Lecture-4

History of microbiology (Part-1)

History of microbiology
Content

- **History of microbiology (part-1)**
  - **Microbiology in the Islamic era (Arabic content).**
  - **Pathways of discovery in microbiology**
    - The historical roots of microbiology
    - Pasteur and the defeat of spontaneous generation
    - Koch, infectious disease, and pure culture microbiology.
- **History of microbiology (part-2)**
  - The rise of microbial diversity
  - The modern era of microbiology

History of microbiology
الأحياء الدقيقة في العصر الإسلامي

إلغاء فكرة المسبب العفوي:

قال صلى الله عليه وسلم عن الطاعون «إذا وقع بأرض فلا تدخلوها، وإذا كنتم بها فلا تفروا منه».

جاءت السنة المطهرة بالحث على النظافة في الأكل والشرب، والنظافة بعد الخارج من السبيلين والنهي عن الاكل في الآنية المشقوقة والتنفس في الطعام والشراب والحث على السواك والمضمضة وتغطية الطعام والتحذير من لعاب الكلب .. الخ

العلماء المسلمون والأمراض المعدية:

نصح المسلمون بالعديد من النصائح لتجنب الأمراض المعدية كالنظافة التامة وتخصيص أدوات للمريض، وعزل المريض المصاب بمرض معدي فكانوا أول من أسس نظام الحجر الصحي.

History of microbiology
الأحياء الدقيقة في العصر الإسلامي

أبو بكر الرازي

- فرق بين الحصبة والجدري- رغم التشابه الشديد بينهما.

ابن سينا

- تناول السل وأنواعه وطرق انتقاله وكيفية الوقاية من عدواه
- تناول الجمرة الخبيثة وسماه (النار الفارسية).
- اقترح التطعيم
- أول من اقترح وجود أجسام صغيرة مسببة للمرض. وسماها (السبب)

ابن رشد

- قام بأول عملية تطعيم ضد الجدري.

The Historical Roots of Microbiology

Microbiology began with the microscope

Robert Hooke (1635–1703)

Antoni van Leeuwenhoek (1632–1723)

Ferdinand Cohn (1828–1898)

Louis Pasteur (1822–1895)

Robert Koch (1843–1910)

A drawing of the microscope used by Robert Hooke in 1664 .

The Historical Roots of Microbiology

Microbiology began with the microscope

Robert Hooke (1635–1703):

- The first description of microorganisms
- Illustrated the fruiting structures of molds

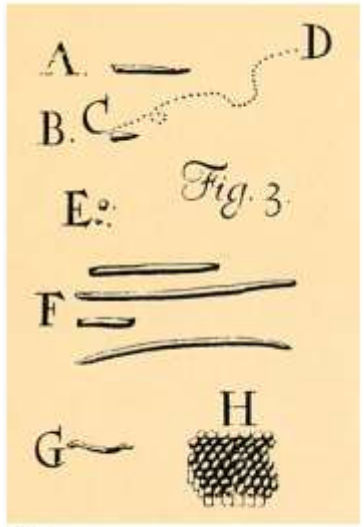
The Historical Roots of Microbiology

Microbiology began with the microscope

Antoni van Leeuwenhoek (1632–1723)

- The first to describe bacteria.
- Further progress required development of more powerful microscopes

(a)



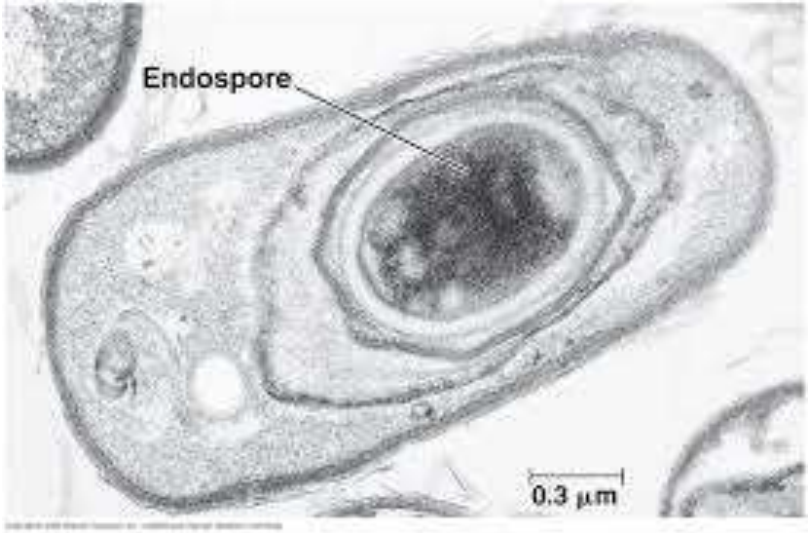
(b)

