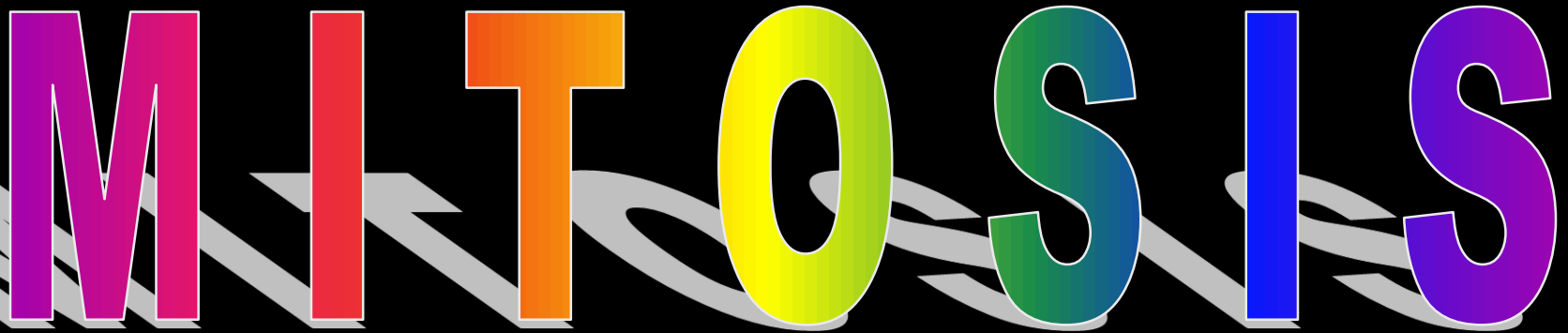


**t h e M - p h a s e**

**M I T O S I S**

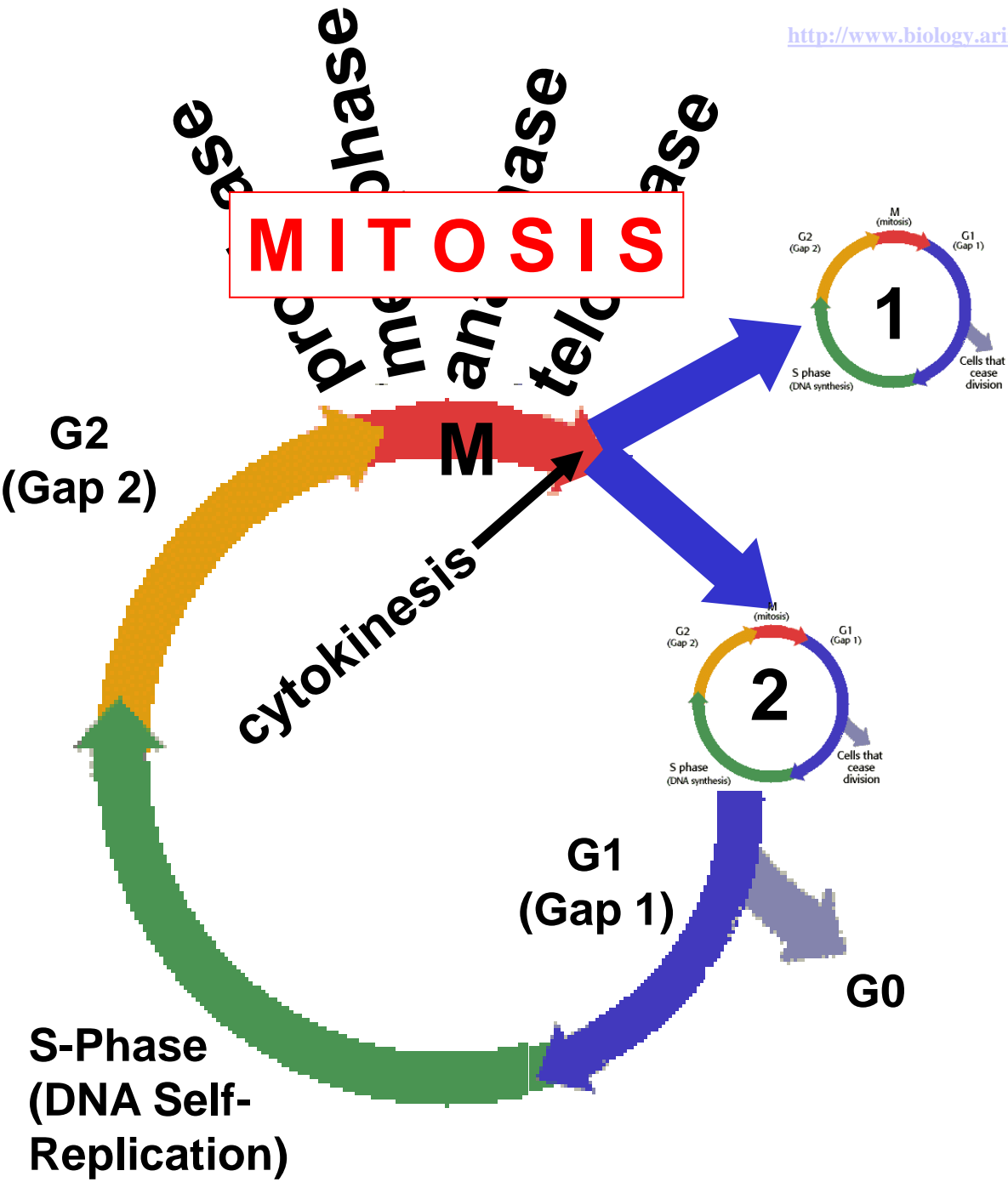
The word 'MITOSIS' is rendered in large, bold, 3D-style letters. Each letter has a distinct color gradient: 'M' is purple to pink, 'I' is red, 'T' is orange, 'O' is yellow to green, 'S' is green to blue, 'I' is blue, and 'S' is purple. The letters are set against a black background and cast long, grey, 3D shadows to the left and slightly forward, giving them a sense of depth.

**Originally created by Bob Perry, Malibu High School  
Modified by John Cary, Malibu High School**

# Disclaimer:

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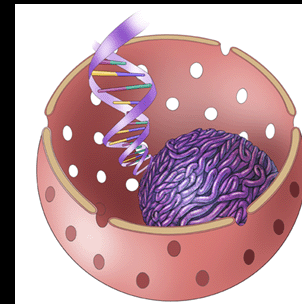
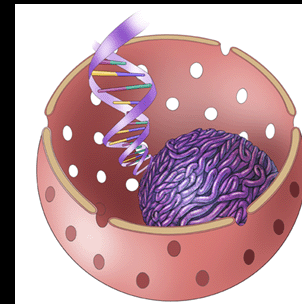
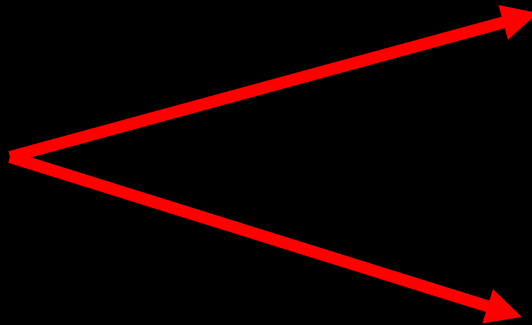
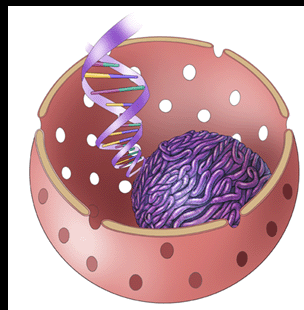
**[perry@smmusd.org](mailto:perry@smmusd.org)**



