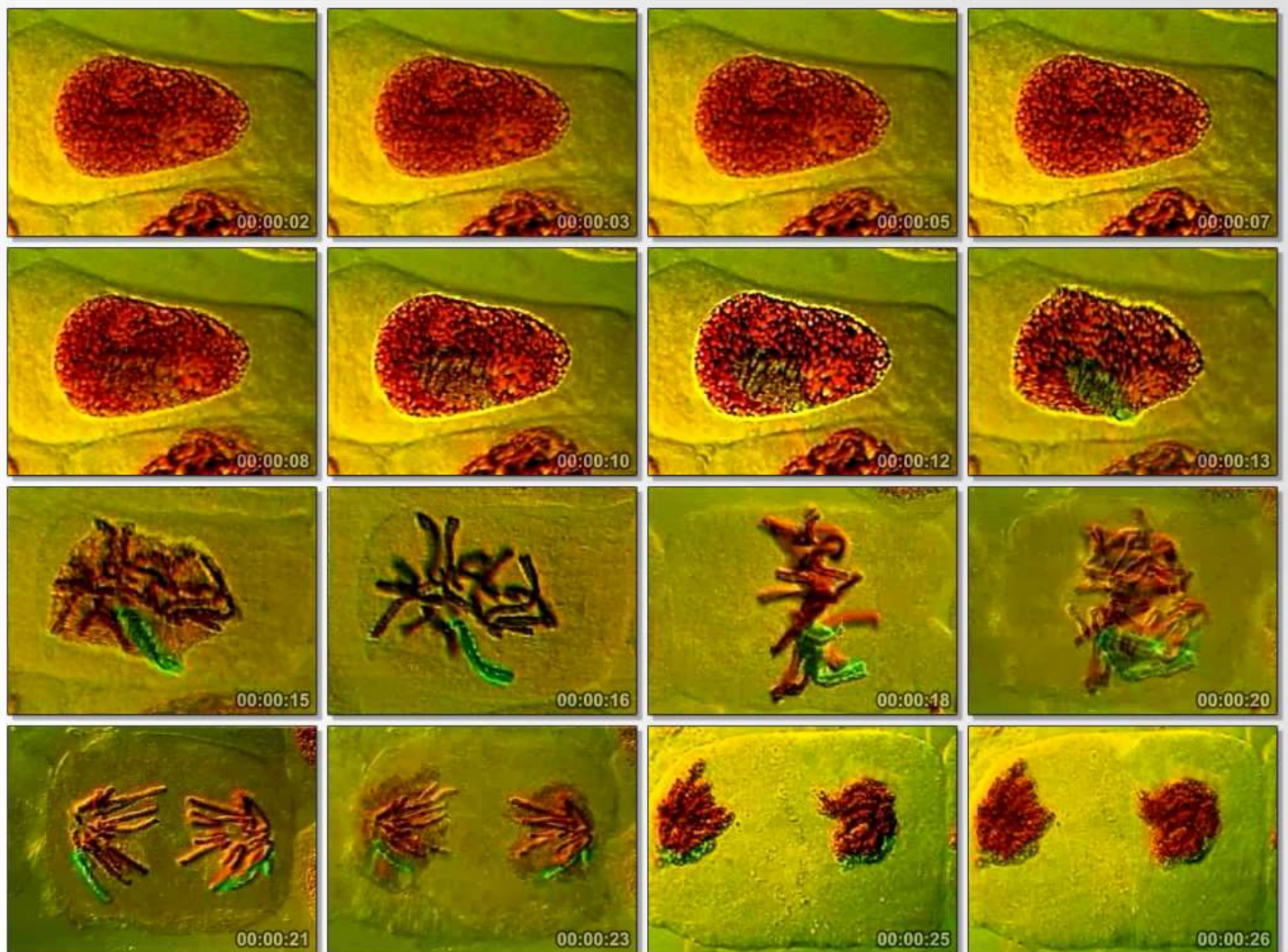


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 Duration: 00:00:28

Media Player Classic



Rappels :

