Kingdom of Bahrain
Ministry of Education

Pakistan School
Kingdom of Bahrain

CHAPTER 4

CELLS AND TISSUES

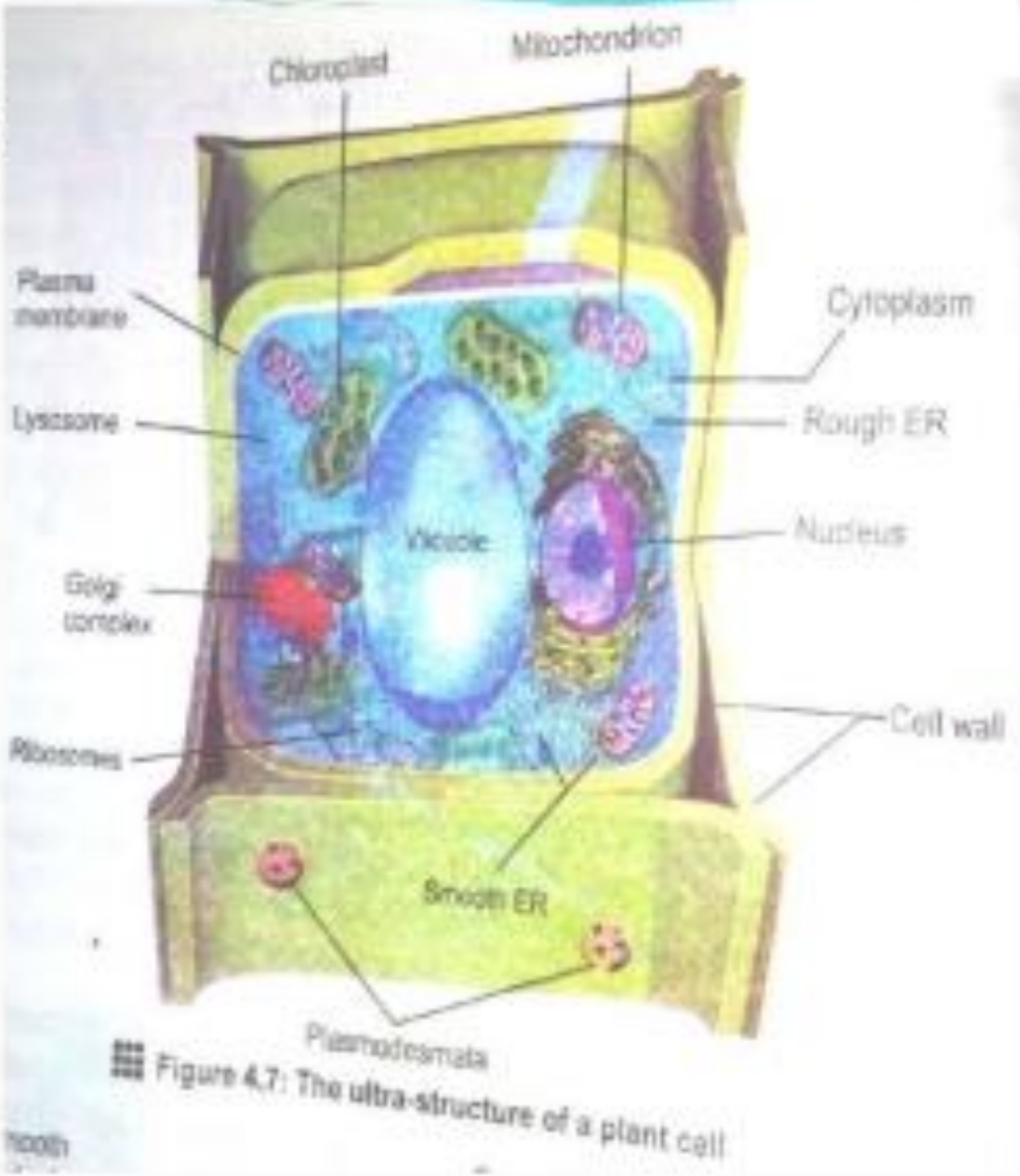

Figure 4.7: The ultra-structure of a plant cell

BIOLOGY

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ENGAGING STARTER

Today's Objective

At the end of the Lesson,

- Students will be able to;
  Investigate history of the
  Formulation of cell theory.
- summarize the contributions of scientists and/or state the cell theory.