# THE CELL CYCLE

# What is MITOSIS ?

**THE PROCESS BY WHICH TWO NEW NUCLEI ARE FORMED, PRECEDING CELL DIVISION.**



# PURPOSE OF MITOSIS:

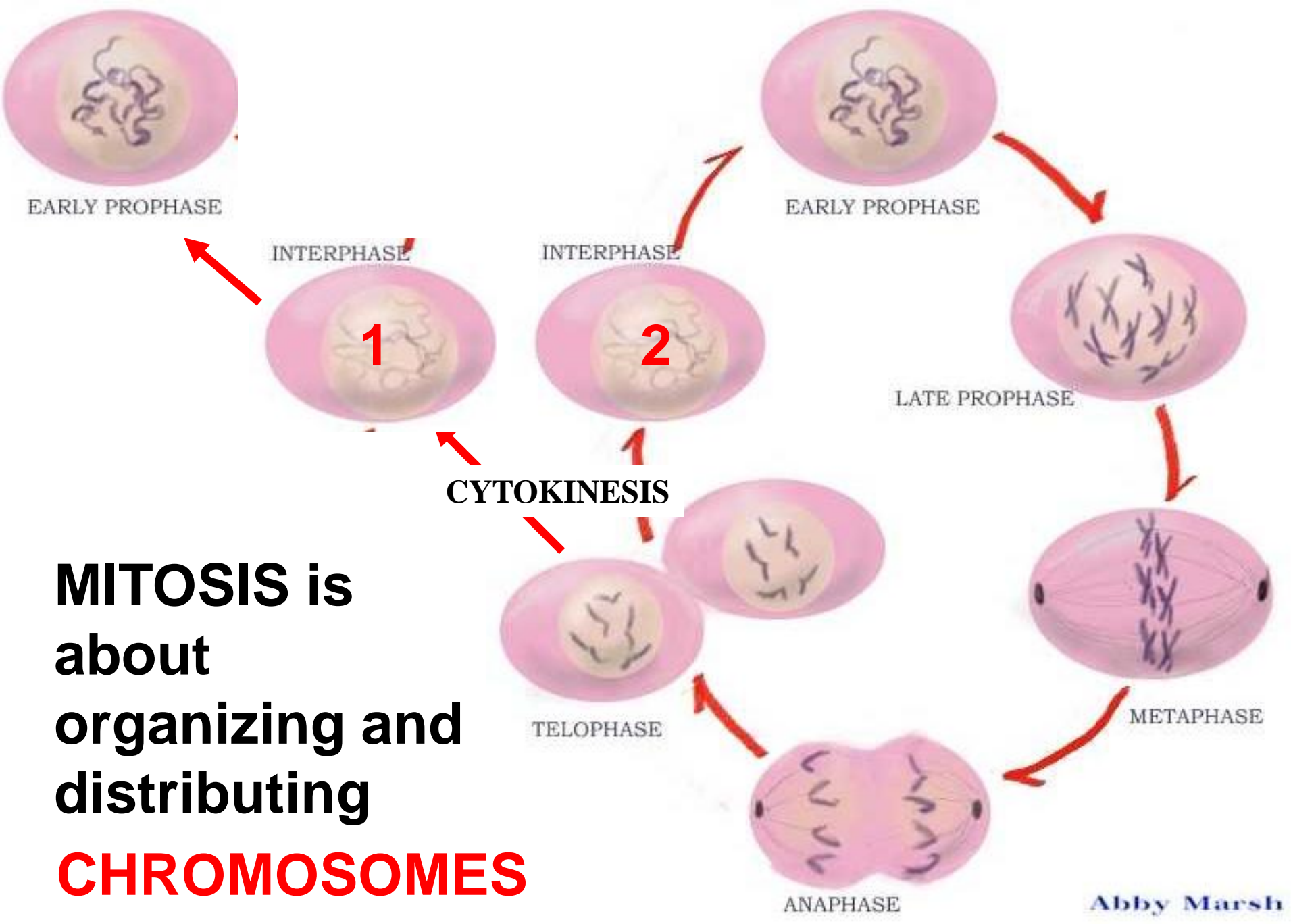
TO PRODUCE **TWO NEW NUCLEI** WITH...

- **EXACTLY THE SAME KIND**

and

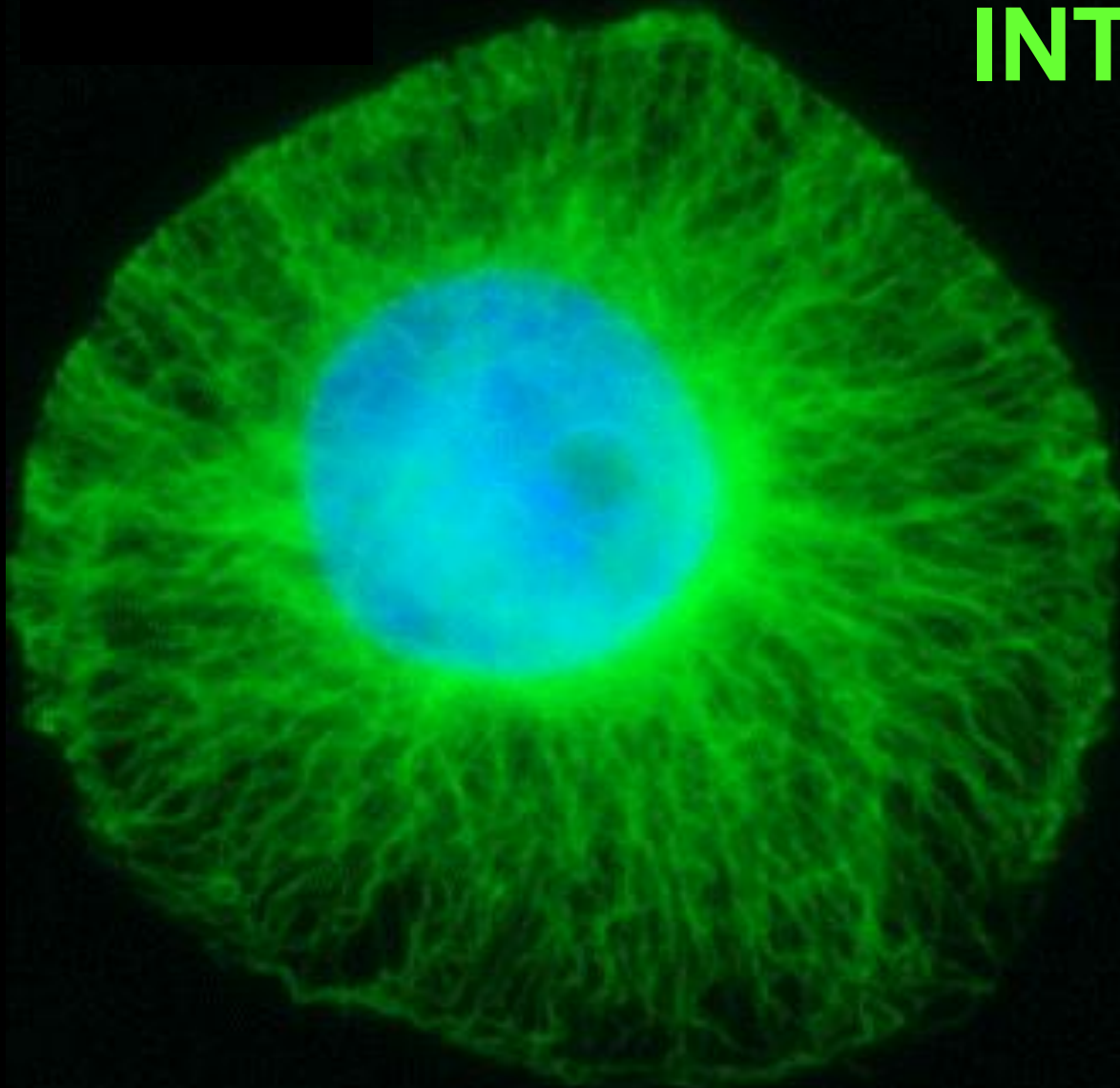
- **EXACTLY THE SAME NUMBER**

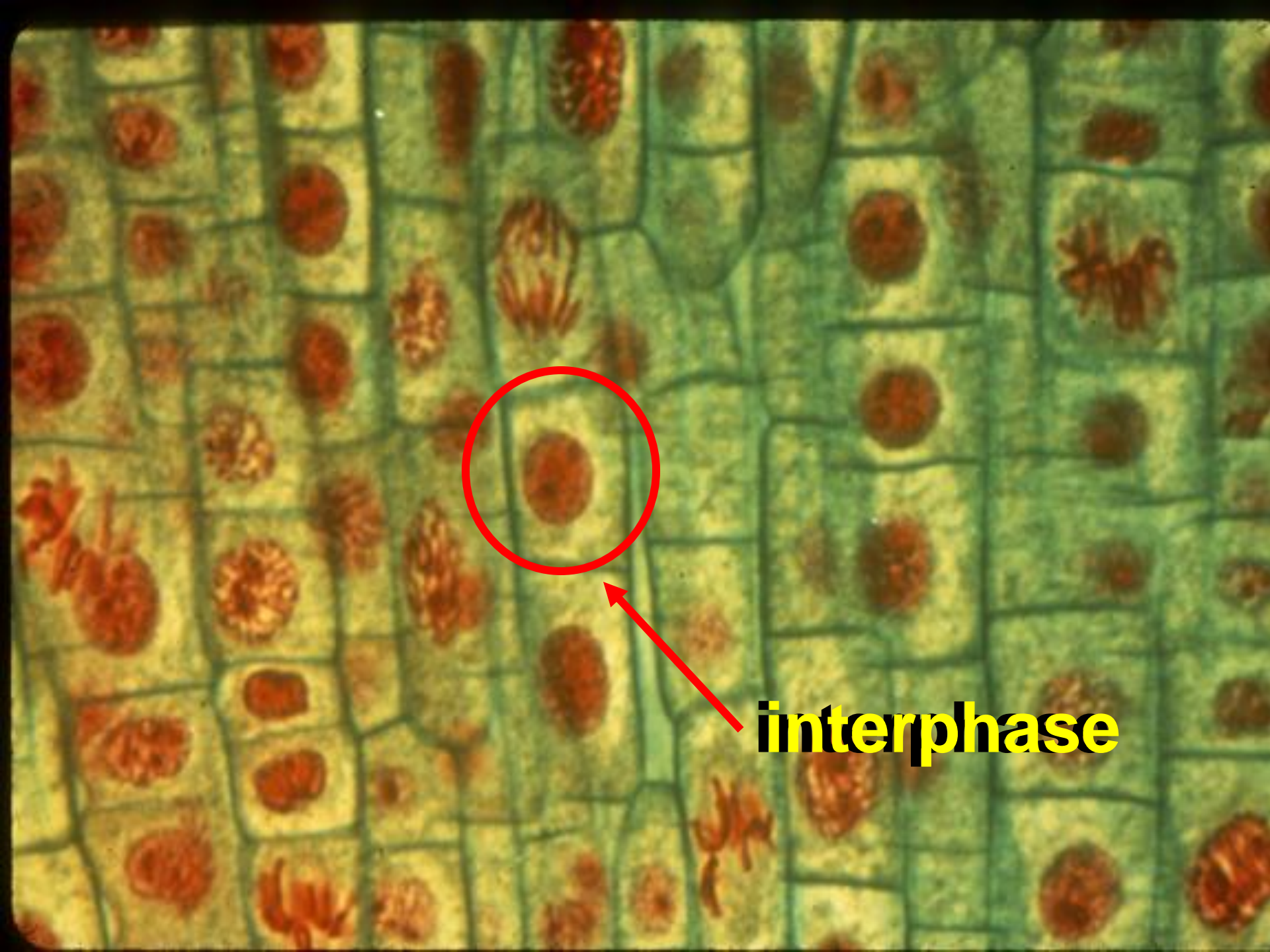
**... OF CHROMOSOMES  
AS THE PARENT CELL.**



