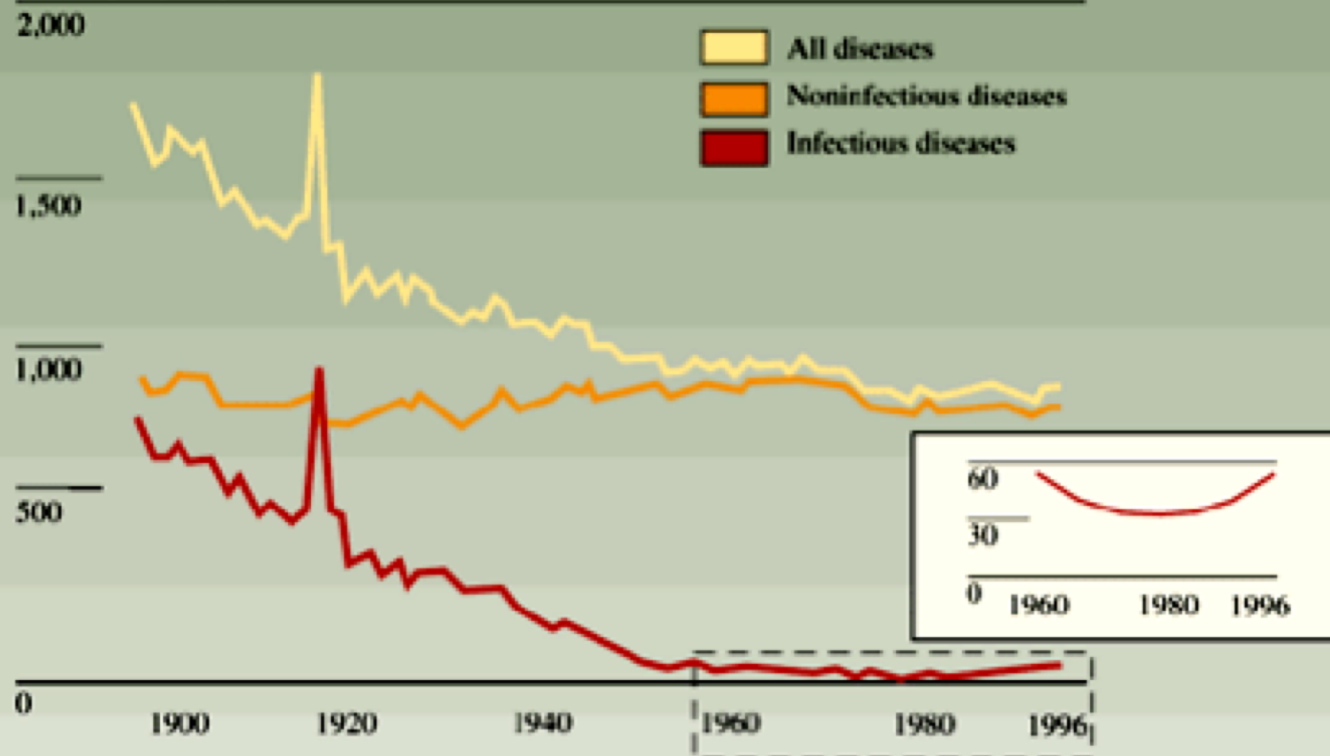
Cancer and heart disease each kill ~ 500K Americans a year