Chapter 4. CELLS AND TISSUES

Topic: Cells and Tissues

Page- 55-57

Fundamental Unit – A Cell

But before microscopes were first used in 17th century, no one knew with certainty that living organisms do share a fundamental unit i.e. cell.

Robert Hooke

Cells were first described by a British scientist Robert Hooke in 1665. He used his self made light microscope to examine a thin slice of cork. Hooke observed a "honey comb" of tiny empty compartments. He called the compartments in the cork as "cellulae". His term has come to us as cells.

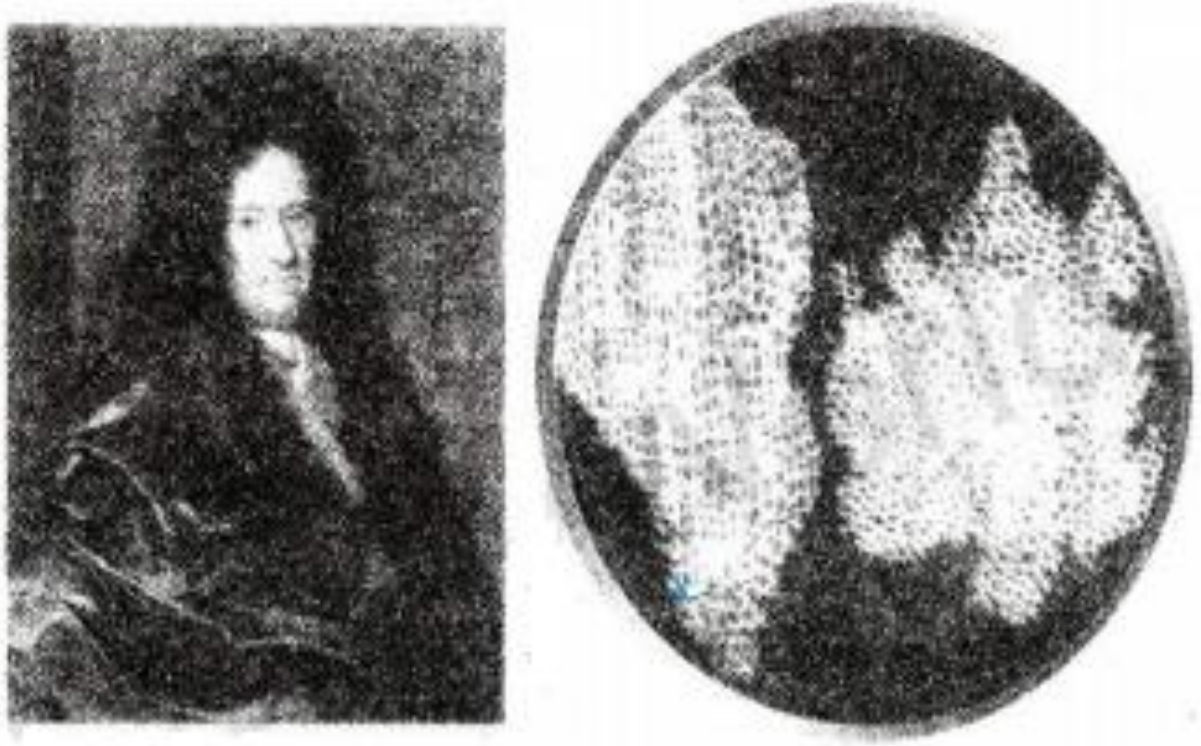


Figure 4.5: Robert Hooke was a chemist, mathematician and physicist.

His remarkable engineering abilities enabled him to invent and improve many Mechanical devices including time pieces, the quadrant and the Gregorian telescope. His observation about the section of cork is also illustrated here.

Antonie Van Leeuwenhoek

The first living cells were observed a few years later by Dutch naturalist Antonie Van Leeuwenhoek. He observed tiny organisms (from pond water) under his microscope and called them as "animalcules".

Jeans Baptist de-Lamarck

In 1809, Jeans Baptist de-Lamarck proposed that "no body can have life if its parts are not cellular tissues or are not formed by cellular tissues."

Robert Brown

In 1831, a British botanist Robert Brown discovered nucleus in the cell.

Schleiden and Schwann

In 1838, a German botanist Mathias Schleiden studied plant tissues and made the first statement of cell theory. He stated that all plants are aggregates of individual cells which are fully independent.