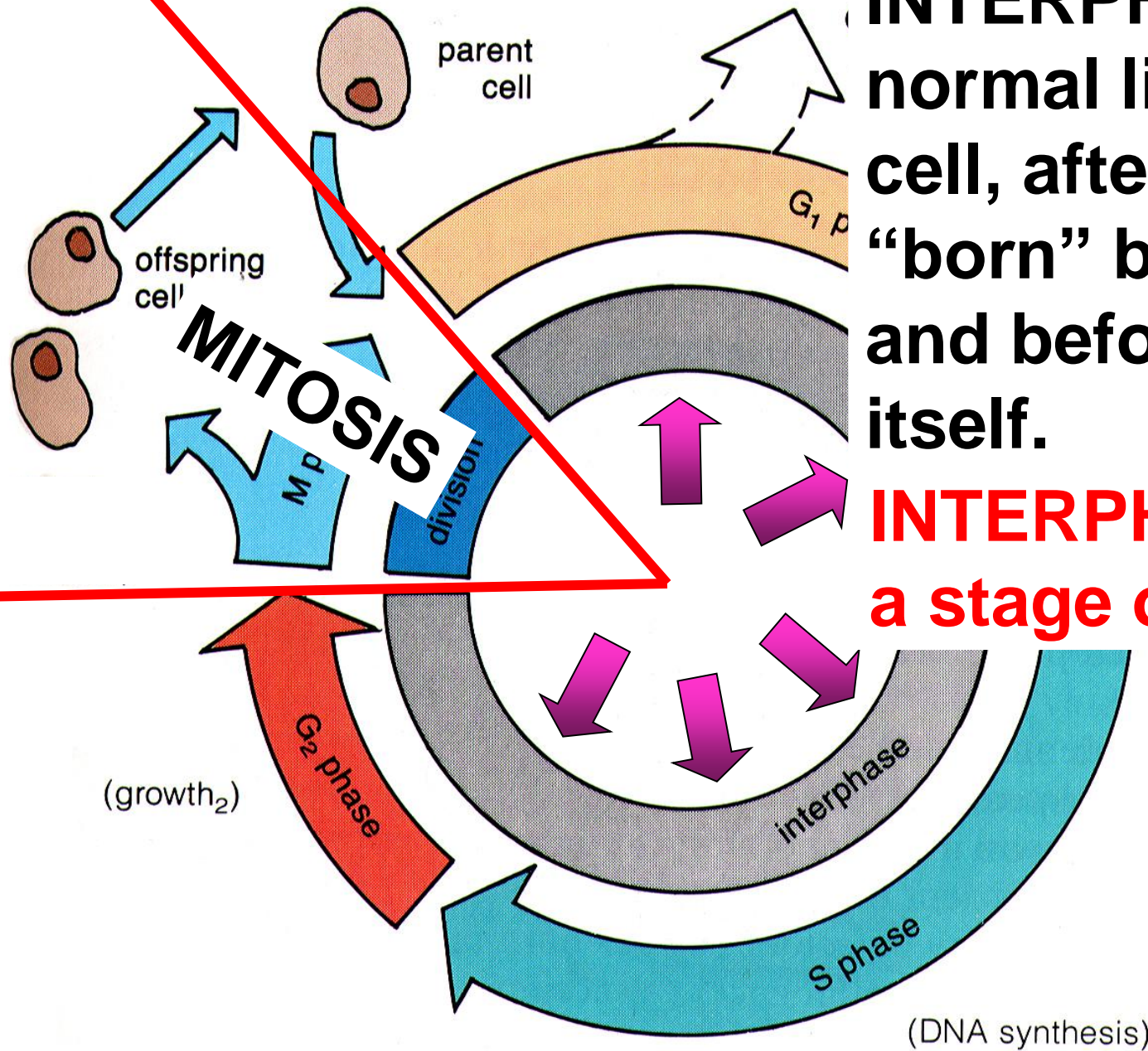
**MITOSIS** is  
about  
organizing and  
distributing  
**CHROMOSOMES**

