Discovery of the Cell

Class 9 Biology · Chapter: The Fundamental Unit of Life
🎬 **Video explanation (PrayogX reel):** https://www.instagram.com/reel/DfCiWu8Exqb/

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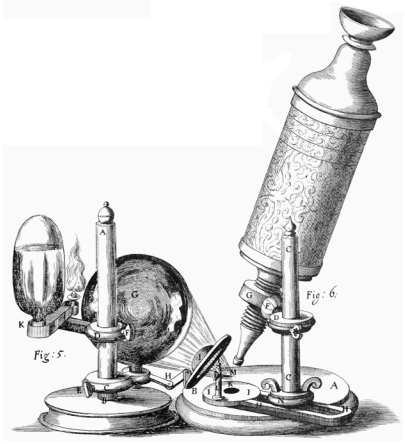
1. The story in one line

In **1665** an English scientist, **Robert Hooke**, looked at a thin slice of **cork** through his microscope and saw tiny boxes like a honeycomb. He called them **"cells"**. That one observation started the study of cells, and about 190 years later it had become the Cell Theory.

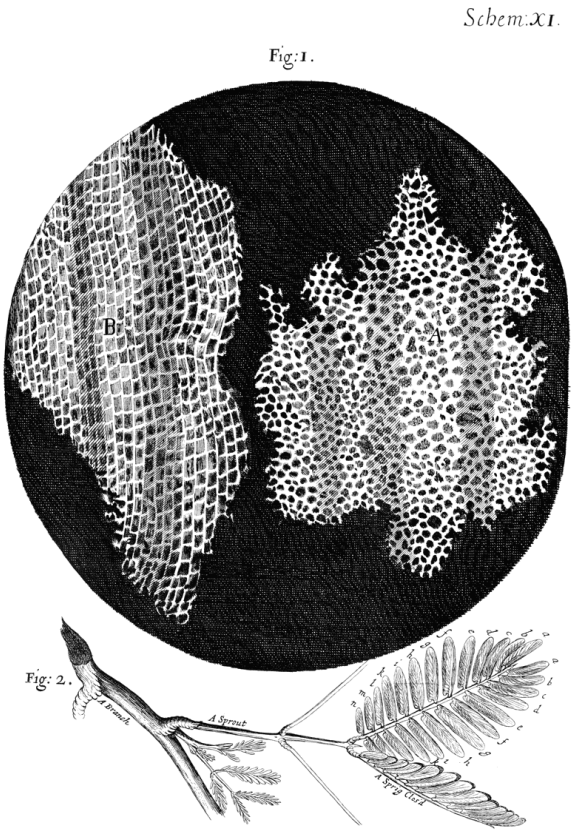
2. Key definitions

Term	Meaning
Cell	The basic structural and functional unit of life. The word comes from the Latin **"cella"**, meaning **a small room**.
Cork	The outer bark of the cork oak tree. Its cells are **dead**; only their walls remain.
Microscope	An instrument with lenses that makes small objects look larger (magnifies them).
Nucleus	The dense, usually round body inside a living cell that controls the cell's activities. Discovered by Robert Brown in 1831.
Protoplasm	The living fluid content of a cell (cytoplasm + nucleus). Term coined by Purkinje in 1839.
Magnification	How many times larger the image is than the real object: **Magnification = size of image ÷ actual size of object**.