Trends in infectious diseases mortality, 1900-1996

Infectious Disease Mortality in the United States

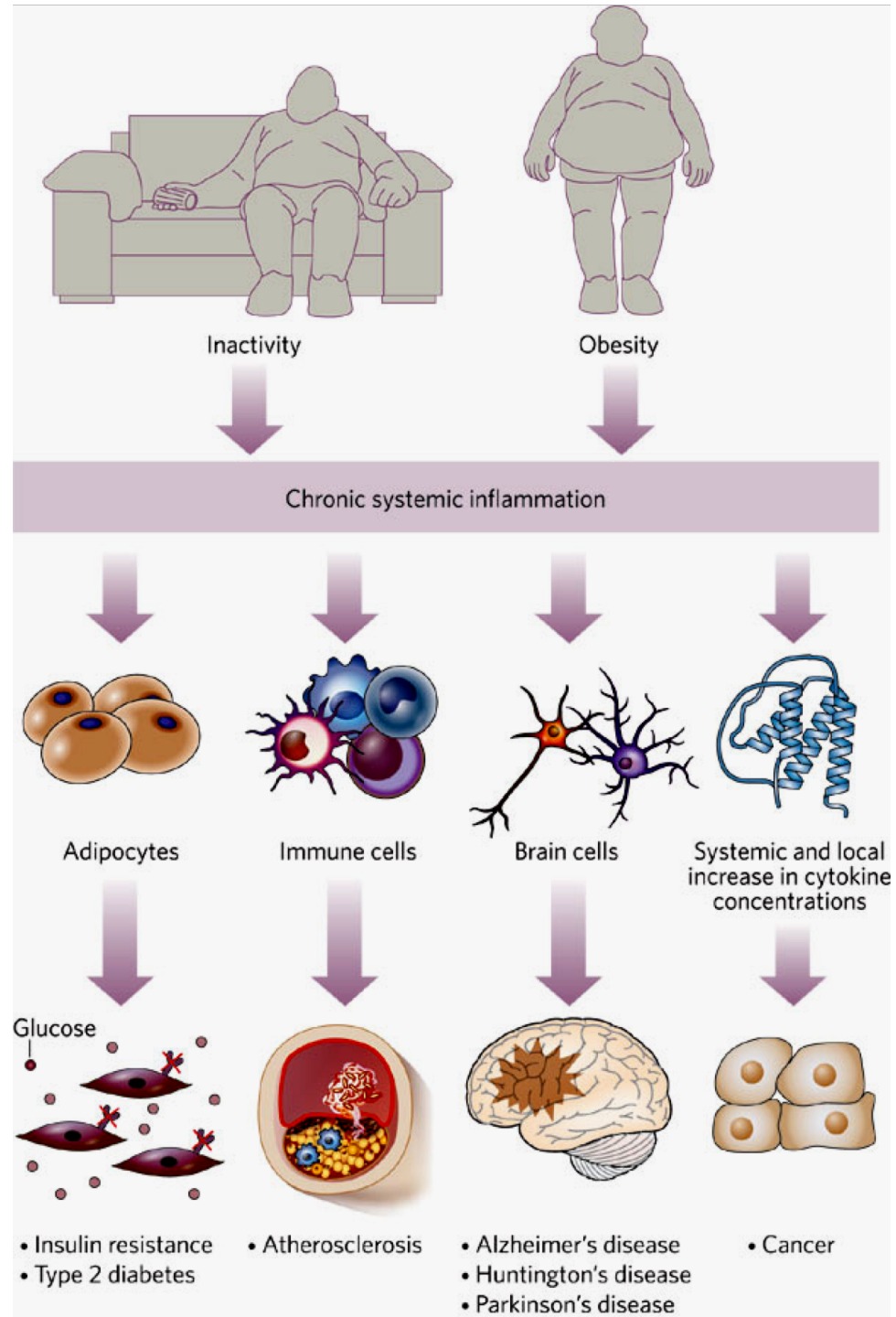
Infectious disease mortality in the United States has generally declined since 1900, but the trend has been up since 1980 when deaths reached a low of 36 per 100,000, as compared to 59 per 100,000 in 1996. Most of the increase owes to HIV/AIDS and, to a lesser extent, to pneumonia and influenza.

Deaths per year per 100,00



Deaths from infectious diseases fell in the United States during the 20th century. The spike shows the 1918 influenza pandemic, which killed more than 20- 100 million people, including about 500,000 Americans