# INTERPHASE





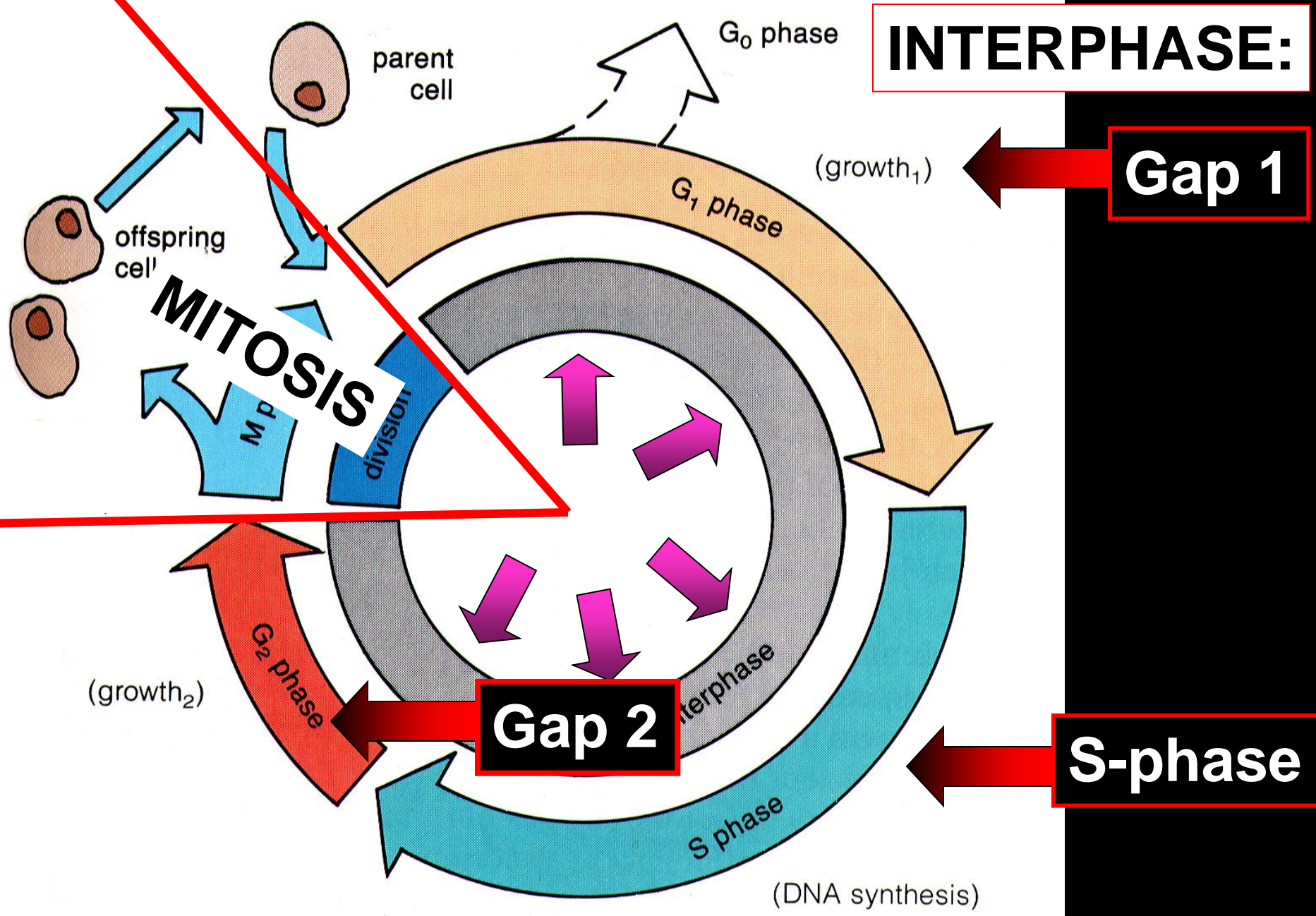
**interphase**



**INTERPHASE** is the normal lifetime of a cell, after being “born” by division, and before it divides itself.

**INTERPHASE is not a stage of mitosis !**

**The Cell Cycle**



**INTERPHASE:**

**Gap 1**

**S-phase**

**Gap 2**

**MITOSIS**  
M P  
division

**The Cell Cycle**

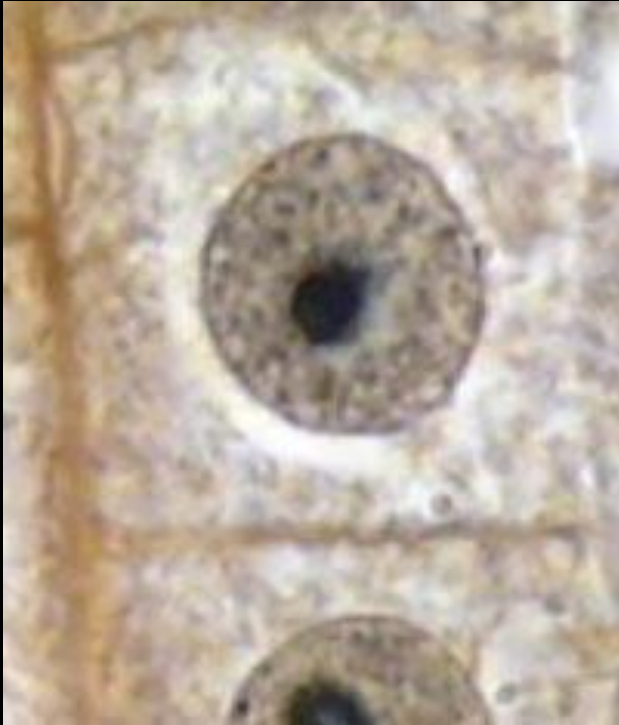
nucleolus (if any)  
still visible

## **INTERPHASE:**

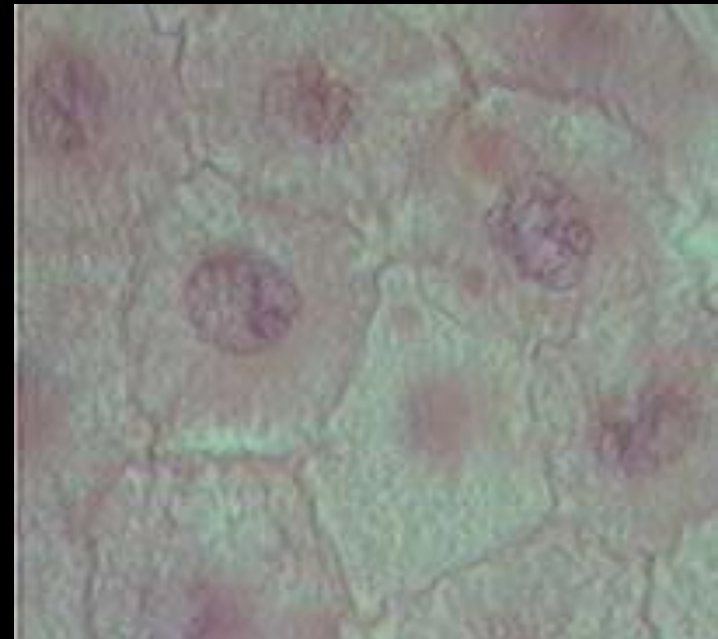
nuclear envelope  
clearly visible

chromatin,  
**NO**  
chromosomes,  
yet

# INTERPHASE



*Allium* root tip

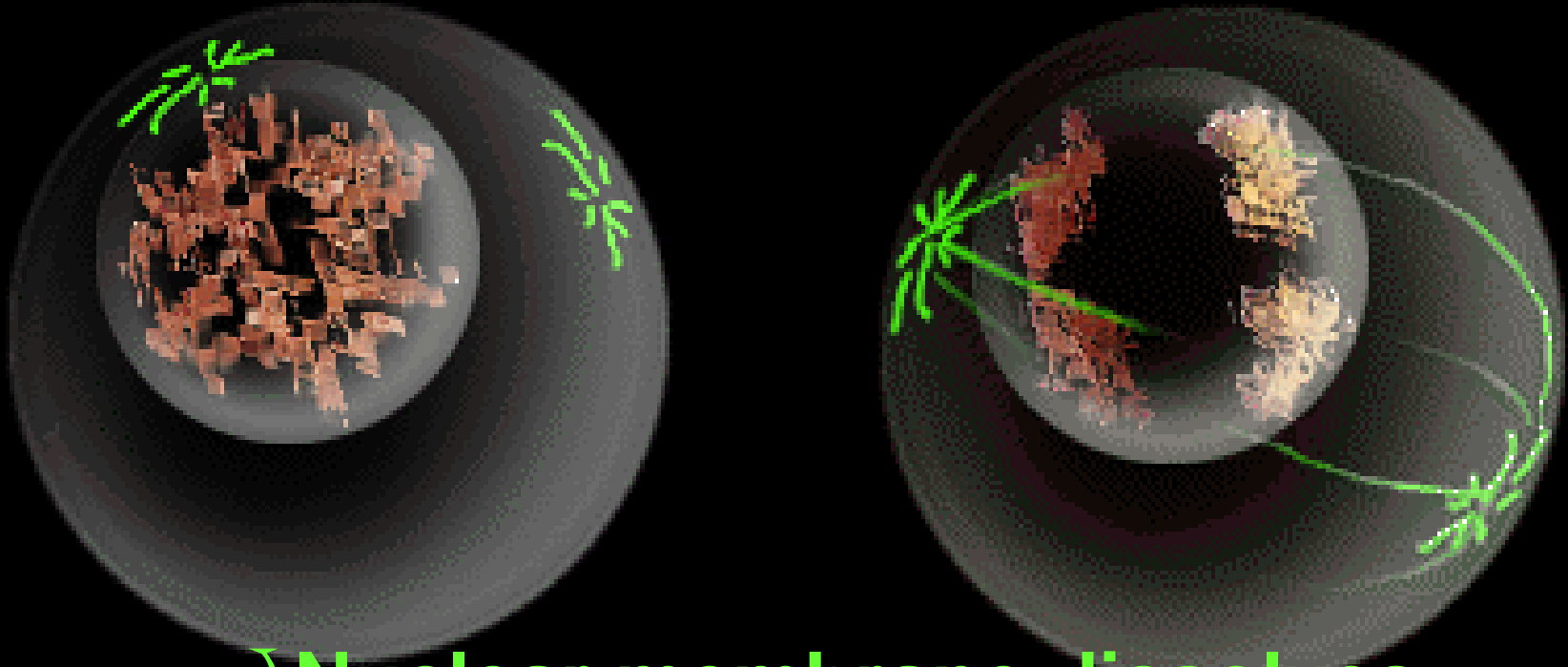


*Coregonus* blastula

A fluorescence micrograph of a cell in the prophase stage of mitosis. The image shows a central region of bright green and blue light, representing the condensing chromosomes and the spindle apparatus. The surrounding cytoplasm is stained with red, showing a network of microtubules and other cellular structures. The overall appearance is that of a cell with a highly organized internal structure.

