

A fluorescence microscopy image of a cell in mitosis. The spindle apparatus is visible, with chromosomes aligned at the metaphase plate. The image is color-coded: blue for DNA/chromosomes, green for microtubules, and red for other cellular structures. The text is overlaid in yellow.

SV-F Génomique

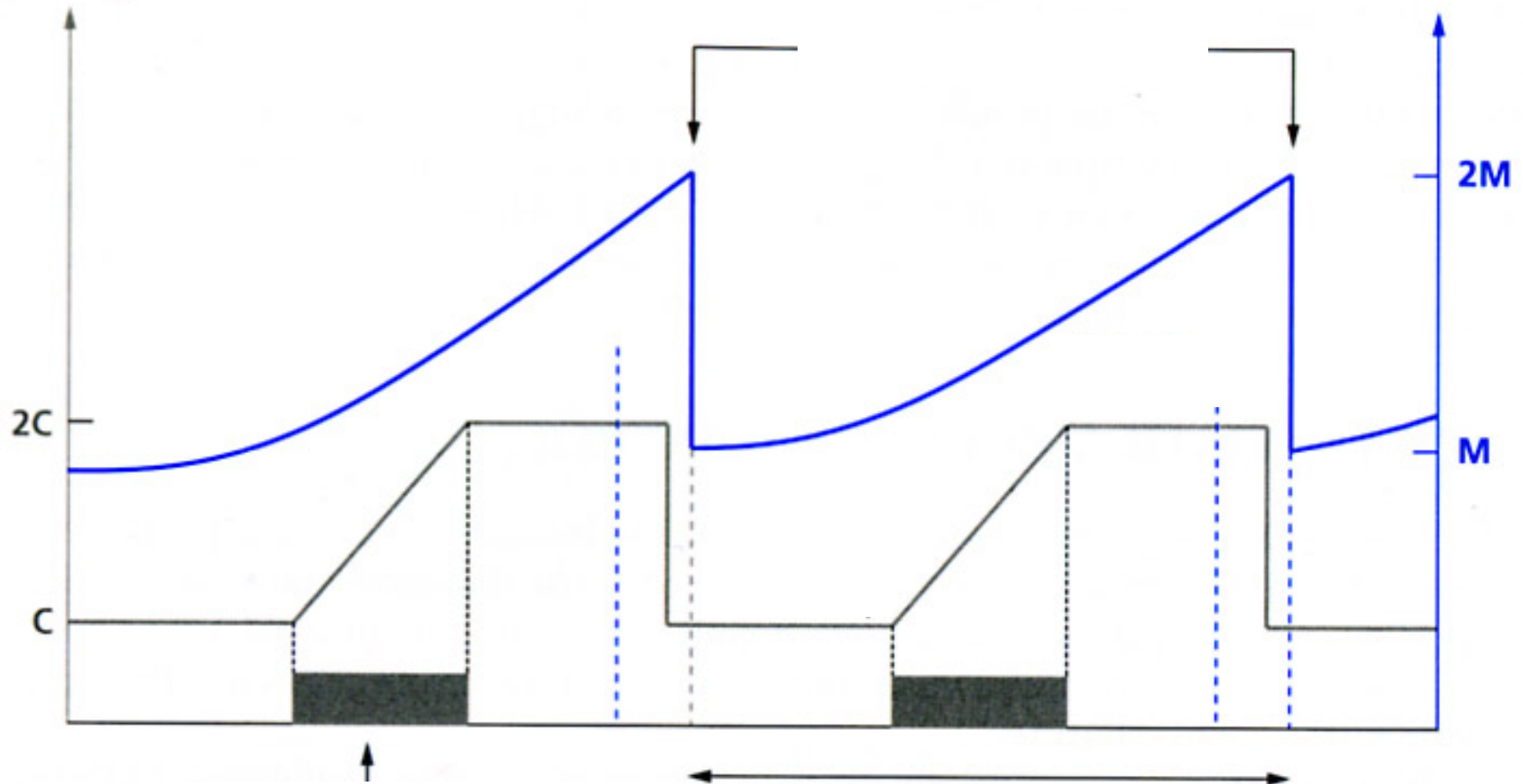
TP : Les divisions cellulaires

BCPST1, Lycée Champollion

<https://actu.epfl.ch/news>

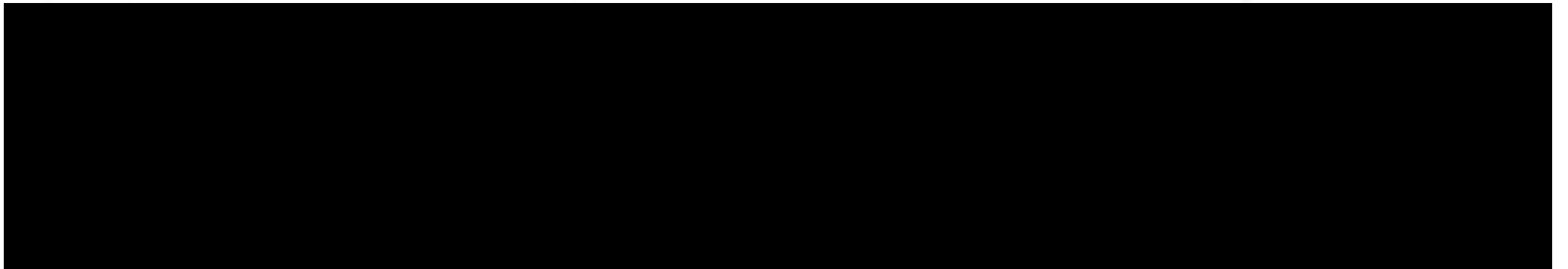
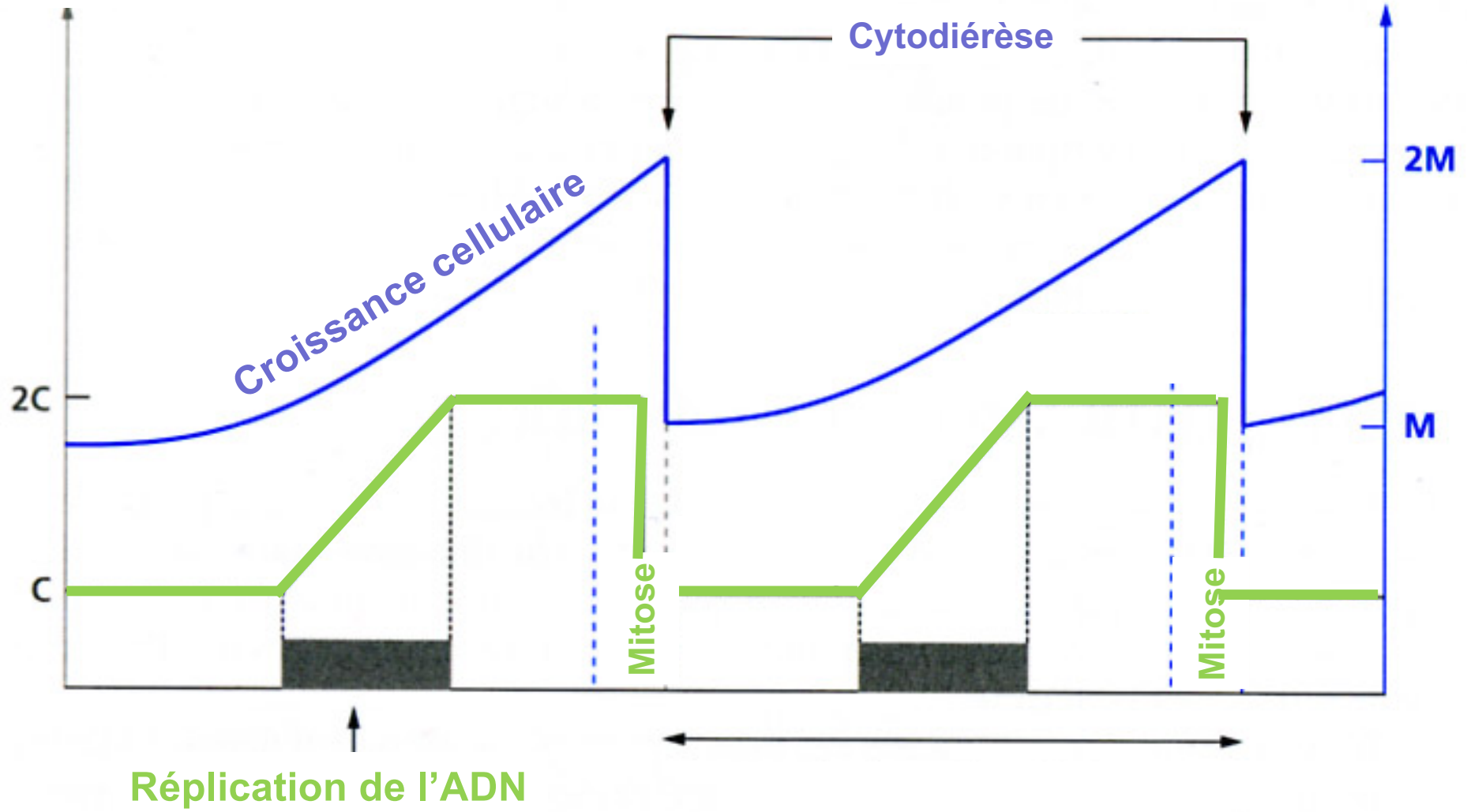
Quantité d'ADN
par noyau