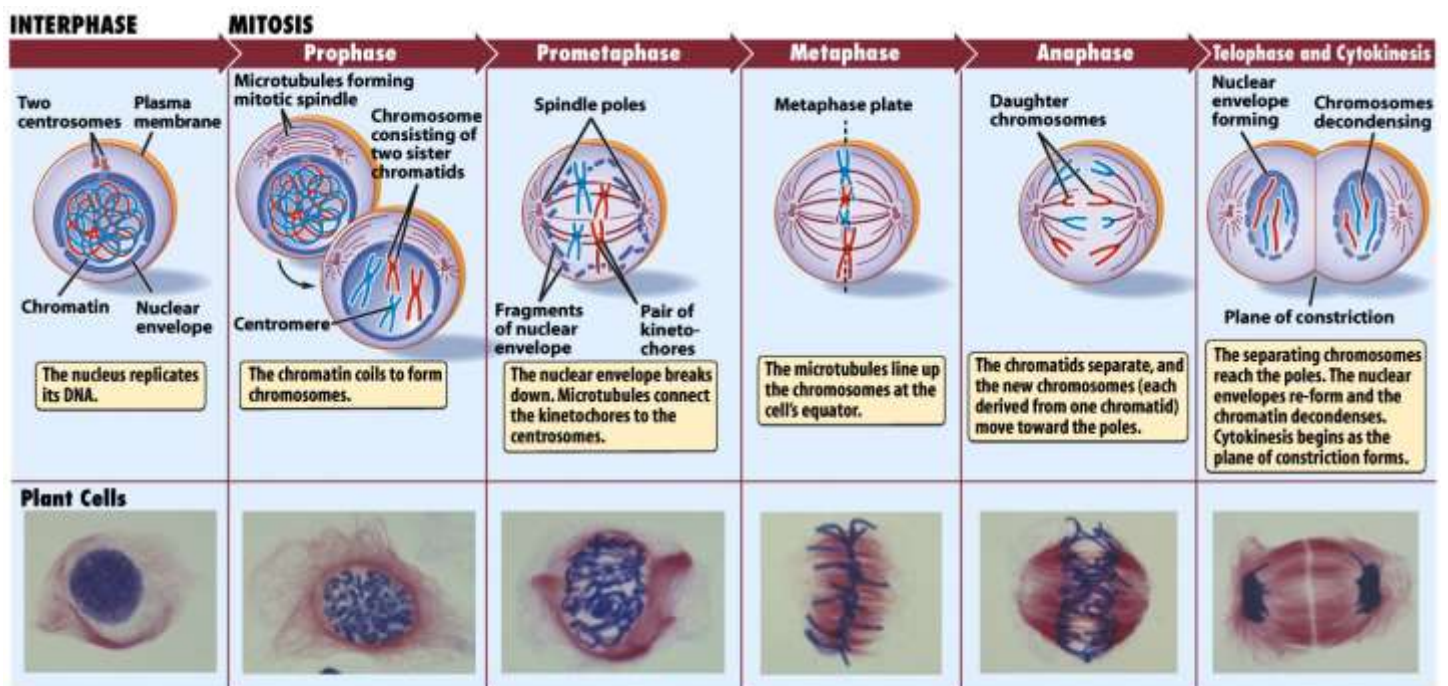
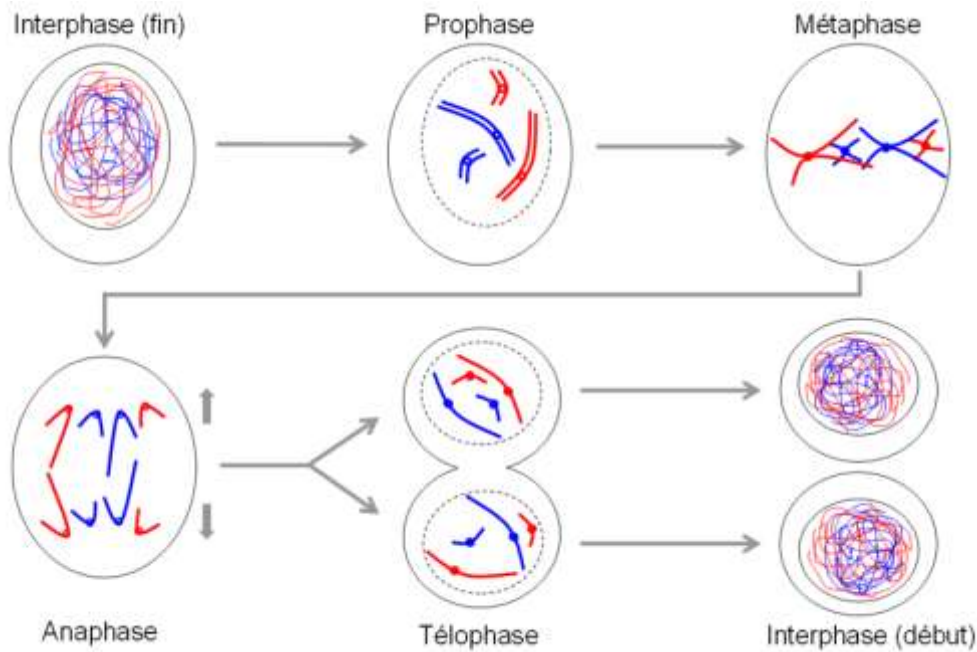
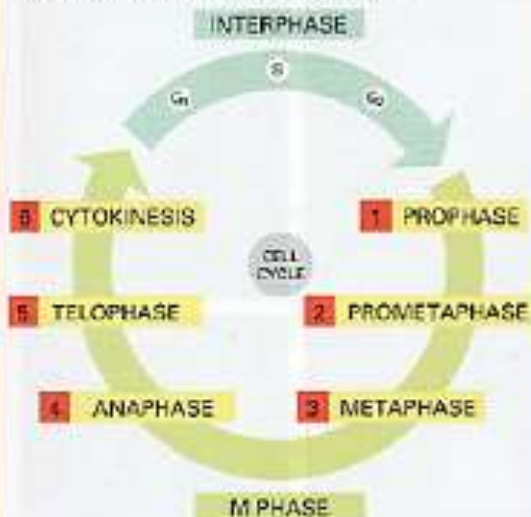