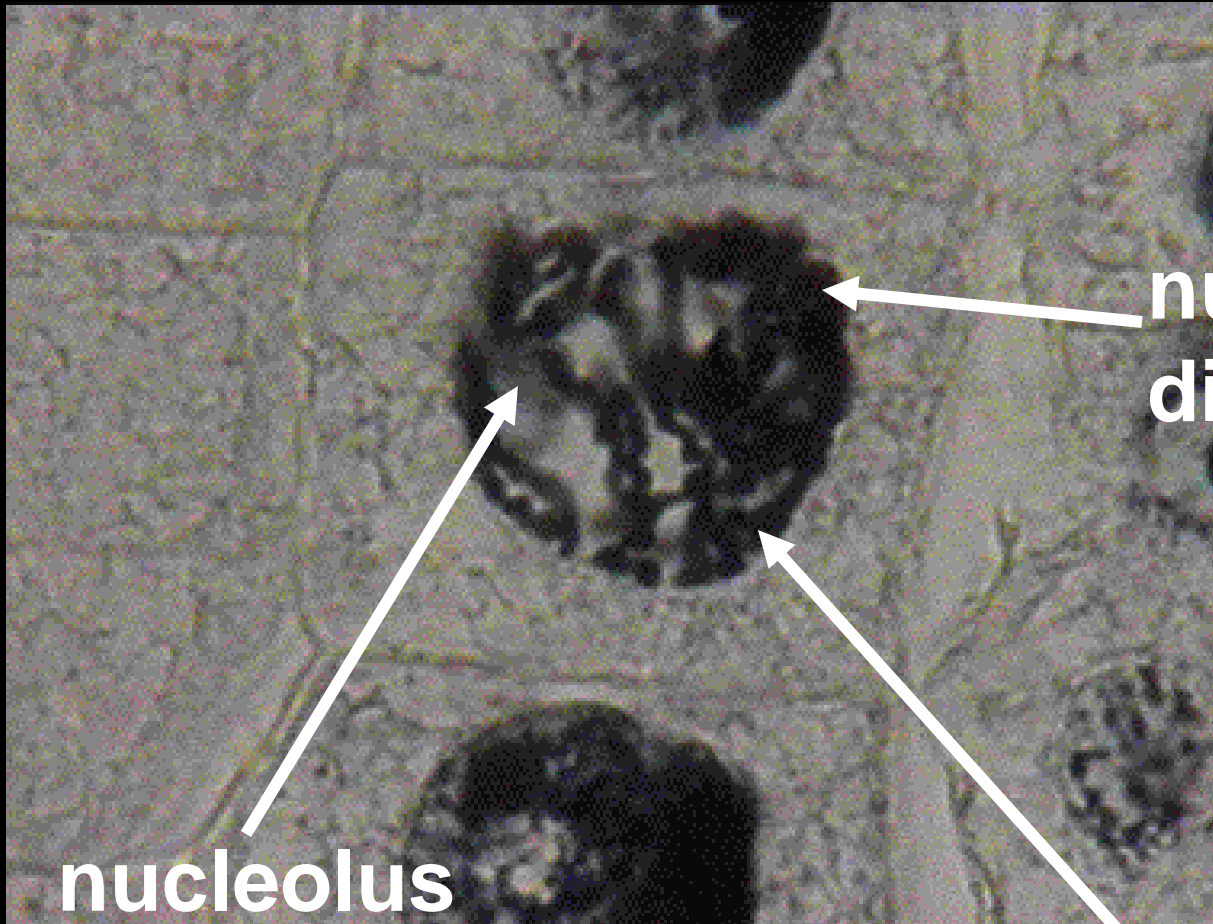
# PROPHASE

# PROPHASE



- ∩ Nuclear membrane dissolves.
- ∩ Nucleolus disappears.
- ∩ Chromosomes form.
- ∩ Centrioles migrate & form spindle.