One year later, in 1839, a German zoologist Theodor Schwann reported that all animal tissues are also composed of individual cells.

Rudolf Virchow and Louis Pasteur

In 1855, Rudolf Virchow, a German physician, proposed an important extension of cell theory. He proposed that all living cells arise from pre-existing cells ("omnis cellula e cellula").

Louis Pasteur

In 1862, Loius Pasteur provided the experimental proof of this idea.

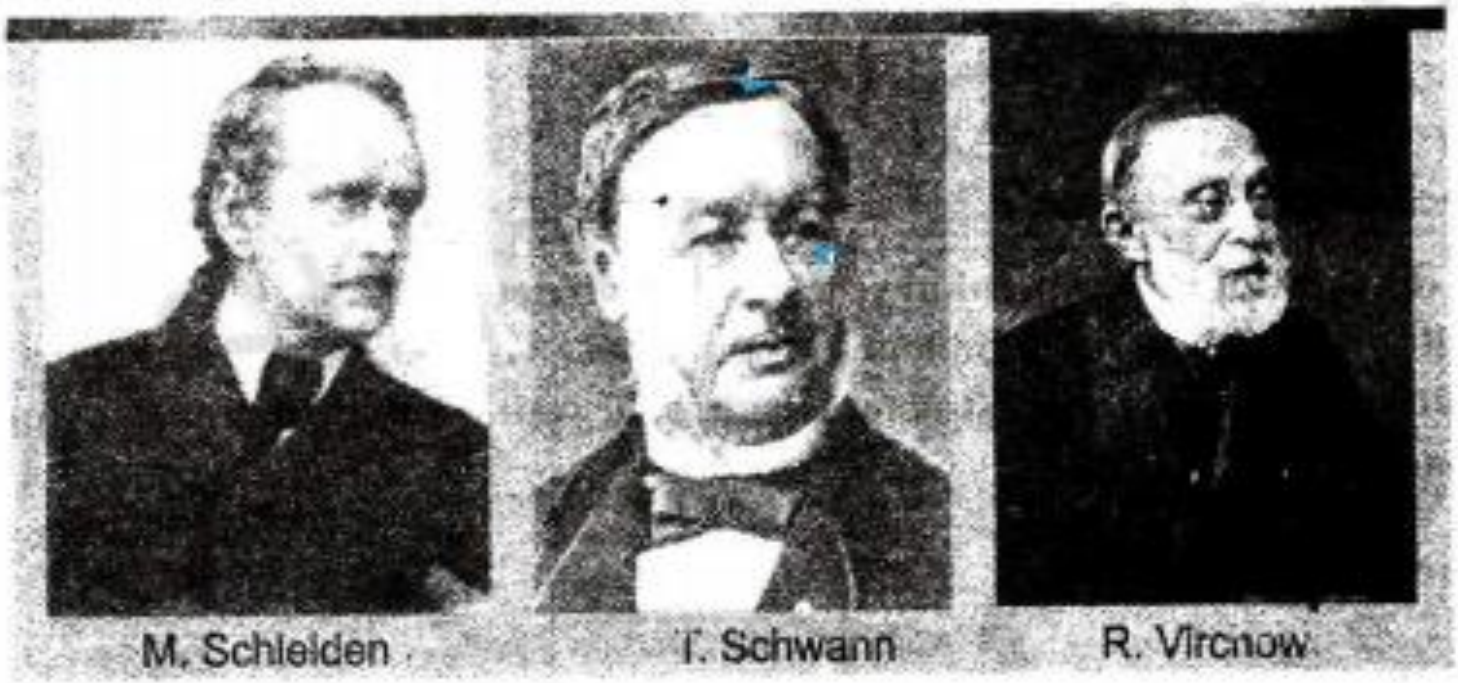
Salient features of Cell Theory

Cell theory was presented by Schleiden & Schwann. Cell Theory in its modern form, includes following principles;

(i) All organisms are composed of one or more cells.

(ii) Cells are the smallest living things, the basic unit of organization of all organisms.

(iii) Cells arise only by divisions in previously existing cells.



The Cell Theory

The **CELL THEORY,** or cell doctrine, states that all organisms are composed of similar units of organization, called cells.