Inflammation and chronic diseases

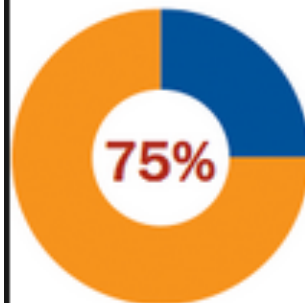


Americans Diagnosed with Diabetes

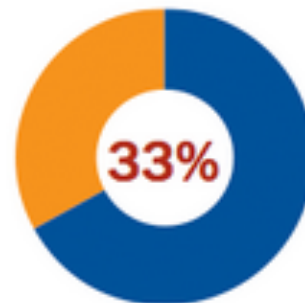
1994
**7.8
million**

2014
**25.8
million**

Hypertension
Attributed to
Obesity



Cancer Deaths
Linked to
Obesity



The Meat Maggot Experiment.: Exploring the Scientific Method

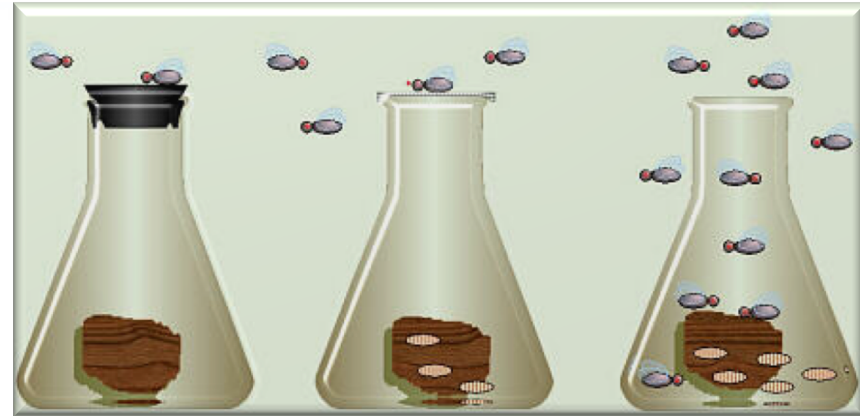
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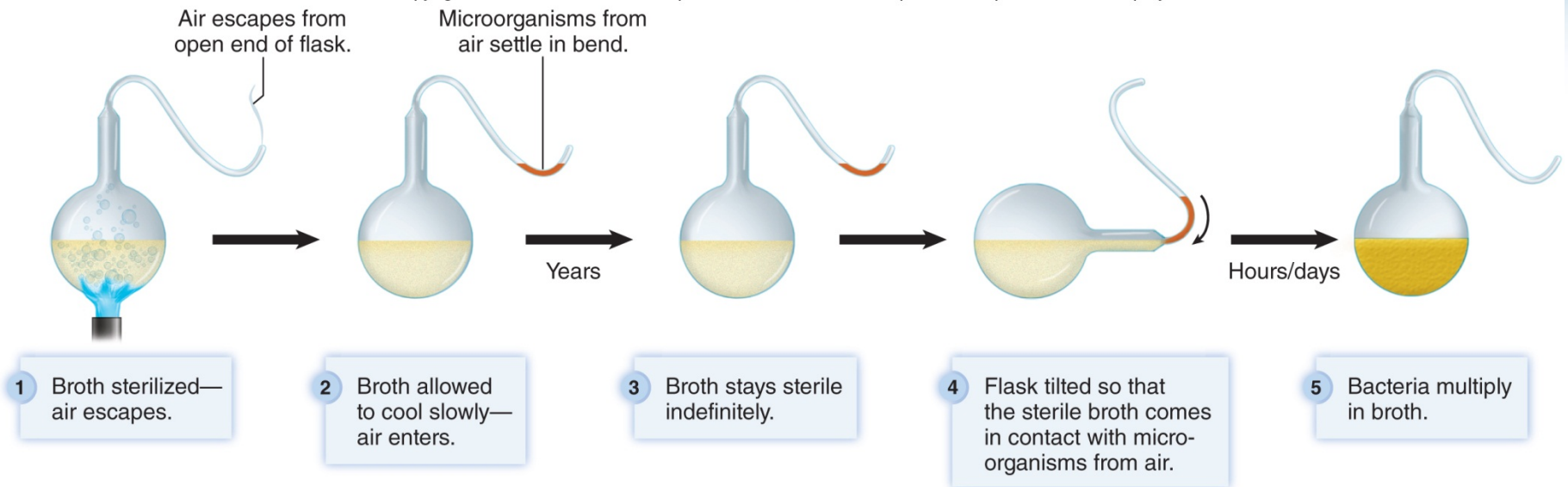


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Conclusion: Only flies can make more flies.