# PROPHASE



nuclear envelope  
disappears

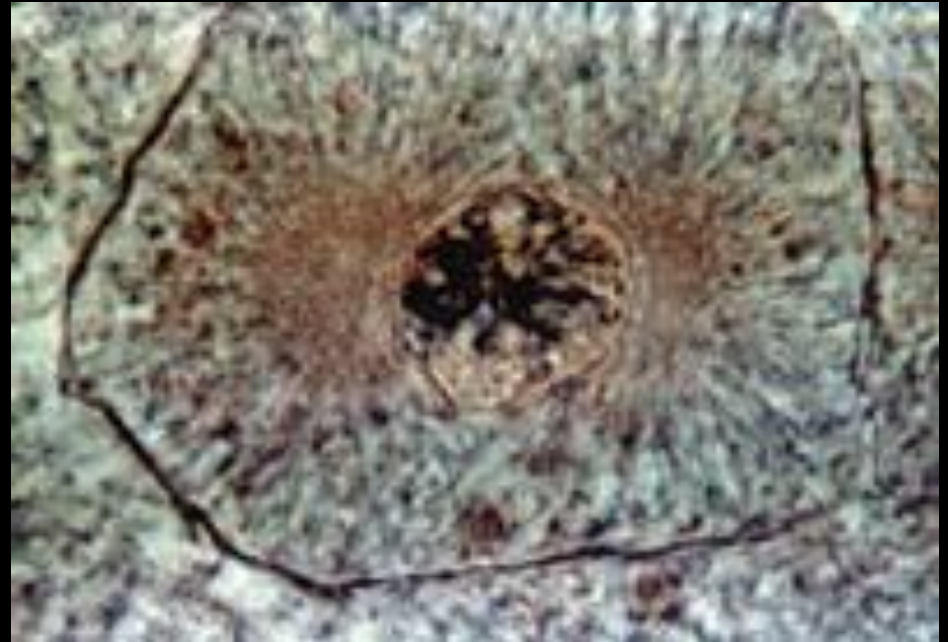
nucleolus  
disappears

chromosomes  
become visible

# PROPHASE

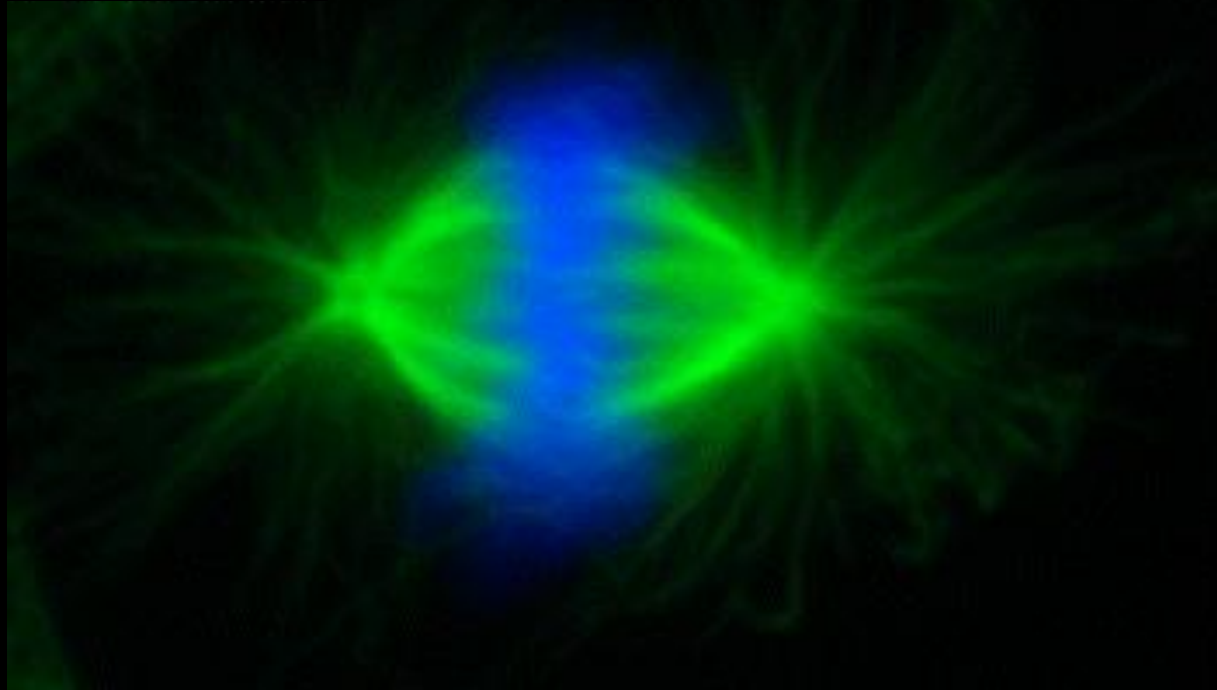


*Allium* root tip



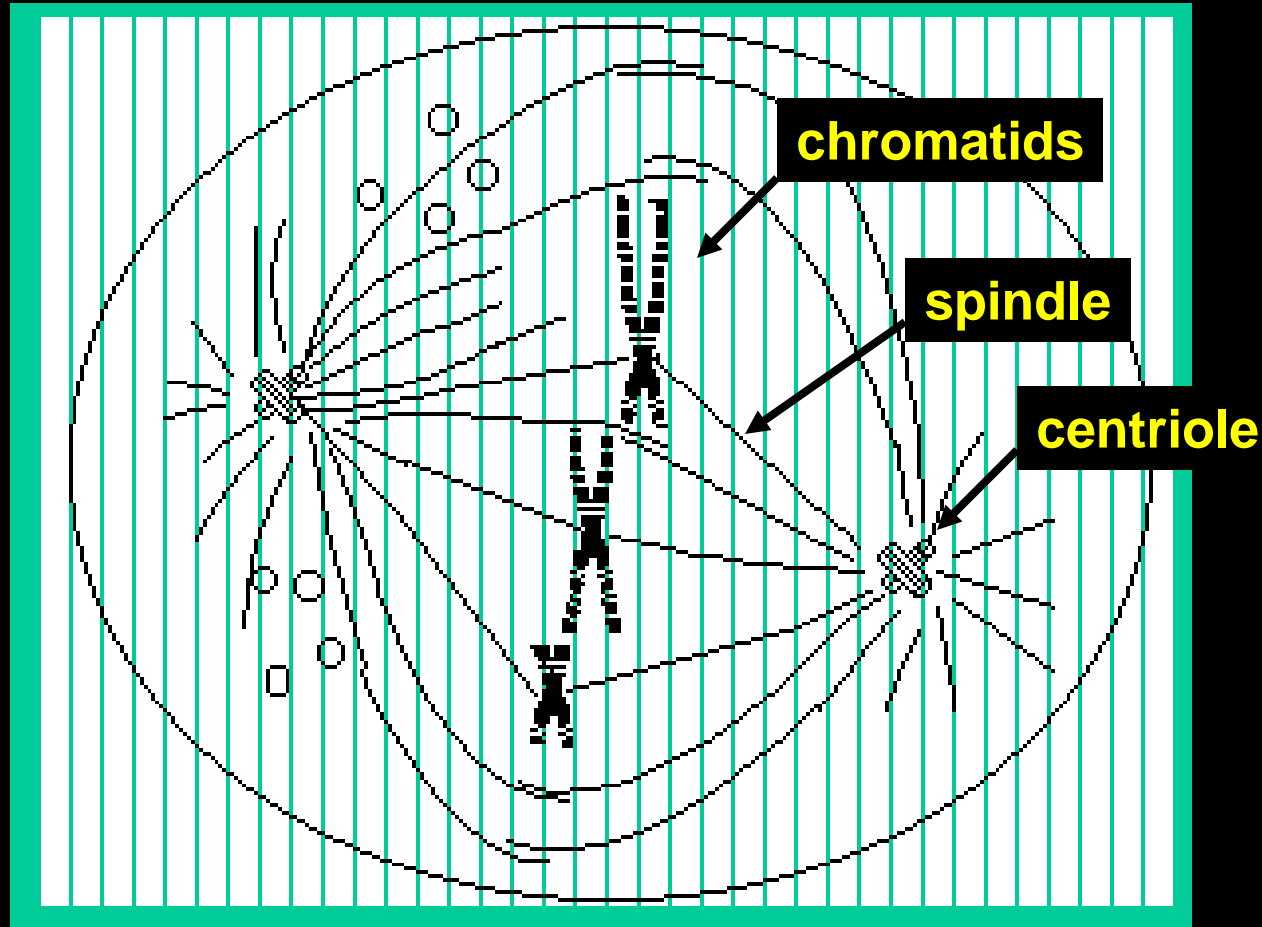
*Coregonus* blastula

# METAPHASE



<http://icbweb.med.harvard.edu/mitchisonlab/Pages/mt.html>

# METAPHASE

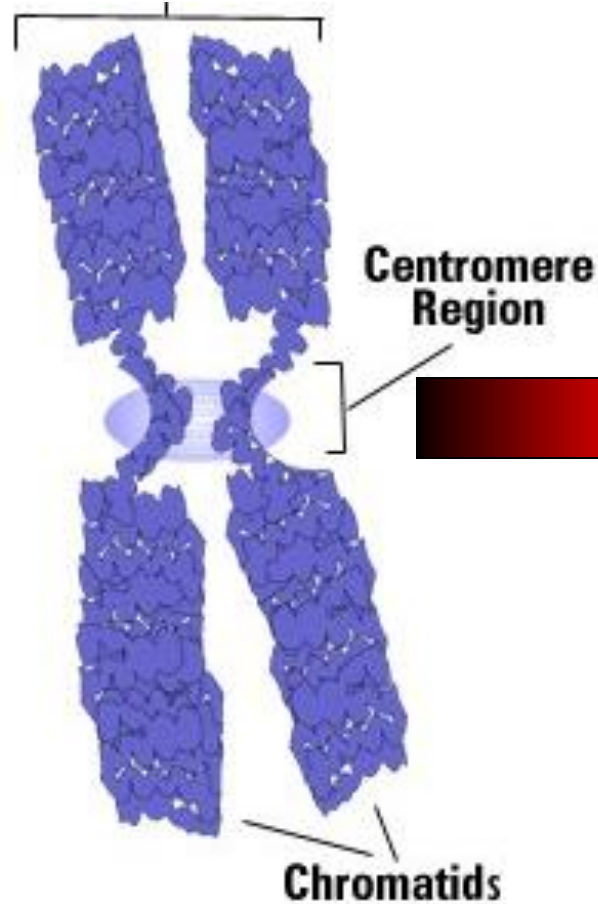


<http://www.chembio.uoguelph.ca/educmat/chm736/cycletx.htm>

∩ chromatids line up on the equator.

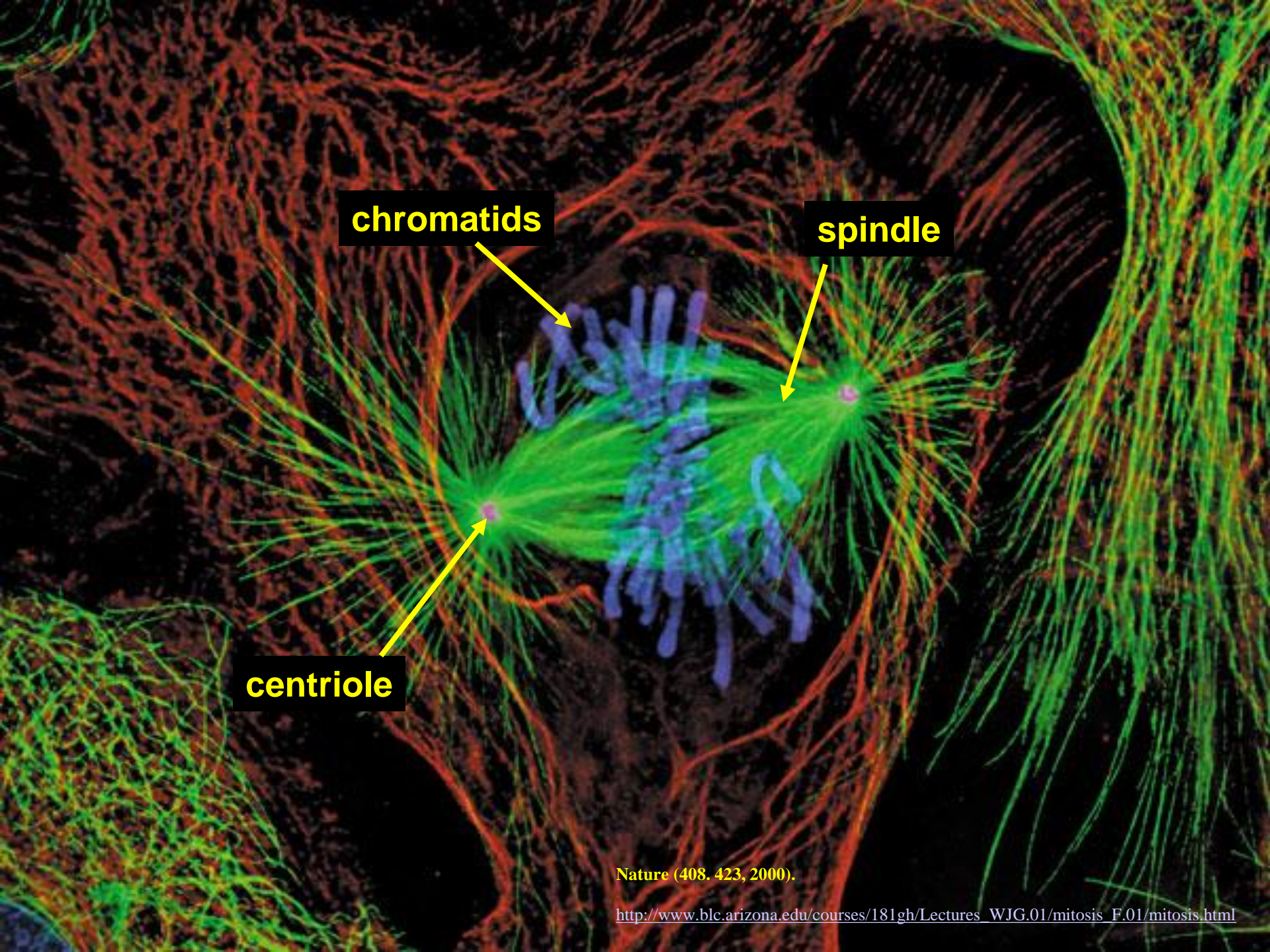
# METAPHASE

TWO IDENTICAL COPIES OF ONE CHROMOSOME.



**THIS  
CHROMATID  
WILL SOON  
MOVE TO  
NORTH POLE**

**THIS  
CHROMATID  
WILL SOON  
MOVE TO  
SOUTH POLE**



**chromatids**

**spindle**

**centriole**

Nature (408, 423, 2000).

