



Second Phase of the Cell Cycle

D) Mitosis

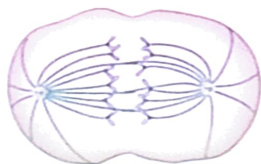
1. Nucleus is divided into 2 nuclei
2. Each nucleus ends up with the same number of chromosomes as the original cell.
3. Includes prophase, metaphase, anaphase and telophase.

Phases of Mitosis

In **anaphase**, sister chromatids of each duplicated chromosome separate and are drawn toward the two spindle poles.

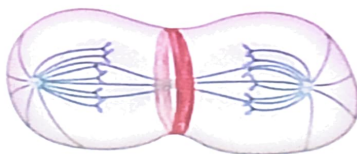
Then in **telophase**, the mitotic spindle disassembles, chromosomes decondense, the nuclear envelope reforms surrounding the chromosomes, and the cell undergoes cytokinesis--the physical division of the cytoplasm.

Anaphase



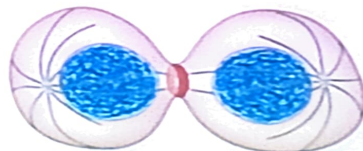
APC/C activated and cohesins degraded
Anaphase A: Chromosome movement to poles
Anaphase B: Spindle pole separation

Telophase



Nuclear envelope reassembly,
Assembly of contractile ring

Cytokinesis



Reformation of interphase microtubule array,
Contractile ring forms cleavage furrow

Prokaryotic cell division

Prokaryotes represent a group of mostly unicellular organisms characterized by the lack of membrane-bound organelles such as the **nucleus**. Instead, prokaryotes possess a nucleoid region where the genetic material is located.

Prokaryotes are classified into two taxonomic groups—domain **Archaea** and domain **Bacteria**. While archaeans were initially classified together with bacteria, researchers have since discovered significant genetic differences that distinguish domain Archaea from domain Bacteria.

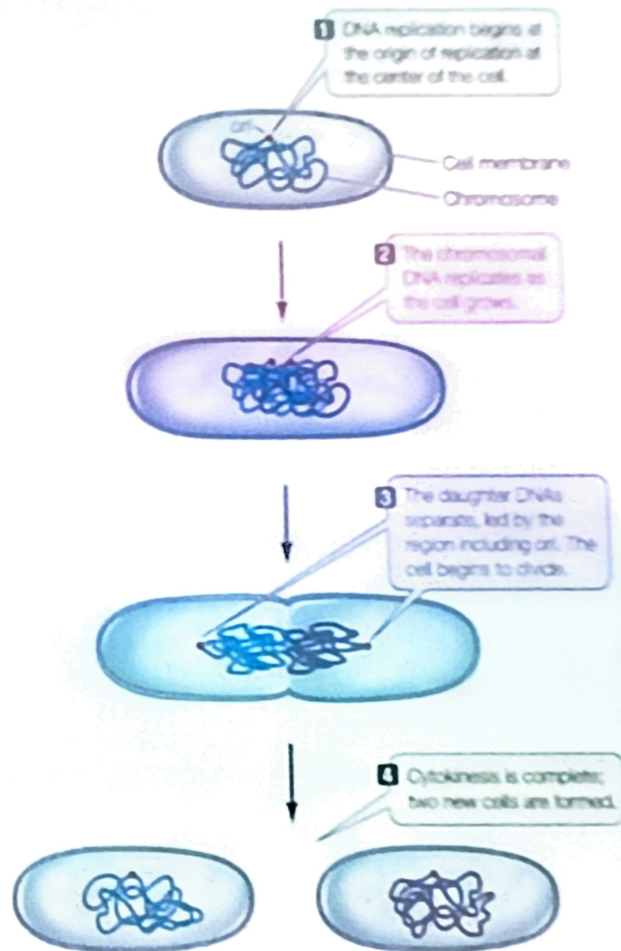
Archaeans, in particular, have the ability to survive in extreme environments associated with high acidity or salinity, the lack of oxygen, and high temperatures.

Some bacteria are also able to survive in extreme environments, but for the most part they are constrained by a narrow range of pH and temperature in which they can exist.