THE CELL THEORY

Developers of Cell Theory

Matthias Schleiden

Theodor Schwann

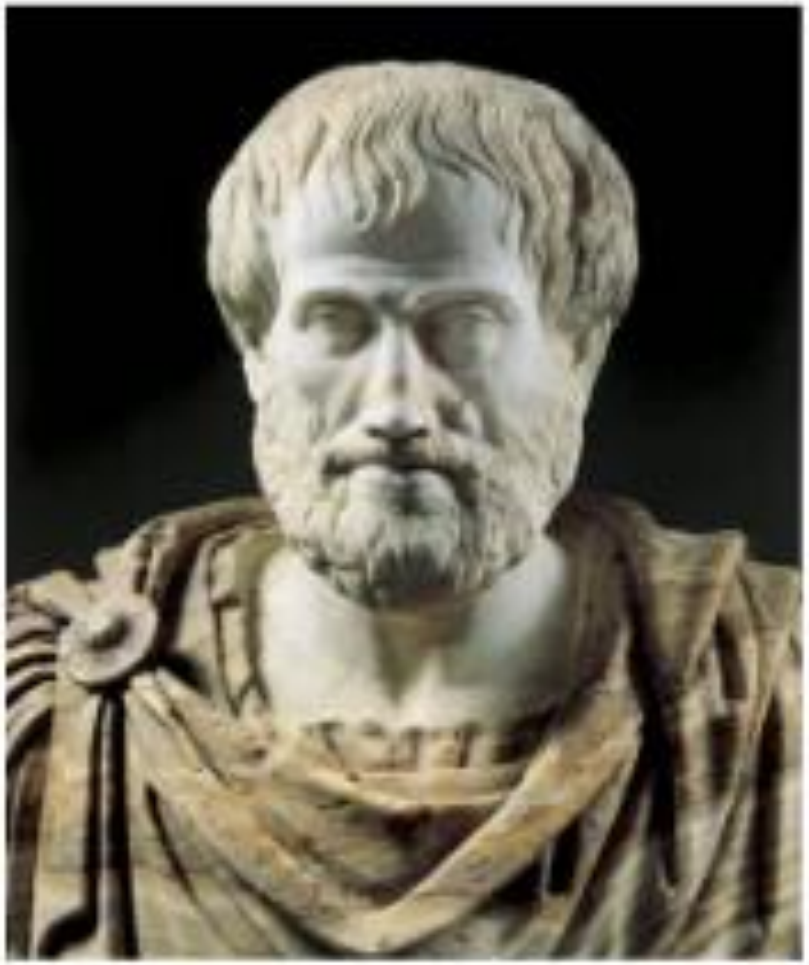
Rudolf Virchow

Year	Scientist	Contribution
1595	Zacharias Jensen	Jensen creates the first compound microscope.
1655	Robert Hooke	Hooke, using a microscope that he devised, viewed the cell walls of cork for the first time. He coined the term 'cell' still used in biology today.
1670	Antonie van Leeuwenhoek	van Leeuwenhoek observes the first living cells in pond water using lenses that he created for his microscope.
1833	Robert Brown	Brown discovers the nucleus in plant cells and suggests its importance in cell creation.
1838	Matthias Jakob Schleiden	Schleiden proposes that all plant tissues are composed of cells.
1839	Theodor Schwann	Schwann concludes that not just plant tissue, but animal tissues, as well, are composed of one or more cells. He also states that the cell is the basic unit for all organisms.
1845	Carl Heinrich Braun	Braun restates the second part of the cell theory proposing that cells are the basic unit of life.
1855	Rudolf Virchow	Virchow adds the third part to the cell theory stating that cells only come from other living cells.

Aristotle

384-322 b.c.

- Classified things based on if they are plant or animal
- Classified animals based on how they look into land, water, or air dwellers
- Grouped plants based on stem structure



Robert Hooke (1665)

- Used light microscope to look at thin slices of plant tissues -- cork
- Looked empty, like monk's chamber
- Called tiny chambers "cells"

1673

- Leeuwenhoek
- first to view pond water organisms
- First to see living microscopic orgs
- Made careful sketches

History Leading up to Cell Theory

3. Antony van Leeuwenhoek
   - First to observe bacteria and protozoa
   - Called "animacules"
   - Approx. 1673

Anton van Leeuwenhoek

- In 1673, Leeuwenhoek (a Dutch microscope maker), was first to view organism (living things)
- Leeuwenhoek used a simple, handheld microscope to view pond water & scrapings from his teeth

Early Contributions

- Robert Hooke - First person to see cells, he was looking at cork and noted that he saw "a great many boxes. (1665)
- Anton van Leeuwenhoek - Observed living cells in pond water, which he called "animalcules" (1673)

The Sad Story of Jean Baptiste Pierre Antoine de Monet Chevalier de Lamarck (1809)

- We will just call him Lamarck
- Lamarck "Lamarcked" that "no body can have life if its constituent parts are not cellular tissue or are not formed by cellular tissue."
- Lamarck's scientific theories were ignored and attacked during his lifetime.