3. Step 1: Robert Hooke and the cork slice (1665)

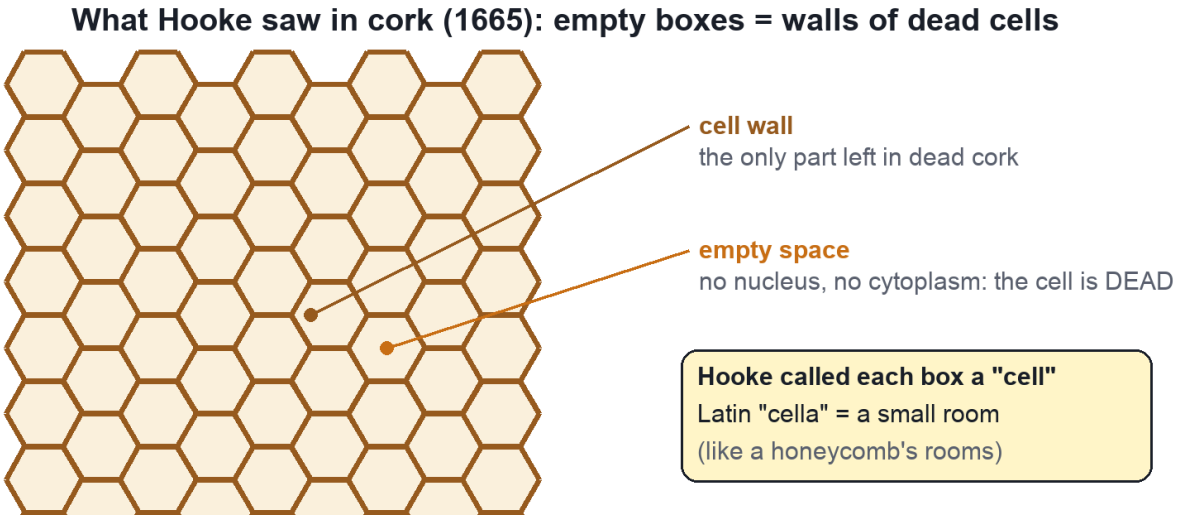


Hooke's microscope (drawing from his book)



Hooke's own drawing of cork
(Micrographia, 1665)

1. Hooke cut a **very thin slice of cork** with a sharp knife.
2. He placed it under a **microscope he designed himself**.
3. He saw the cork was made of many tiny **compartments**, packed like a **honeycomb**.
4. The boxes reminded him of small rooms, so he named them **"cells"** (Latin *cella* = small room).
5. He published his drawings in his famous book **Micrographia** (1665).



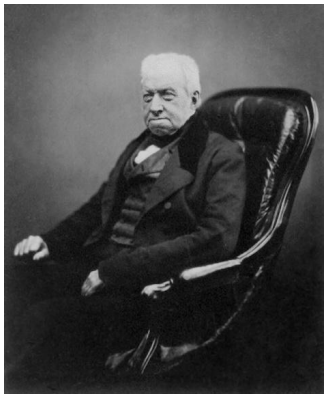
Important twist: the cells Hooke saw were **DEAD**. Cork cells are dead, so he saw only the empty boxes, which were their **cell walls**. He saw no nucleus and no living material.

4. Step 2: Leeuwenhoek sees living cells (1674)

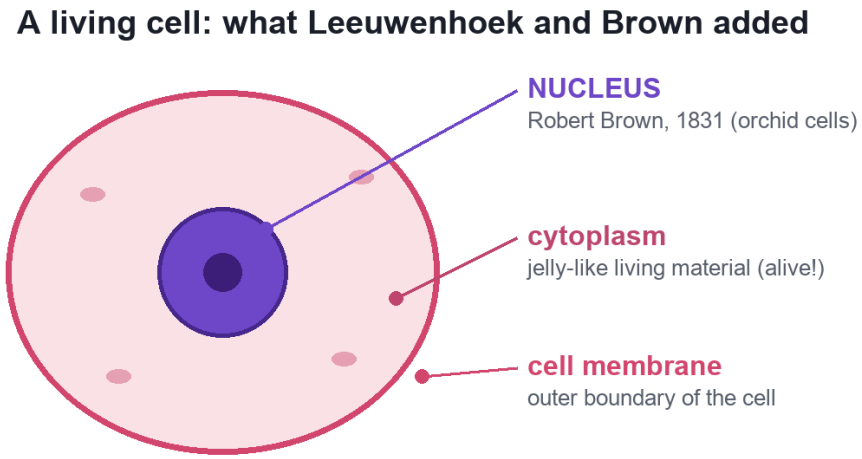


The Dutch scientist **Antonie van Leeuwenhoek** made **better, stronger lenses**. With his improved microscope he looked at a drop of **pond water** and, in 1674, discovered **free-living cells** that were moving and swimming. These were the first **living** cells ever seen.