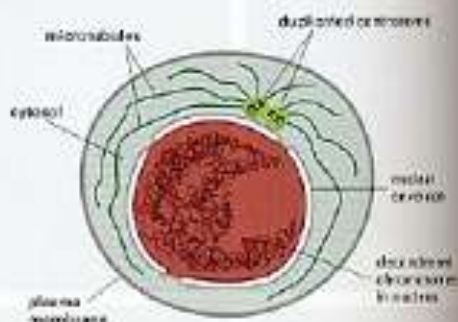
Figure 9-5 Discover Biology 3/e
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CELL DIVISION AND THE CELL CYCLE



The division of a cell into two daughters occurs in the M phase of the cell cycle. M phase consists of nuclear division (mitosis) and cytoplasmic division (cytokinesis). In this figure, the M phase has been expanded for clarity. Mitosis is itself divided into five stages, and these, together with cytokinesis, are described in this panel.

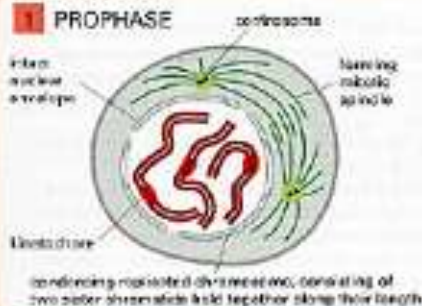
INTERPHASE



During interphase, the cell increases in size. The DNA of the chromosomes is replicated, and the centrosome is duplicated.

The light micrographs shown in this panel are of a living cell from the lung epithelium of a newt. The same cell has been photographed when viewed by differential interference contrast microscopy at different times during its division into two daughter cells. (Courtesy of Conly L. Blocher.)

1 PROPHASE

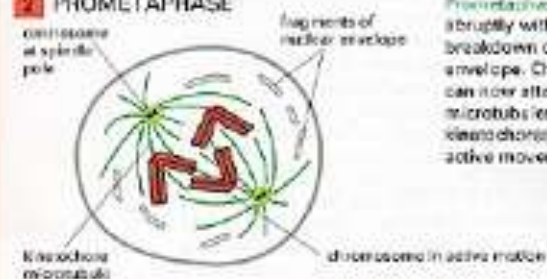


At prophase, the replicated chromosomes, each consisting of two closely associated sister chromatids, condense. Outside the nucleus, the mitotic spindle assembles between the two centrosomes, which have replicated and moved apart. For simplicity, only three chromosomes are shown. In diploid cells, there would be two copies of each chromosome present.