[http://www.blc.arizona.edu/courses/181gh/Lectures\\_WJG.01/mitosis\\_F.01/mitosis.html](http://www.blc.arizona.edu/courses/181gh/Lectures_WJG.01/mitosis_F.01/mitosis.html)

# METAPHASE



*Allium* root tip

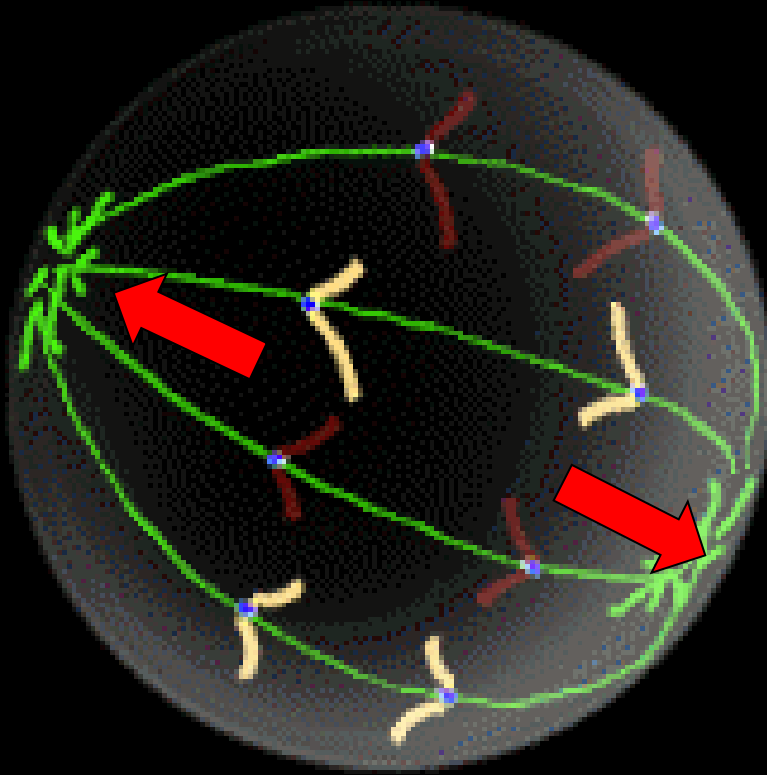


*Coregonus* blastula

A fluorescence micrograph of a cell in anaphase. The cell is roughly circular and shows a complex internal structure. The central region is bright yellow and orange, indicating high intensity of the fluorescent signal. This central region is surrounded by a green ring, which likely represents the spindle fibers. At the periphery, there are several bright red spots, which could be the chromosomes or other organelles. The overall appearance is that of a cell in the process of dividing.

# ANAPHASE

# ANAPHASE



∩ chromatids migrate to each pole.