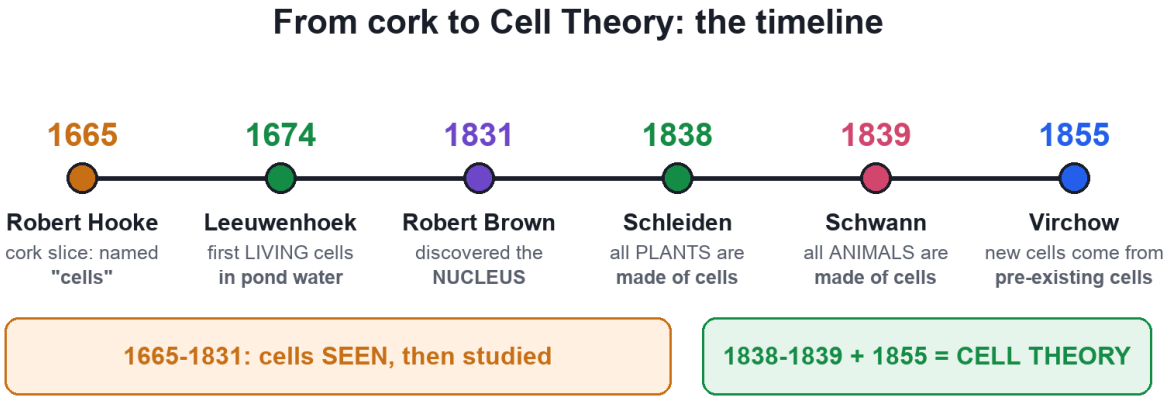
5. Step 3: Robert Brown finds the nucleus (1831)



The Scottish botanist **Robert Brown** studied cells of **orchid** plants and in 1831 discovered a round, dense body inside them: the **nucleus**. Now scientists knew a living cell is not empty; it has a control centre.



6. The complete timeline



Year	Scientist	Discovery
1665	Robert Hooke	Saw cells in cork (dead cells); coined the term "cell"
1674	Antonie van Leeuwenhoek	Discovered free-living cells in pond water (first living cells)
1831	Robert Brown	Discovered the nucleus in the cell
1839	J. E. Purkinje	Coined the term "protoplasm" for the living fluid of the cell
1838–1839	Schleiden and Schwann	Proposed the Cell Theory: all plants and animals are made of cells
1855	Rudolf Virchow	All cells arise from pre-existing cells
1940	(Electron microscope)	Made it possible to see the fine structure of cells and their organelles

7. Hooke vs Leeuwenhoek: compare

Point	Robert Hooke	Antonie van Leeuwenhoek
Year	1665	1674
Sample	Thin slice of cork	Drop of pond water
Cells seen	**Dead** (only cell walls)	**Living**, free and moving
Contribution	Named the "cell"	First to see living cells

8. Analogy and examples

- **Analogy:** Hooke saw an **empty hostel**: rooms with walls but no students. Leeuwenhoek and Brown later saw **rooms full of life**, and a "warden" (the nucleus) in each.
- **Why cork?** Cork is light, easy to slice thin, and its dead cells have thick, clear walls, so the boxes stand out under a simple microscope.
- **Try it (NCERT activity):** peel a thin layer of onion skin, stain it with a drop of safranin or iodine and observe under a microscope; you will see brick-like cells with a dark nucleus.

9. Solved examples

Solved example 1. A cell is 0.02 mm wide. Under a microscope its image is 4 mm wide. Find the magnification.

