

WHERE DID LIFE COME FROM?

Mapping the historical theories and definitive experiments on the origin of life.



The Panspermia Hypothesis

Life did not originate on Earth. Instead, units of life called “spores” were transferred here from outer space.

Timeline Note:

Earth formed ~4.5 billion years ago.
Life appeared ~4 billion years ago.

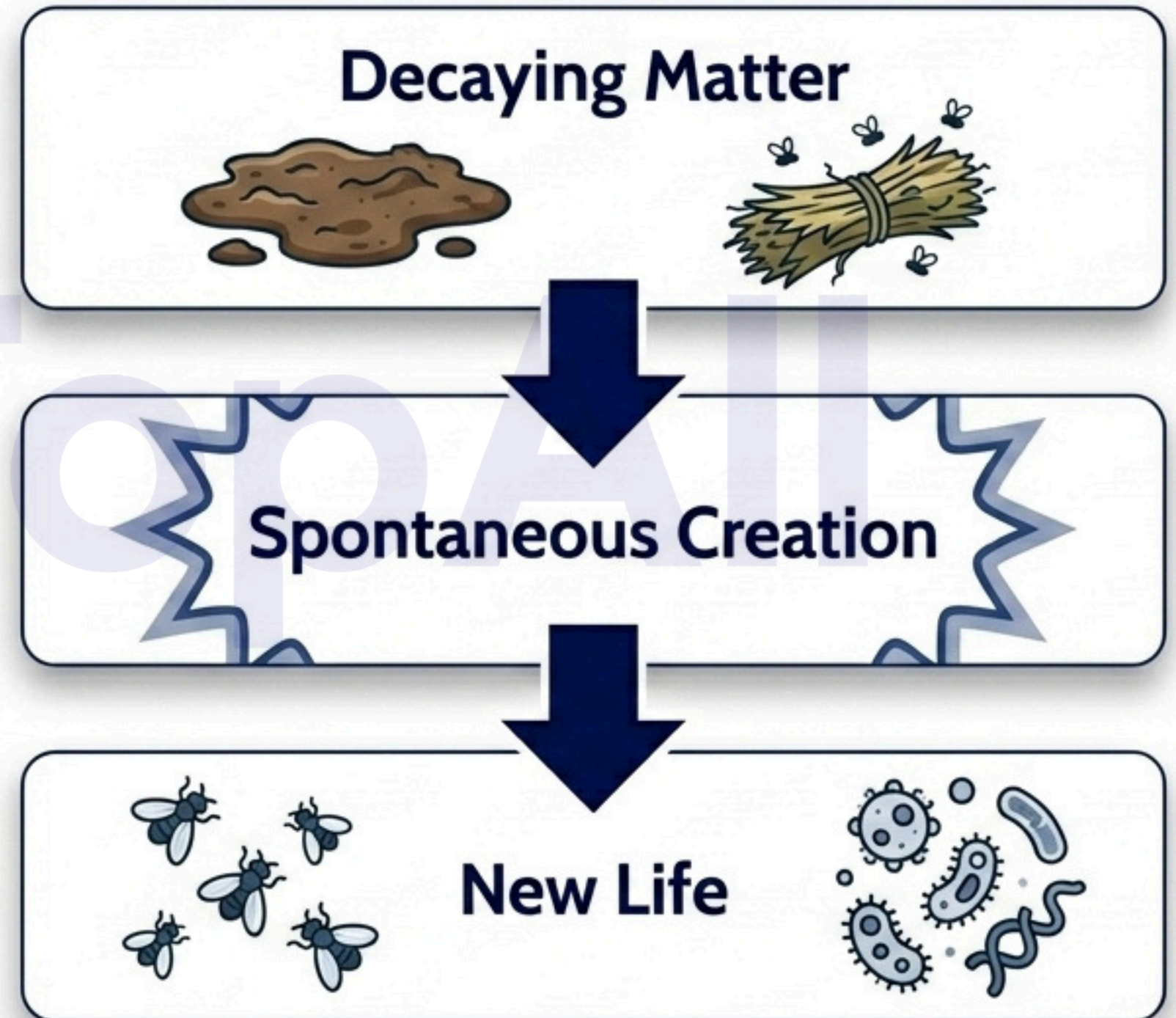
Quick Tip

- **Historical Context:** Strongly favored by early Greek thinkers.
- **Current Status:** Still a favorite, valid consideration for some modern astronomers who analyze meteorite contents.



Spontaneous Generation Theory

For a long time, it was believed that life could arise spontaneously from non-living, decaying, and rotting matter.





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Louis Pasteur's Flask Experiment

Panel A: Sealed Flask



Incubated over time

No new life

Panel B: Open Flask



Incubated over time

New living organisms arose

Biogenesis: The New Law

**Life comes only
from pre-existing life.**

Pasteur's careful experimentation definitively proved that modern living organisms cannot spontaneously generate from rotting mud or straw.

Decaying Matter

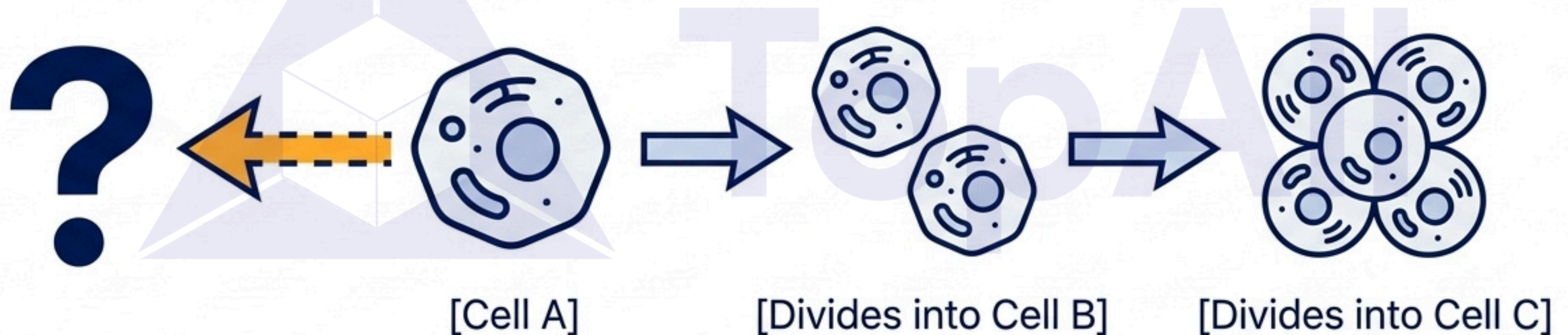
Creation

New Life

The Unsolved Mystery

The Paradox of Biogenesis

If every living organism must come from a previous living organism, how did the very first cellular form of life originate ~2000 million years ago?



Biogenesis explains the continuity of life, but not its origin.

Common Mistake



Mistake: Believing Pasteur proved life never came from non-living matter.



Correction: Pasteur only proved life doesn't spontaneously generate under current Earth conditions. The first life forms are theorized to have evolved from non-living organic molecules (e.g., RNA, proteins) in the extreme conditions of early Earth—a slow process known as Chemical Evolution.

Synthesis: Origin of Life Theories



Concept	Core Premise	Scientific Status
Panspermia	Life arrived from space via spores	Still debated; possible for basic organic matter.
Spontaneous Generation	Life arises rapidly from decaying matter	Completely debunked by Pasteur.
Biogenesis	Life only comes from pre-existing life	The established law for modern biology.



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