(100 × 0.1)

2 PROMETAPHASE



Prometaphase starts abruptly with the breakdown of the nuclear envelope. Chromosomes can now attach to spindle microtubules via their kinetochores and undergo active movement.

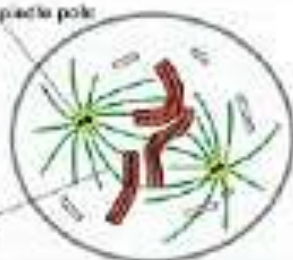


(100 × 0.1)

METAPHASE

centro at spindle pole

kinetochore
microtubule



At **metaphase**, the chromosomes are aligned at the equator of the spindle, midway between the spindle poles. The kinetochore microtubules attach sister chromatids to opposite poles of the spindle.



time = 250 min

ANAPHASE

daughter chromosomes

shortening
kinetochore
microtubule

spindle pole
moving outward



At **anaphase**, the sister chromatids synchronously separate to form two daughter chromosomes, and each is pulled slowly toward the spindle pole it faces. The kinetochore microtubules get shorter, and the spindle poles also move apart; both processes contribute to chromosome separation.



time = 279 min

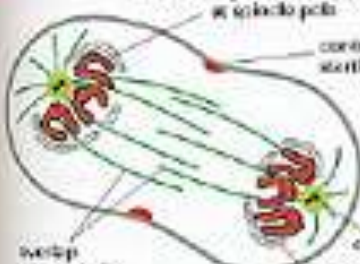
TELOPHASE

set of daughter chromosomes
at spindle pole

contractile ring
starting to form

overlap
microtubules

condensome
nuclear envelope reassembling
around individual chromosomes



During **telophase**, the two sets of daughter chromosomes arrive at the poles of the spindle and decondense. A new nuclear envelope reassembles around each set, completing the formation of two nuclei and marking the end of mitosis. The division of the cytoplasm begins with the assembly of the contractile ring.



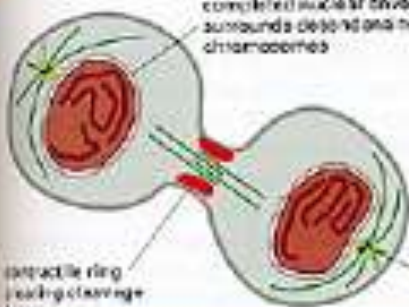
time = 315 min

CYTOKINESIS

completed nuclear envelope
surrounds decondensing
chromosomes

contractile ring
pinching cleavage
furrow

re-formation of interphase
level of microtubules reclustered
by the centrosome

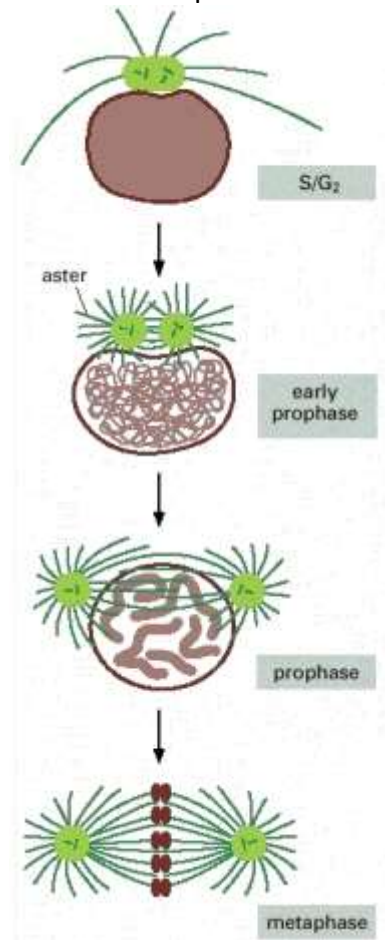


During **cytokinesis**, the cytoplasm is divided in two by a contractile ring of actin and myosin filaments, which pinches the cell in two to create two daughters, each with one nucleus.



time = 362 min

Les centrioles pendant la mitose (Alberts) :



Mitose (végétaux)



1 Prophase. The chromatin is condensing. The nucleolus is beginning to disappear. Although not yet visible in the micrograph, the mitotic spindle is starting to form.