Solution: Magnification = image size ÷ actual size = 4 mm ÷ 0.02 mm = **200×**.
Solved example 2. Why could Hooke not see a nucleus in his cork cells?
Solution: Cork cells are **dead**. Their living contents (cytoplasm and nucleus) are gone; only the cell walls remain. So there was no nucleus to see.

10. Key takeaways

- **1665, Robert Hooke:** cork, honeycomb boxes, named them "cells" (Latin *cella* = small room), book *Micrographia*.
- Hooke's cork cells were **dead**: he saw only cell walls.
- **1674, Leeuwenhoek:** first **living** cells, in pond water, with better lenses.
- **1831, Robert Brown:** the **nucleus**.
- These discoveries led to the **Cell Theory** (1838–39, completed 1855).
- **Magnification = image size ÷ actual size**.

Practice questions (CBSE style)

Q1 (MCQ). Who first discovered cells, and in which year?
(a) Leeuwenhoek, 1674 (b) Robert Hooke, 1665 (c) Robert Brown, 1831 (d) Schwann, 1839
Q2 (MCQ). The word "cell" comes from a Latin word meaning:
(a) a living thing (b) a small room (c) a honeycomb (d) a tiny box of life
Q3 (MCQ). Robert Brown discovered the nucleus in the cells of:
(a) cork (b) pond water (c) orchid (d) onion
Q4 (Short answer, 2 marks). Were the cells observed by Robert Hooke living or dead? Give a reason.
Q5 (Short answer, 2 marks). What was the contribution of Antonie van Leeuwenhoek? How was it different from Hooke's observation?
Q6 (Numerical, 2 marks). A pond-water cell is 0.05 mm long. Under a microscope it appears 15 mm long. What is the magnification? If the same cell is seen at 400×, how long will its image be?
Q7 (Diagram based, 3 marks). Draw what Hooke saw in a thin slice of cork and label the cell wall and the empty space. Why does the drawing look like a honeycomb?
Q8 (Application, 3 marks). Arrange in the correct order and name the scientist for each: discovery of the nucleus; naming of the cell; first living cells seen; Cell Theory proposed.
Q9 (Case based, 4 marks). A student peels onion skin, puts it on a slide with a drop of iodine and looks at it under a microscope. She sees brick-shaped compartments, each with a dark round spot.
(a) What are the brick-shaped compartments? (1)
(b) What is the dark round spot, and who discovered it? (1)
(c) Are these cells living or dead when peeled? How is this different from Hooke's cork? (1)
(d) Why is a stain such as iodine used? (1)

Answer key with worked solutions

A1. (b) Robert Hooke, 1665.
A2. (b) a small room (Latin *cella*).
A3. (c) orchid.
A4. Dead. Cork is made of dead cells; Hooke saw only empty compartments (cell walls) with no living contents or nucleus.
A5. Leeuwenhoek (1674) used better lenses and discovered **free-living, moving cells** in pond water, the first **living** cells seen. Hooke (1665) had seen only **dead** cork cells (empty walls).
A6. Magnification = 15 mm ÷ 0.05 mm = **300×**. At 400×: image size = magnification × actual size = 400 × 0.05 mm = **20 mm**.
A7. Diagram as in Section 3: hexagon-like boxes with thick walls; label "cell wall" on a wall line and "empty space" inside a box. It looks like a honeycomb because the dead cells are packed closely side by side, and only their walls remain, forming many small empty compartments.
A8. (1) Naming of the cell: Robert Hooke, 1665. (2) First living cells seen: Leeuwenhoek, 1674. (3) Discovery of the nucleus: Robert Brown, 1831. (4) Cell Theory proposed: Schleiden and Schwann, 1838–1839 (completed by Virchow, 1855).
A9. (a) Onion peel **cells** (their walls make the brick shape). (b) The **nucleus**, discovered by Robert Brown in 1831. (c) Freshly peeled onion cells are **living** and have a nucleus and cytoplasm, whereas Hooke's cork cells were **dead**, with only walls. (d) Cell parts are almost colourless; the stain colours the nucleus and walls so they can be seen clearly.