Robert Brown

- Discovered "nucleus" within the cells.
- Scottish botanist and palaeobotanist

Matthias Schleiden

http://www.britannica.com/eb/article-9066147/Matthias-Jacob-Schleiden

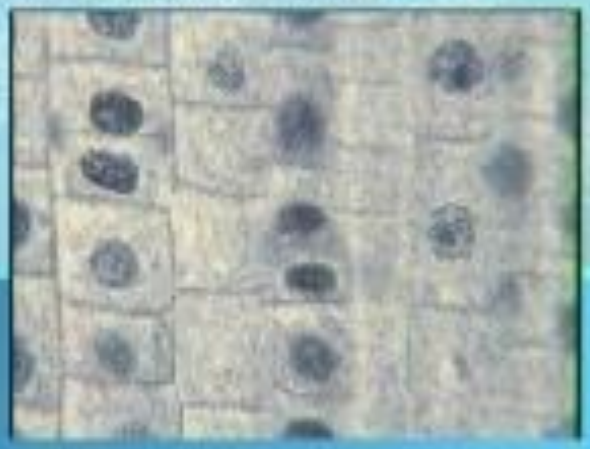
- Born: April 5, 1804
- Died: June 23, 1881
- German botanist
- Discovered that all plants were made of cells
- Contributed to the creation of the cell theory

Theodor Schwann

- 1810-1882
- Theorized that animals develop from cells that divide into new cells.
- Therefore all animals are built from dividing cells, just like plants.

Beginning of the Cell Theory

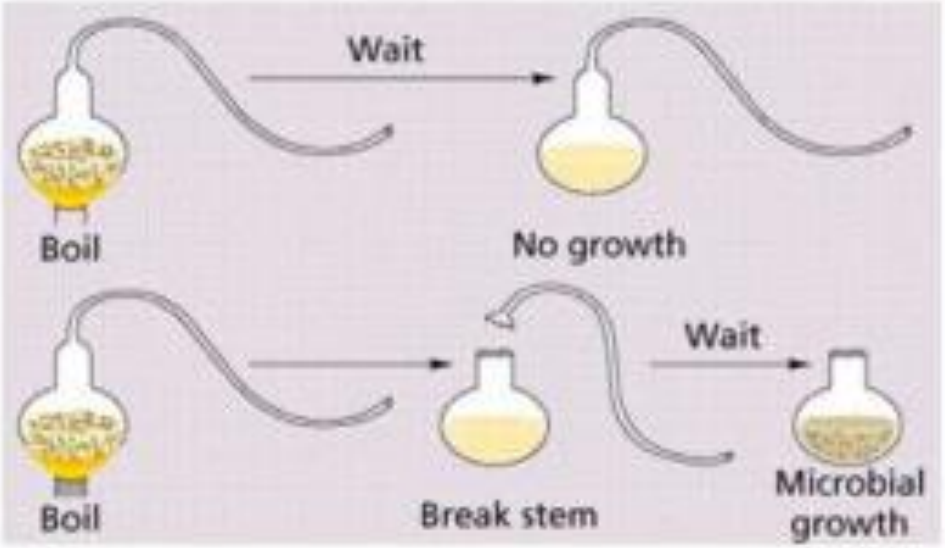
- In 1855, a German medical doctor named **Rudolph Virchow** observed, under the microscope, **cells dividing**
- He reasoned that **all cells come from other pre-existing cells** by **cell division**