Pasteur's Flasks

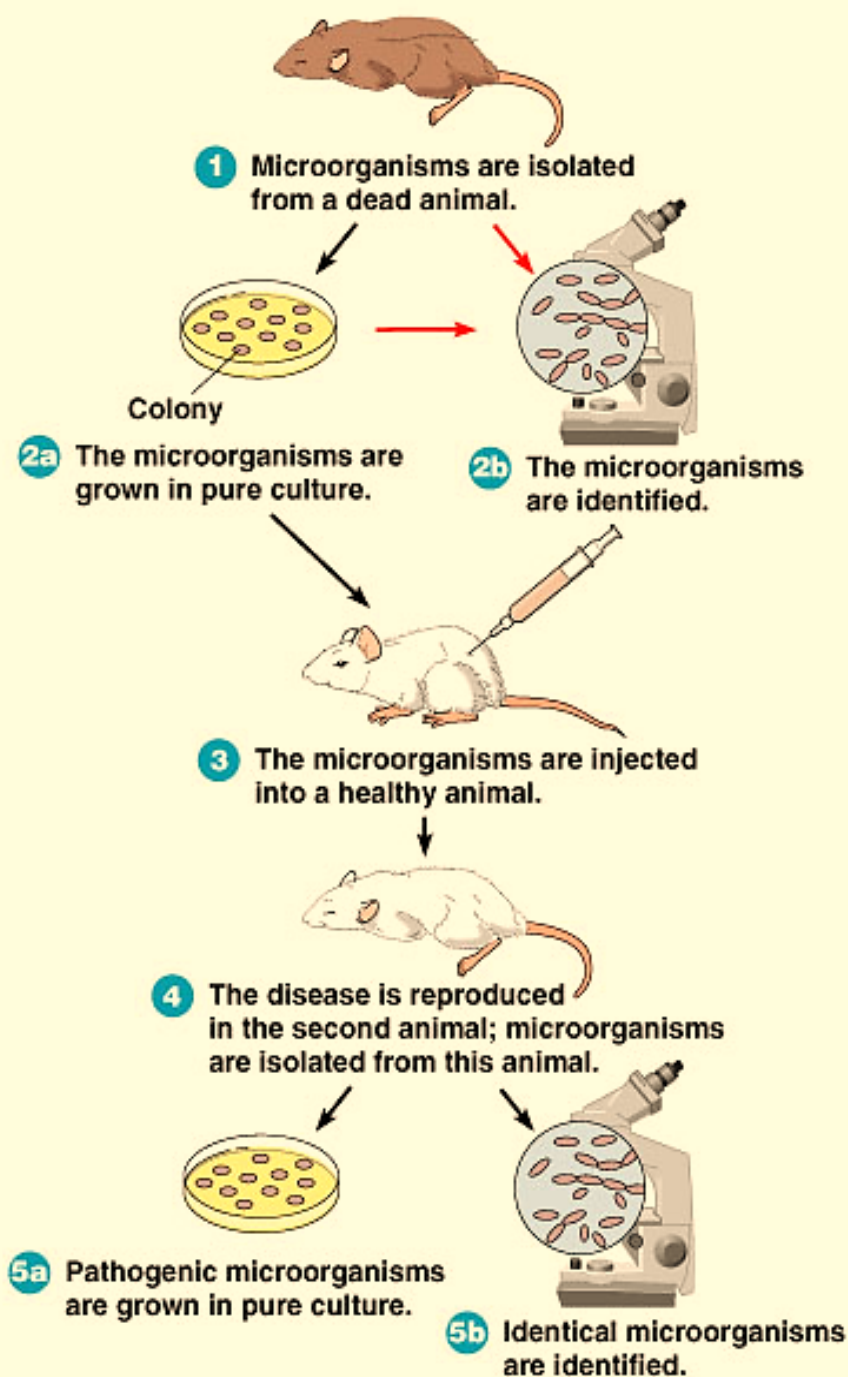
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Koch's Postulates

In 1876 Robert Koch provided definitive proof of the germ theory by isolating the cause of anthrax. From this came the development of Koch's Postulates, a set of rules for the assignment of a microbe as the cause of a disease.

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3. The pure cultures must cause the disease when inoculated into new host
4. The same pathogen must be recovered.