Masse de la cellule

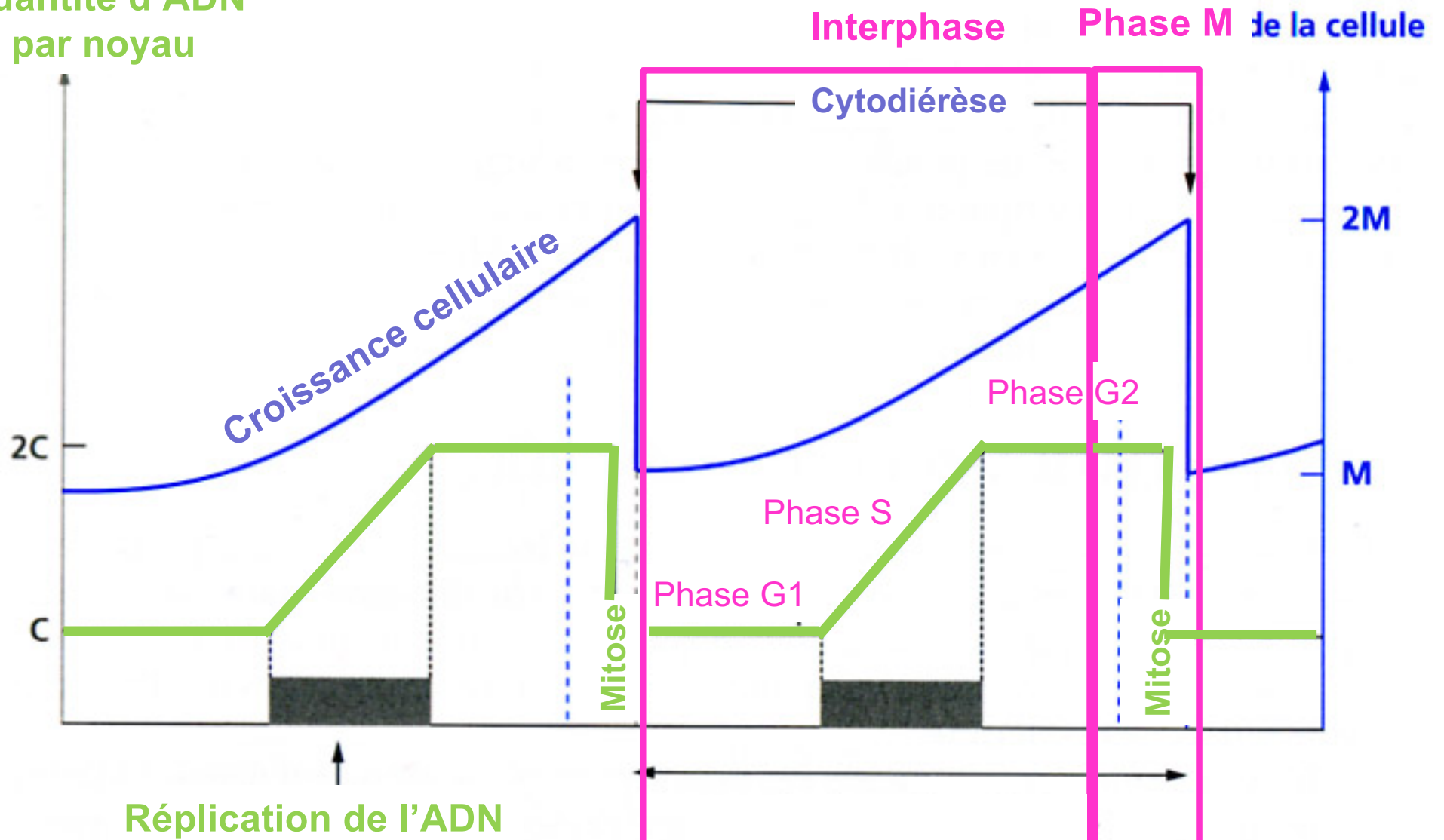


Quantité d'ADN
par noyau

Masse de la cellule