The Historical Roots of Microbiology

Microbiology began with the microscope

Ferdinand Cohn (1828–1898):

- Founded the field of bacterial classification and bacteriology .
- Discovered bacterial endospores (heat resistance bacteria)

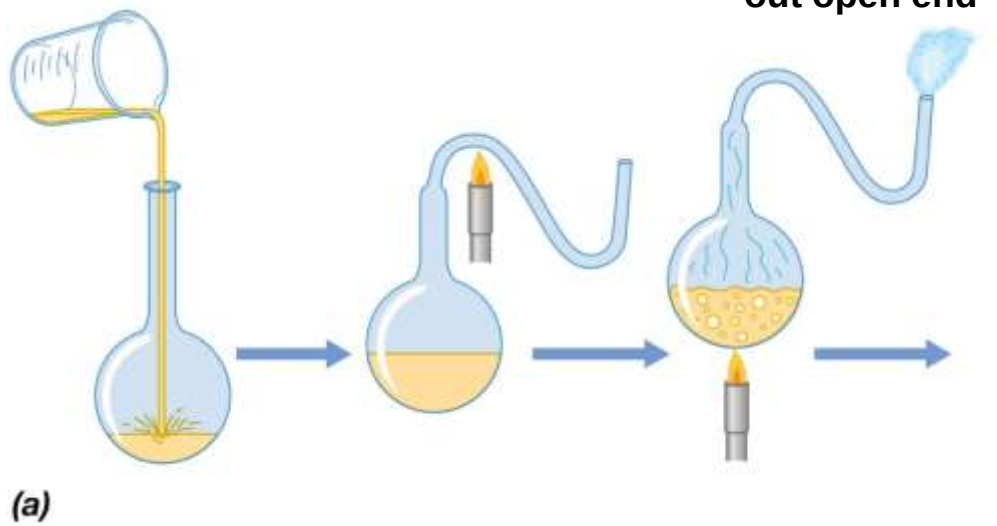


Pasteur and **the Defeat of Spontaneous Generation**

Louis Pasteur (1822–1895).

- Discovered that alcoholic fermentation was a biologically mediated process (originally thought to be purely chemical)
- **Disproved theory of spontaneous generation.**
  - Led to the development of methods for controlling the growth of microorganisms (aseptic technique)or sterilization.
- Developed vaccines for anthrax, fowl cholera, and rabies