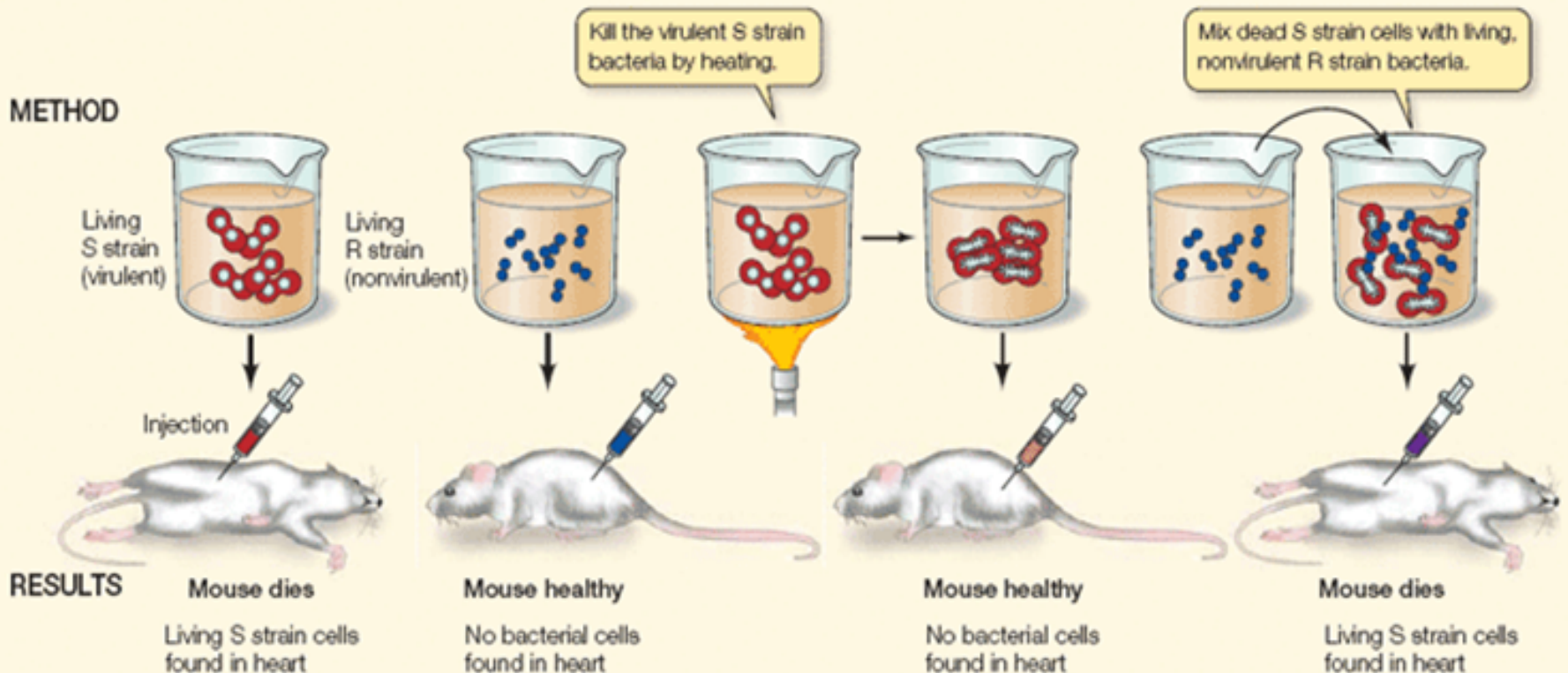


Griffith's Transforming Factor

EXPERIMENT

HYPOTHESIS: Material in dead bacterial cells can genetically transform living bacterial cells.

METHOD



CONCLUSION: A chemical substance from one cell is capable of genetically transforming another cell.

Exploring the association between Morgellons disease and Lyme disease: identification of *Borrelia burgdorferi* in Morgellons disease patients

[Marianne J Middelveen](#), [Cheryl Bandoski](#), [Jennie Burke](#), [Eva Sapi](#),
[Katherine R Filush](#), [Yean Wang](#), [Agustin Franco](#), [Peter J Mayne](#), and
[Raphael B Stricker](#)✉

[Author information](#) ► A

Abstract

Go to: 

Background

Go to: 

Morgellons disease (MD) is a complex skin disorder characterized by ulcerating lesions that have protruding or embedded filaments. Many clinicians refer to this condition as delusional parasitosis or delusional infestation and consider the filaments to be introduced textile fibers. In contrast, recent studies indicate that MD is a true somatic illness associated with tickborne infection, that the filaments are keratin and collagen in composition and that they result from proliferation and activation of keratinocytes and fibroblasts in the skin. Previously, spirochetes have been detected in the dermatological specimens from four MD patients, thus providing evidence of an infectious process.



Methods & Results

Go to: 

Based on culture, histology, immunohistochemistry, electron microscopy and molecular testing, we present corroborating evidence of spirochetal infection in a larger group of 25 MD patients. Irrespective of Lyme serological reactivity, all patients in our study group demonstrated histological evidence of epithelial spirochetal infection. Strength of evidence based on other testing varied among patients. Spirochetes identified as *Borrelia* strains by polymerase chain reaction (PCR) and/or in-situ DNA hybridization were detected in 24/25 of our study patients. Skin cultures containing *Borrelia* spirochetes were obtained from four patients, thus demonstrating that the organisms present in dermatological specimens were viable. Spirochetes identified by PCR as *Borrelia burgdorferi* were cultured from blood in seven patients and from vaginal secretions in three patients, demonstrating systemic infection. Based on these observations, a clinical classification system for MD is proposed.

GASTRIC ULCERS