Prokaryotic cell division

Cell division in prokaryotes represents a form of asexual reproduction. Primarily occurring via **binary fission**, cell division represents the process by which one cell divides into two cells.

In nature, there are multiple other methods of cell division in prokaryotes include multiple cell division, budding, and intracellular offspring.



Prokaryotic cell division- Multiple cell divisions

Some Cyanobacteria produce Baeocytes, enlarged bacterial cells that have rapid multiple division internally before breaking open and spewing out numerous new bacteria.

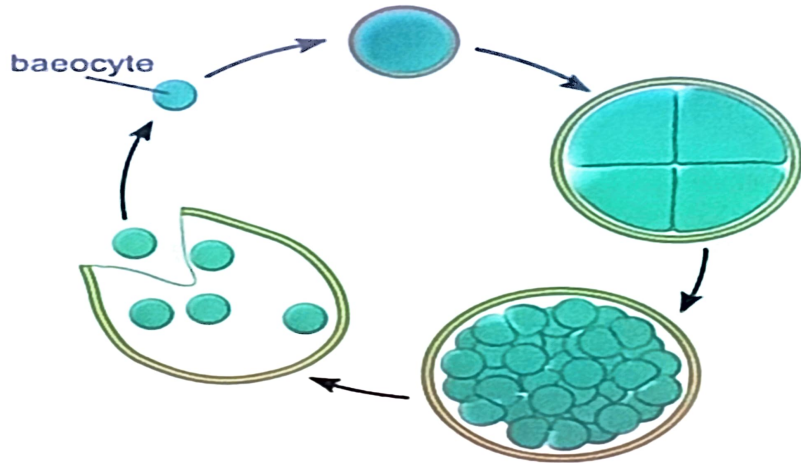
It starts out as a small, spherical cell approximately 1 to 2 μm in diameter. This cell is referred to as a baeocyte (which literally means "small cell").

The baeocyte begins to grow, eventually forming a vegetative cell up to 30 μm in diameter. As it grows, the cellular DNA is replicated over and over, and the cell produces a thick extracellular matrix.

Prokaryotic cell division- Multiple cell divisions

The vegetative cell eventually transitions into a reproductive phase where it undergoes a rapid succession of cytoplasmic fissions to produce dozens or even hundreds of baeocytes.

The extracellular matrix eventually tears open, releasing the baeocytes.

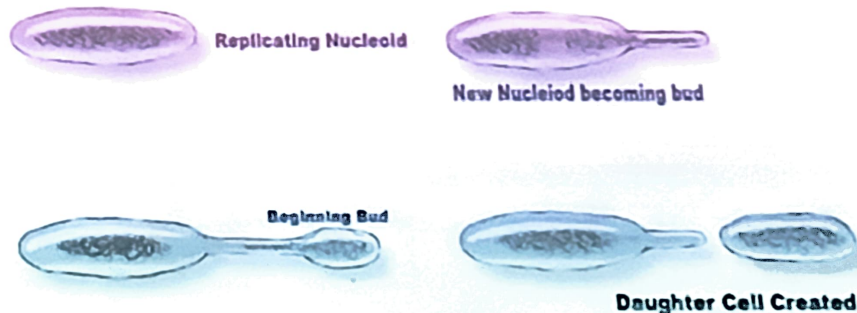


Prokaryotic cell division- budding

Budding is a type of asexual reproduction where the new organism (offspring) grows as an outgrowth from the body of the parent.


Here, the new individual starts growing as a small body on one side of the parent organism and continues growing in size while still attached to the parent.

Early on, it appears as part of the parent given that it does not detach until it has grown further. Ultimately, the new individual, which resembles the parent, detaches and becomes an independent organism.