Pasteur's experiment that defeated the spontaneous generation theory



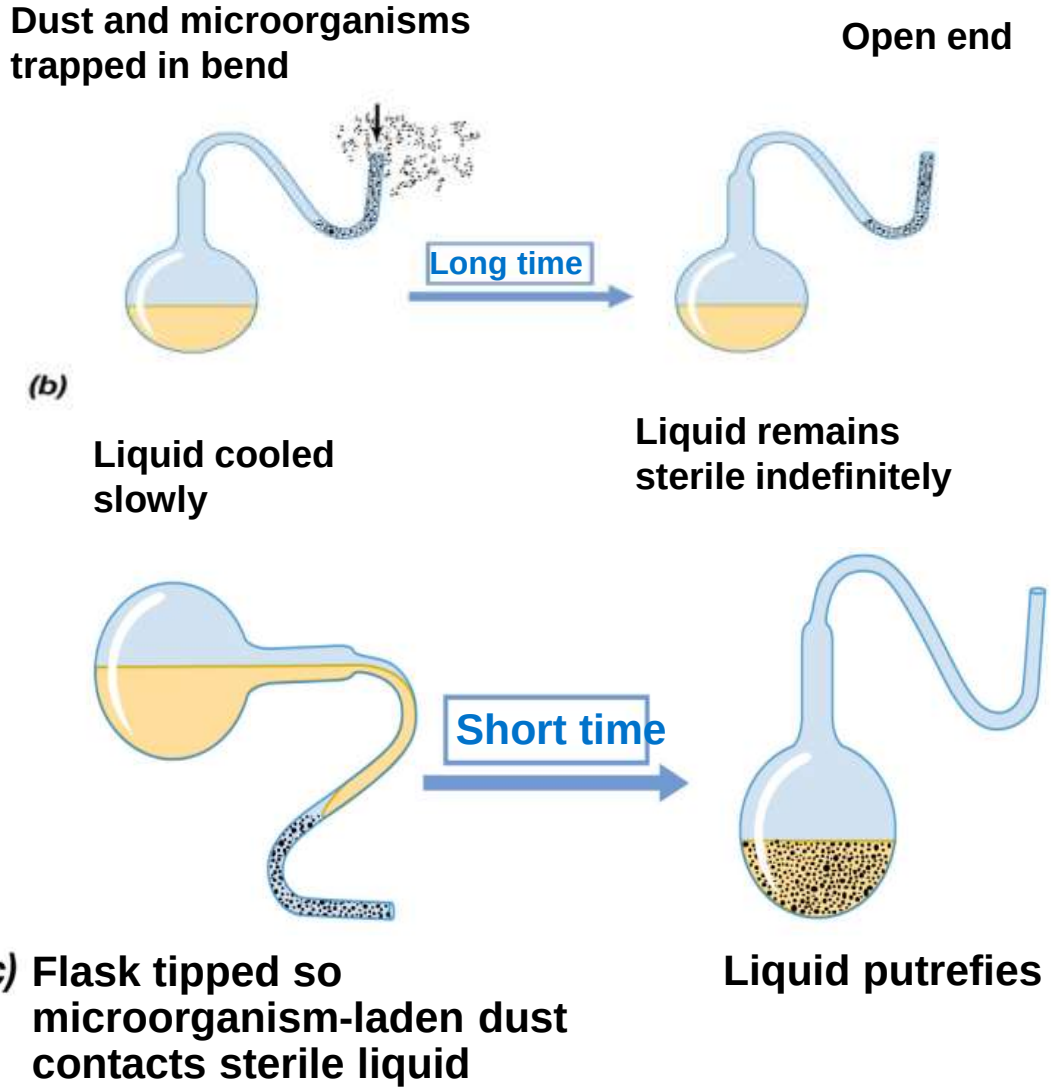
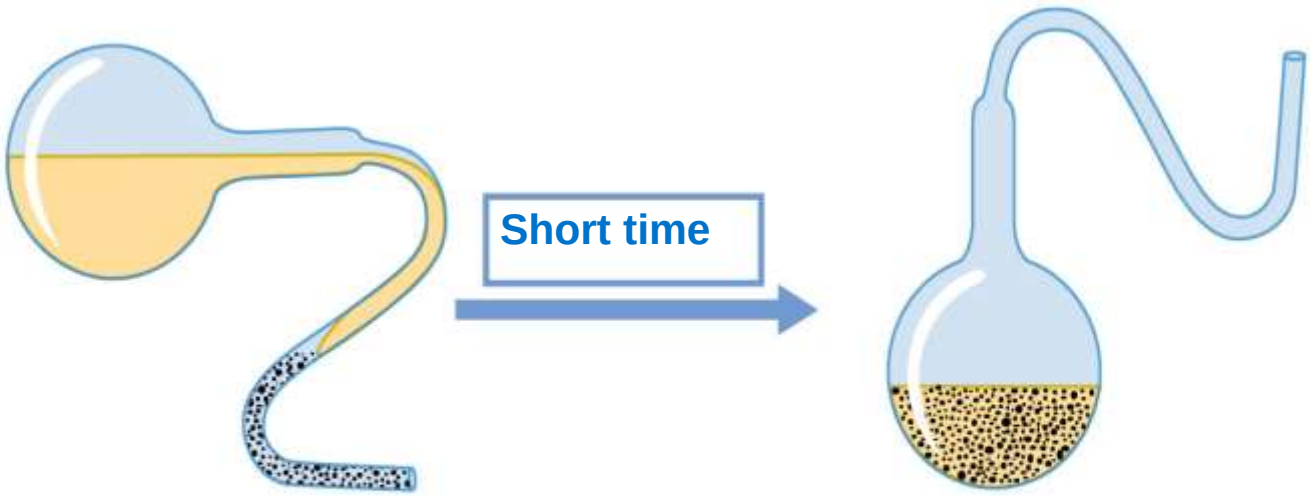