Louis Pasteur - 1862

Disproved spontaneous generation

Proved that all life comes from life



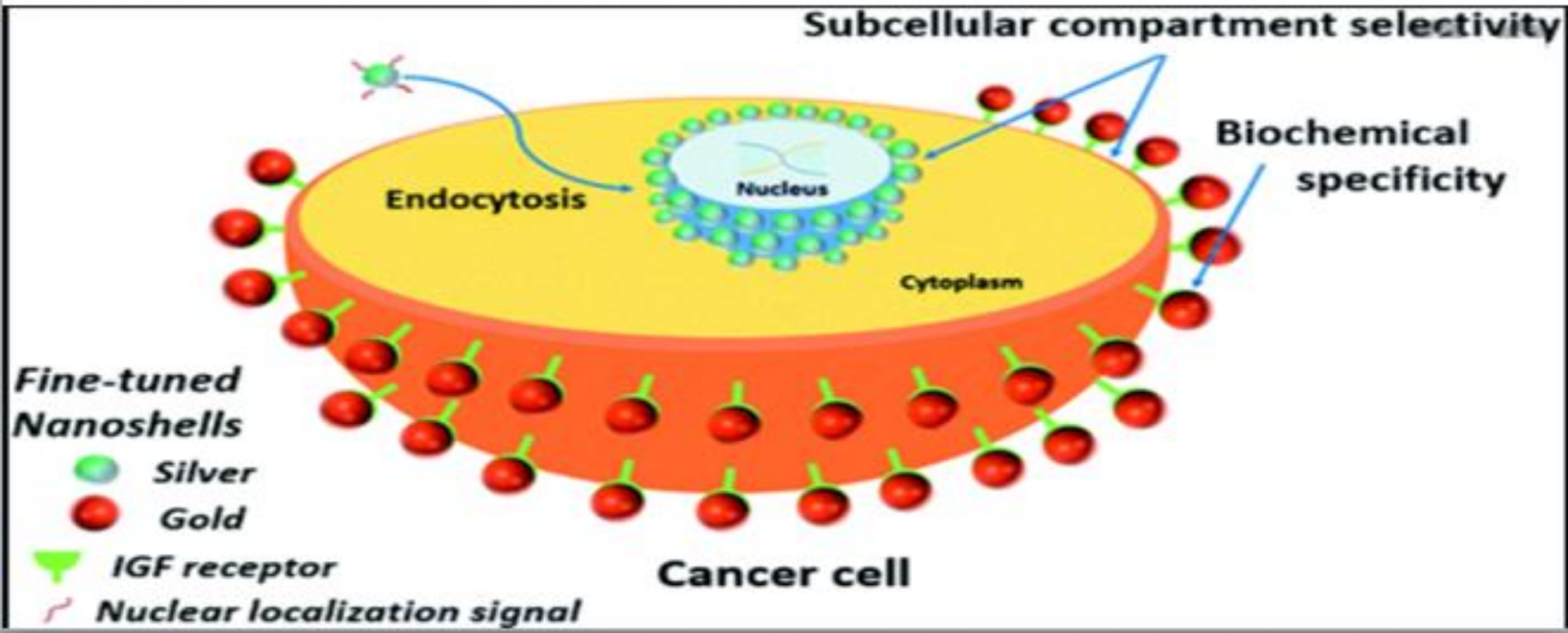
Cell Theory; Cell theory is regarded as one of the most fundamental knowledge in Biology. It has wide ranging effects in all fields of research. After the initial presentation of cell theory by Scheleiden and Schwann, many details of cells were studied and cell theory was extended.

Cell theory Principles. Cell theory, in its modern form, includes the following principles,

1. All organisms are composed of one or more cells.
2. Cells are the smallest living things, the basic unit of organization.
3. Cells arise only by division in previously existing cells.

SUBCELLULAR OR ACELLULAR PARTICLES

Viruses, prions and viroids are not composed of cells; rather they are sub-cellular particles or acellular particles which do not run any metabolism inside them. But they show some characteristics of living organisms i.e. they can increase in number and can transmit their characters to the next generations. These are not classified in any of the five kingdoms of organisms.



the history of formulation of the cell theory.

Worksheet:01

MCQs.

1. Microscopes were first used in;

a.14^{th} century b. 15^{th} century c.16^{th} century d.17century

2. Robert Hooke in 1665 examined a thin slice of cork called it as a. cellule b. Animaliae

3. Leeuwenhoek observed tiny organisms;

a. From pond water b. From sea water c. Drinking water

4. Initial cell theory was proposed by;

a. Schleiden and schwann b. Robert brown

5. _____ discovered nucleus in the cell.

a. Rudolf virchow b. Robert Brown

Plenary :

Short Questions

Q1. Write the principles of cell theory.

Q2. Define sub- cellular or acellular particle.

Q3. Who was Robert Hooke ?


Any
Questions?


Thank You!
Prepared By
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