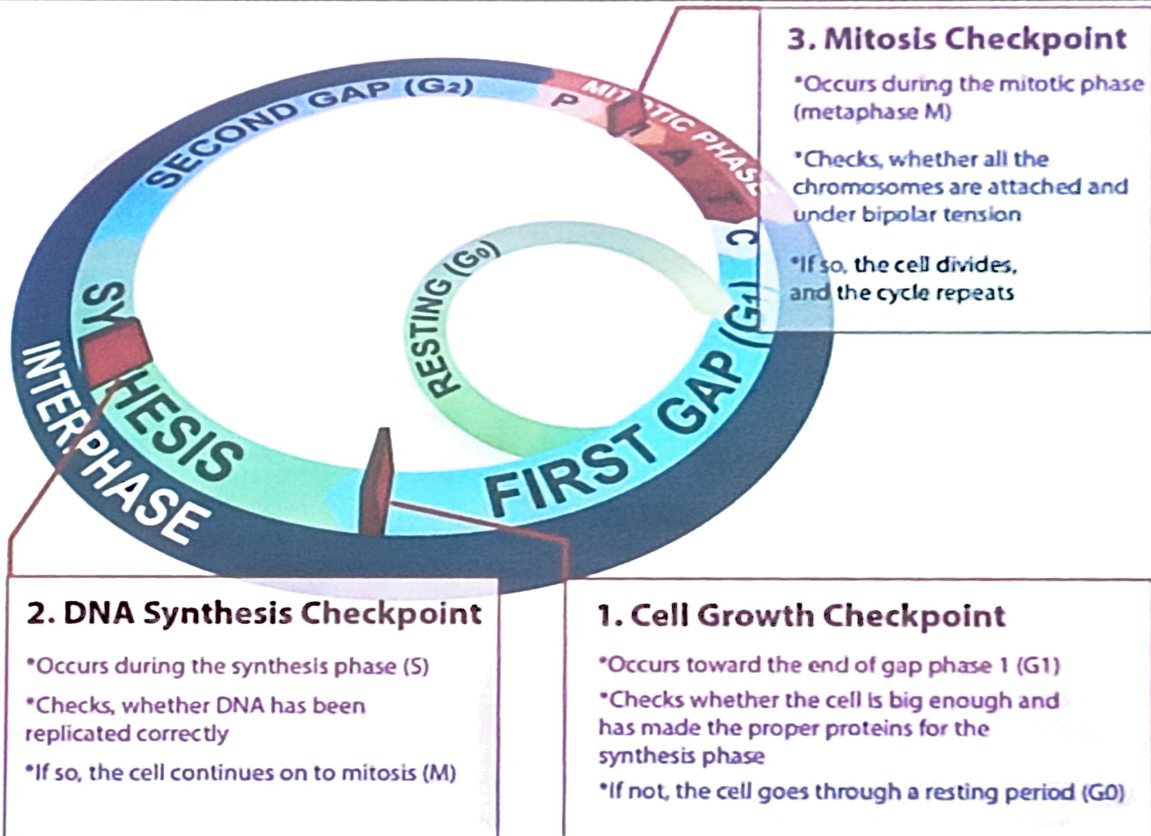




Cell Cycle in Eukaryotes



A **cell cycle** is a series of events that takes place in a cell as it grows and divides. A cell spends most of its time in what is called interphase, and during this time it grows, replicates its chromosomes, and prepares for cell division.



NAMEID

✓ Kushagra Kataria

12341290

✓ Tushant Jainwal

12340990

✓ Aditya Jha

12340090

✓ Divyansh Dubey

12340690

✓ Kartikeya

12341090

✓ Naman Sharma

12341160

Om Anand

12341250

Maharshi Soni

12341350

Gaurav

12340790

12341840

Rounak Gupta

12342320

Varun Rao

12340740

✓ Farhan Alam

12341320

✓ Laxman Patel

12341830

Poojant

Krish Pagnumwshi

12341330

Nitin Dhankar

12341490

Mohak

12341420

✓ Anish Ahire

12341390

✓ Tanishq Gupta

12342220

✓ G.S. Abhinav

12340840

✓ J. Mukesh Reddy

12341000

R. Devender

12341760

aagush

12840040

✓ JIVARI PURVA

✓ TIYA MENTA

✓ SNEHAL SUHANE

✓ Khushi Sharma

✓ Kiraanya Mhaibadure

Sanjani Kumbri

Rishika Pandey

✓ Arpit Bhomia

Pratik Raj

Sneha Nagmohi

✓ AKSHITA

✓ Maati Das

✓ Chandou Aji

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