Figure 1.16c



(c) Flask tipped so microorganism-laden dust contacts sterile liquid

Liquid putrefies

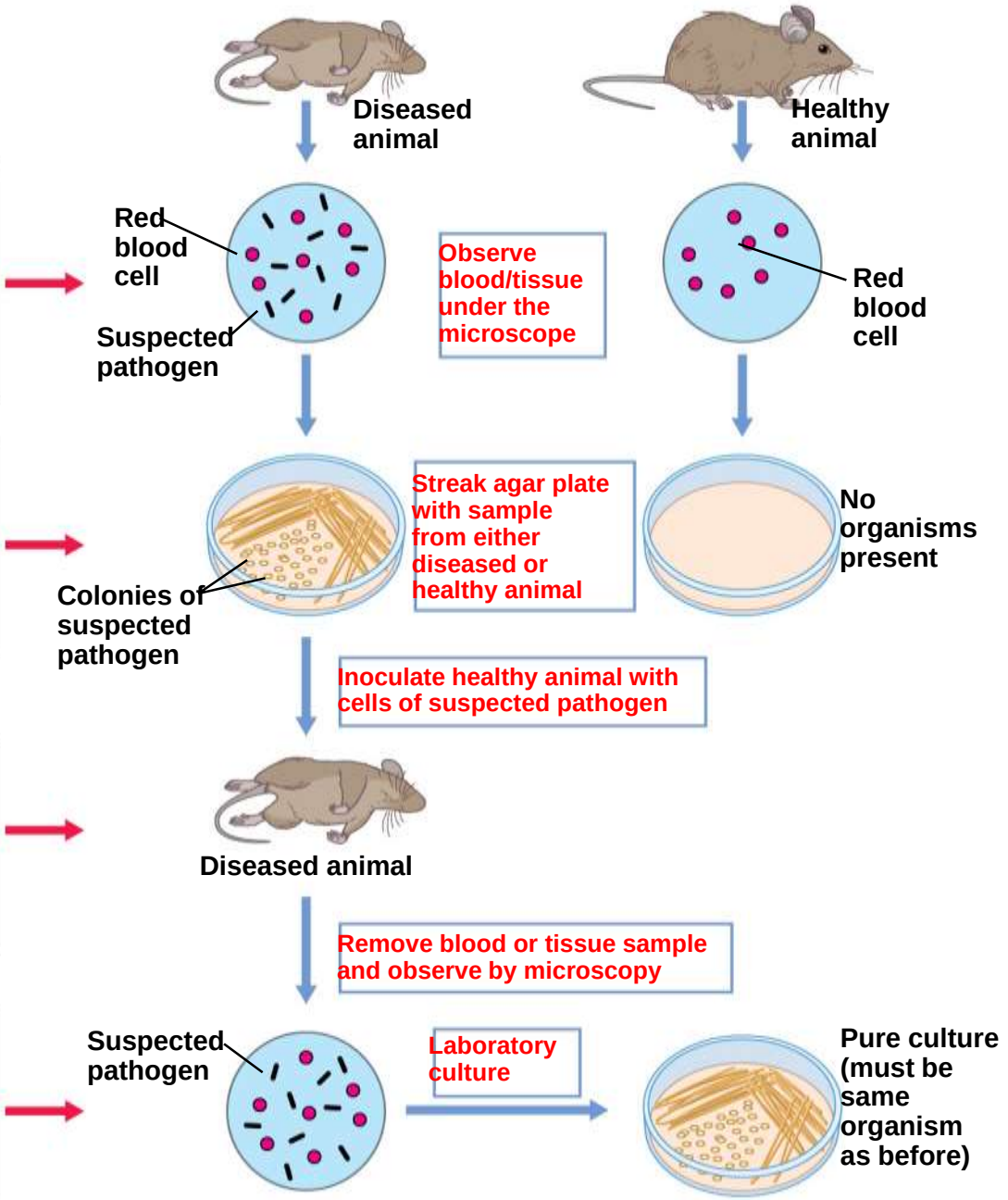
Koch, Infectious Disease, and the Rise of Pure Cultures

Robert Koch (1843–1910)

- Demonstrated the link between microbes and infectious diseases
  - Identified causative agents of anthrax and tuberculosis
- Koch's postulates
- Developed techniques (solid media) for obtaining pure cultures of microbes, some still in existence today
- Awarded Nobel Prize for Physiology and Medicine in 1905

KOCH'S POSTULATES

The Postulates:	Tools:
1. The suspected pathogen must be present in *all* cases of the disease and absent from healthy animals.	Microscopy, staining
2. The suspected pathogen must be grown in pure culture.	Laboratory culture
3. Cells from a pure culture of the suspected pathogen must cause disease in a healthy animal.	Experimental animals
4. The suspected pathogen must be reisolated and shown to be the same as the original.	Laboratory reisolation and culture



Koch, Infectious Disease, and the Rise of Pure Cultures

Koch's Postulates Today

- Koch's postulates apply for diseases that have an appropriate animal model
- Remain "gold standard" in medical microbiology, but not always possible to satisfy all postulates for every infectious disease
- Animal models not always available
  - For example, cholera, rickettsias, chlamydias

Koch and the Rise of Pure Cultures

- Discovered that using solid media provided a simple way of obtaining pure cultures
- Began with potato slices, but eventually devised uniform and reproducible nutrient solutions solidified with gelatin and agar

REMEMBER

You can always ask questions through our discussion board on
www.lms.ksu.edu.sa