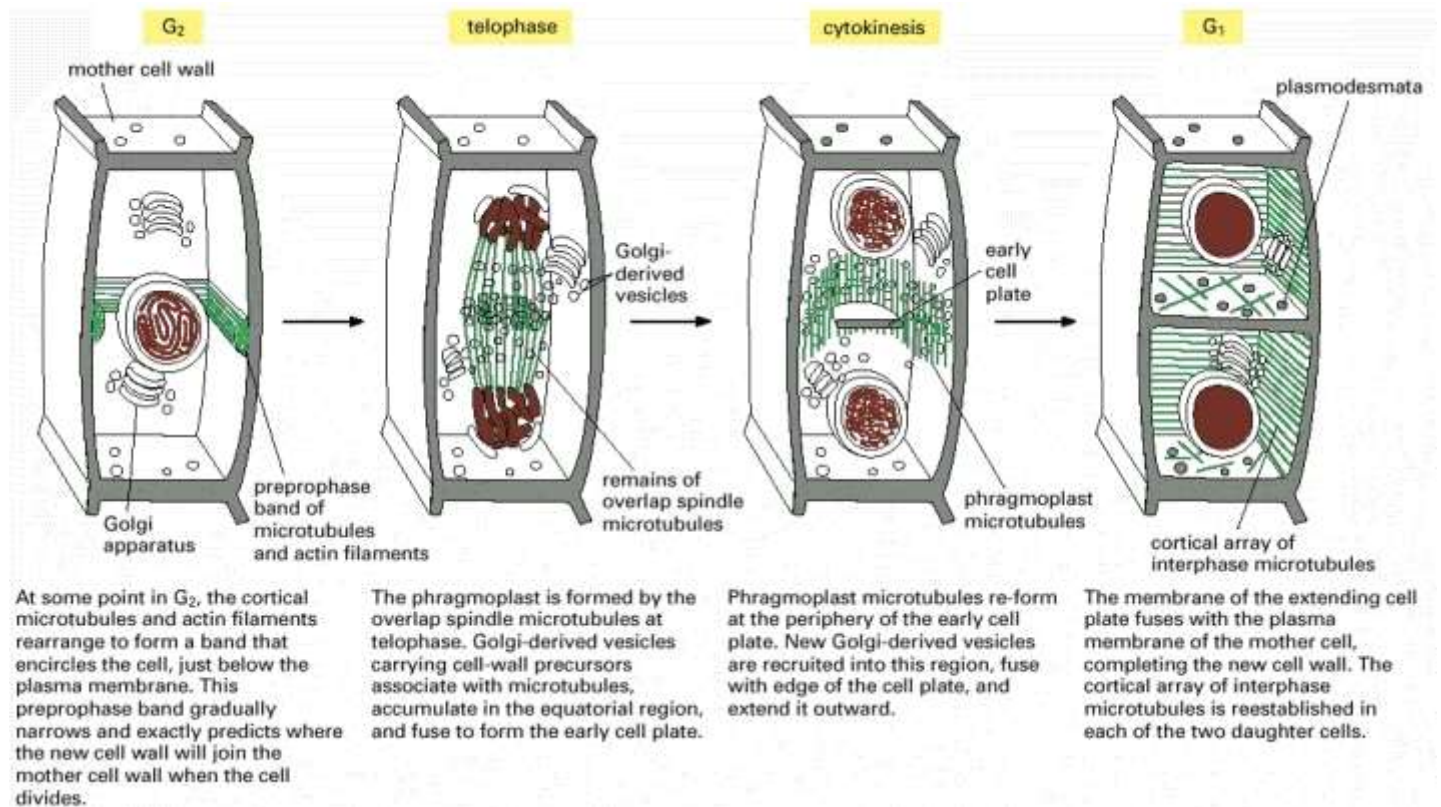
2 Prometaphase. We now see discrete chromosomes; each consists of two identical sister chromatids. Later in prometaphase, the nuclear envelope will fragment.

3 Metaphase. The spindle is complete, and the chromosomes, attached to microtubules at their kinetochores, are all at the metaphase plate.

4 Anaphase. The chromatids of each chromosome have separated, and the daughter chromosomes are moving to the ends of the cell as their kinetochore microtubules shorten.

5 Telophase. Daughter nuclei are forming. Meanwhile, cytokinesis has started: The cell plate, which will divide the cytoplasm in two, is growing toward the perimeter of the parent cell.

Et l'interprétation chez les végétaux (source : Alberts)



Fuseau mitotique et séparation des cellules végétales (source : Nature)