# ANAPHASE

early



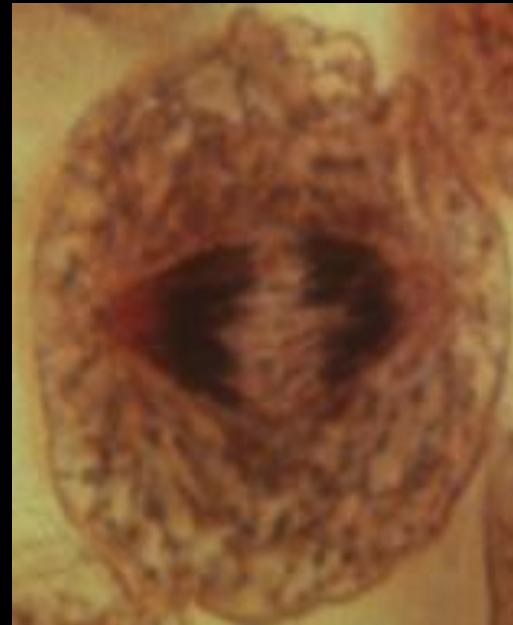
late



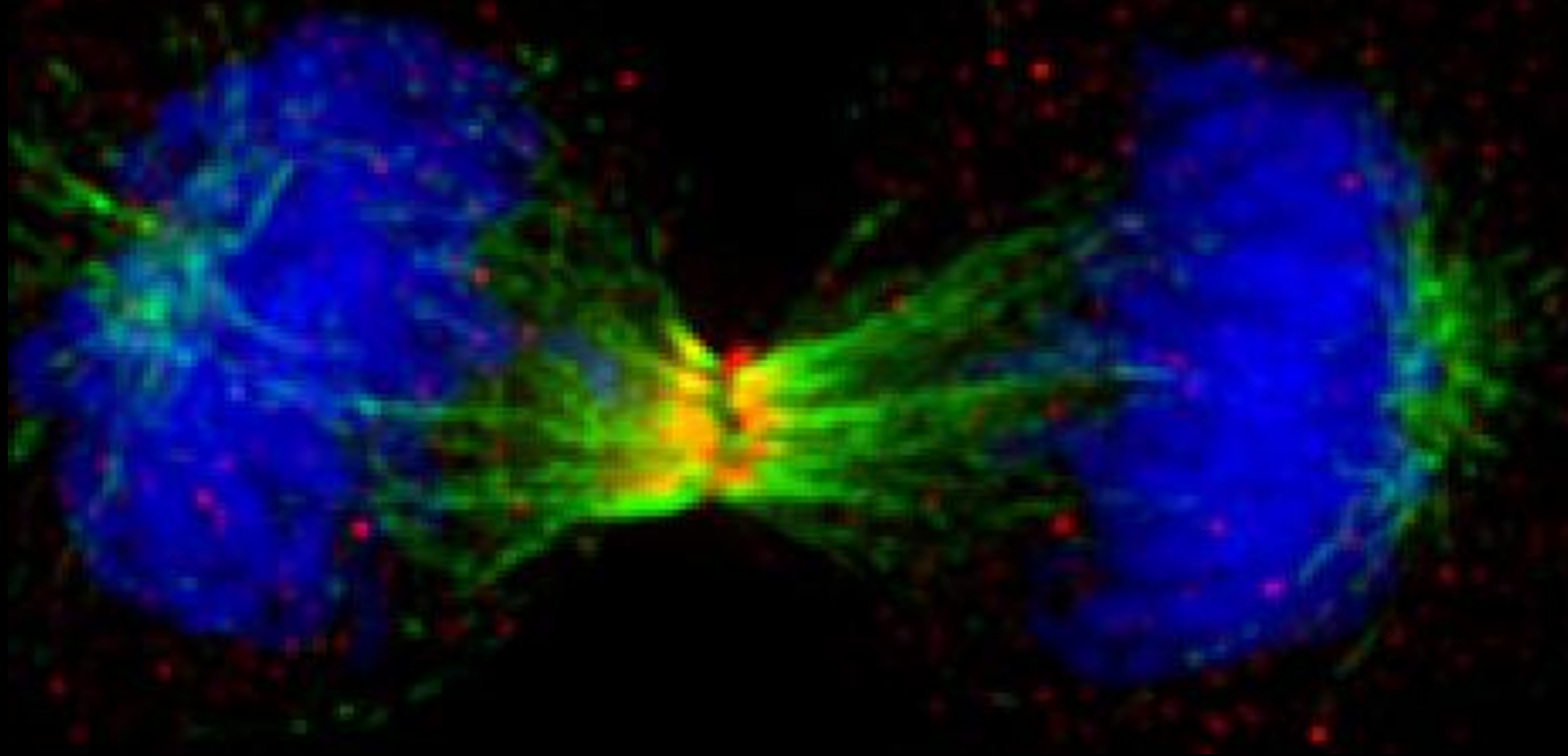
# ANAPHASE



*Allium* root tip

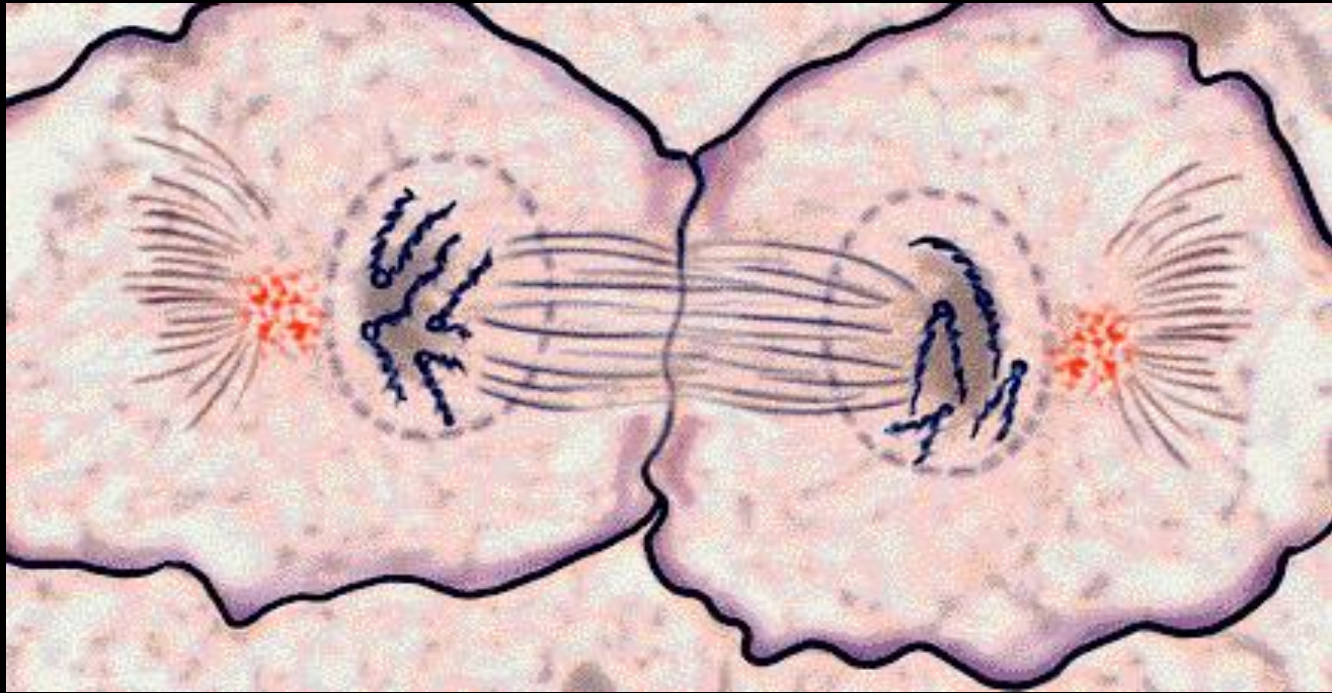


*Coregonus* blastula



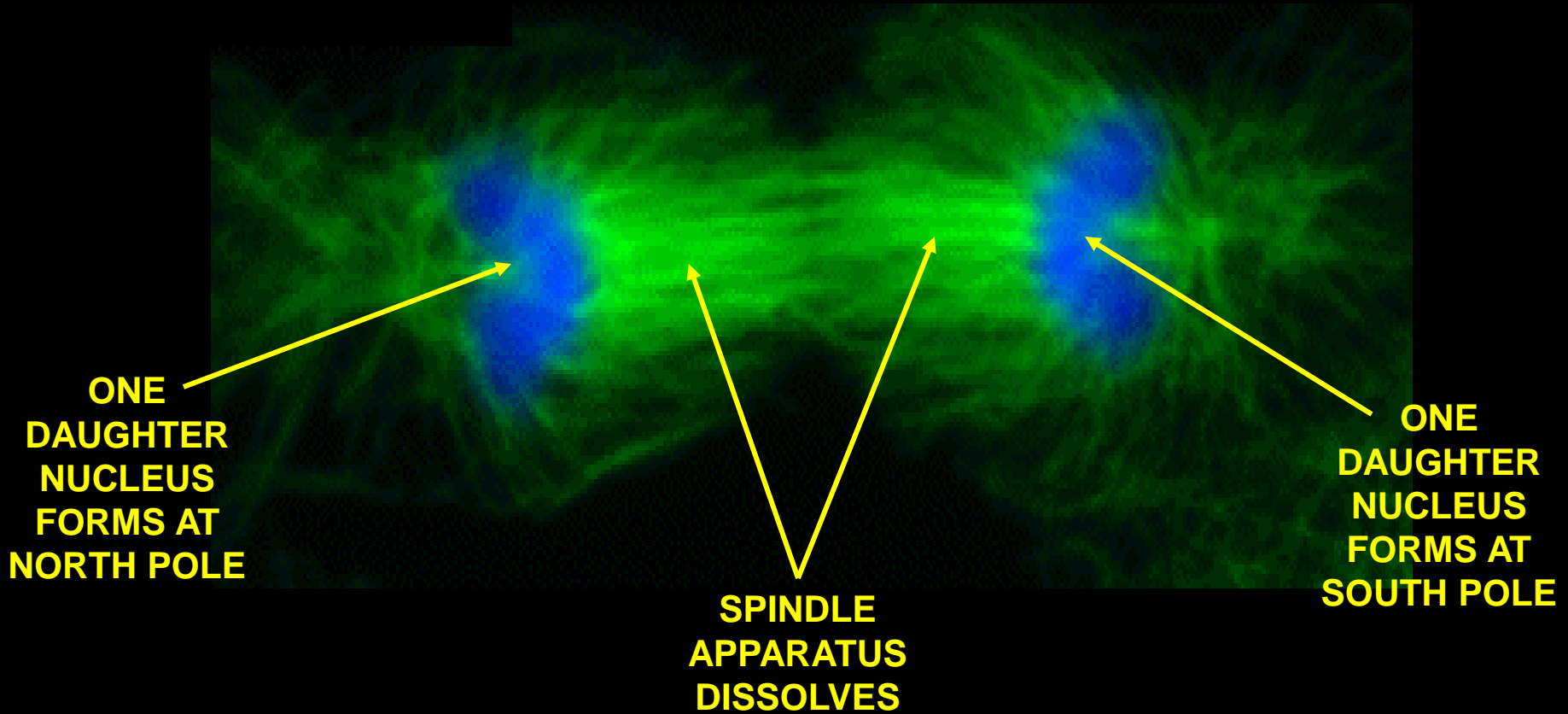
**TELOPHASE**

# TELOPHASE

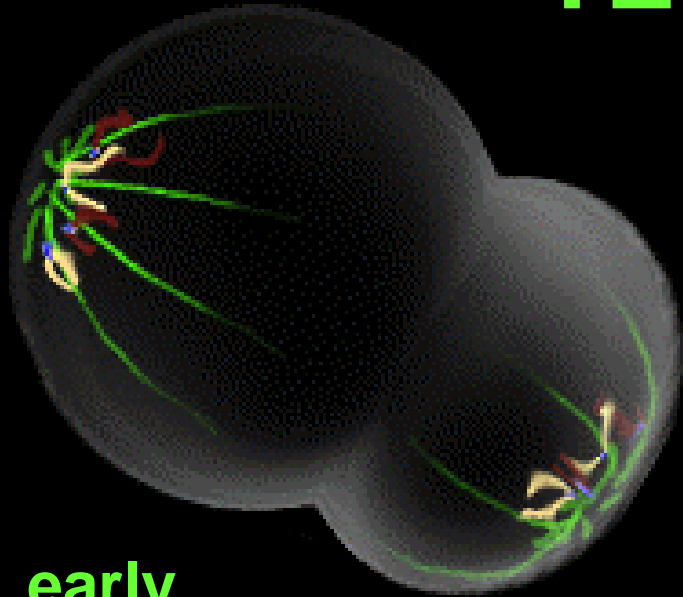


- ∩ Chromosomes dissolve.
- ∩ Mitotic spindle dissolves.
- ∩ Nuclear membrane forms.
- ∩ New nucleoli form.

# TELOPHASE

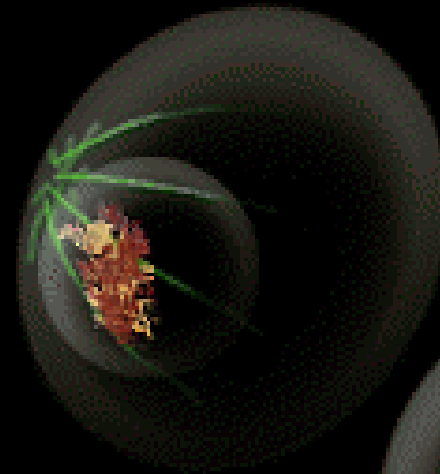


# TELOPHASE



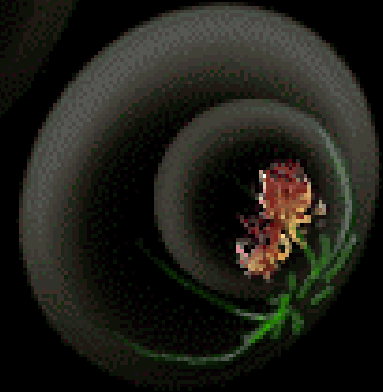
early

**New nuclei form at the poles.**

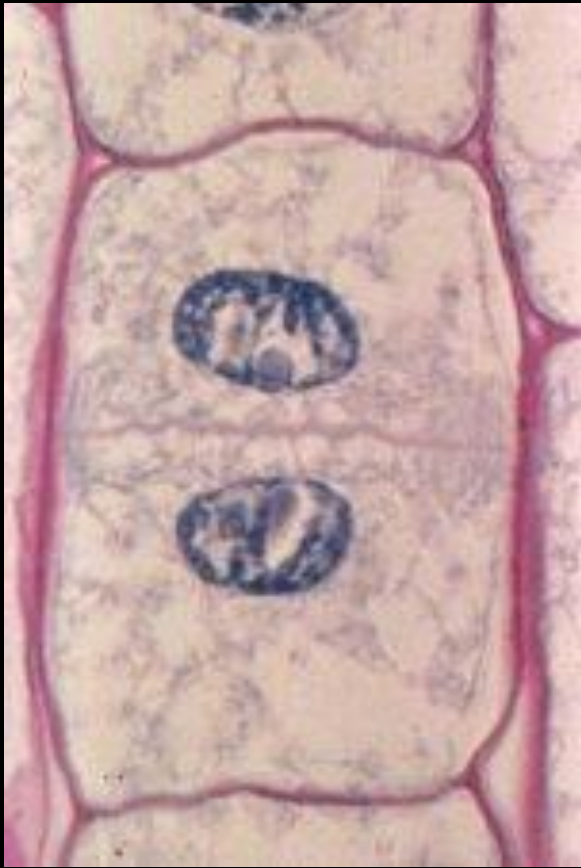


late

**Cytokinesis begins.**



# TELOPHASE



*Allium* root tip



*Coregonus* blastula



**THE  
END**

**(← CAN YOU ACE  
THIS QUIZ ?)**