Quantité d'ADN
par noyau

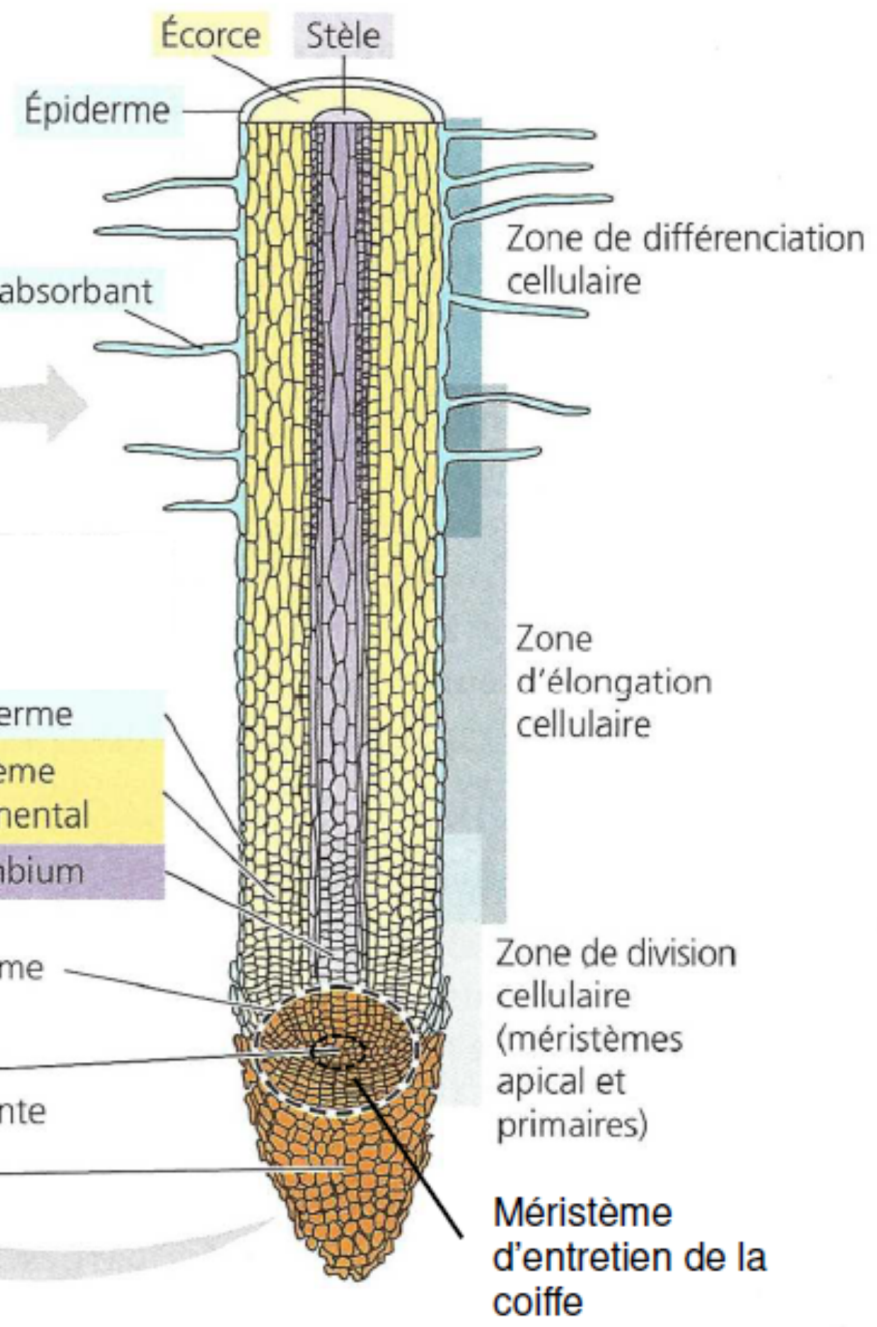
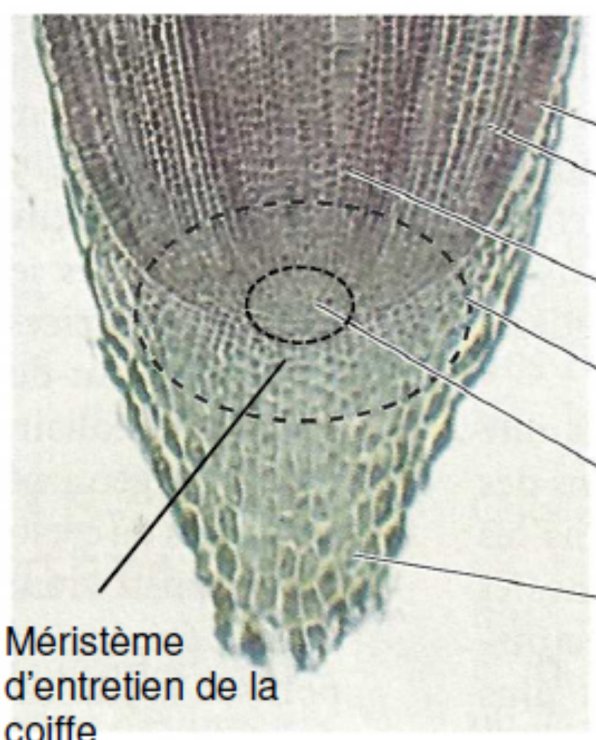


Cycle cellulaire

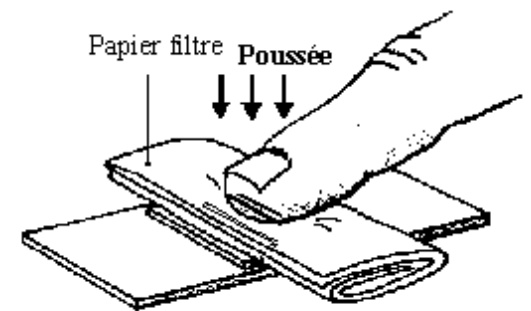
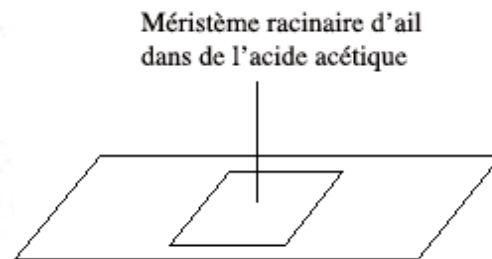
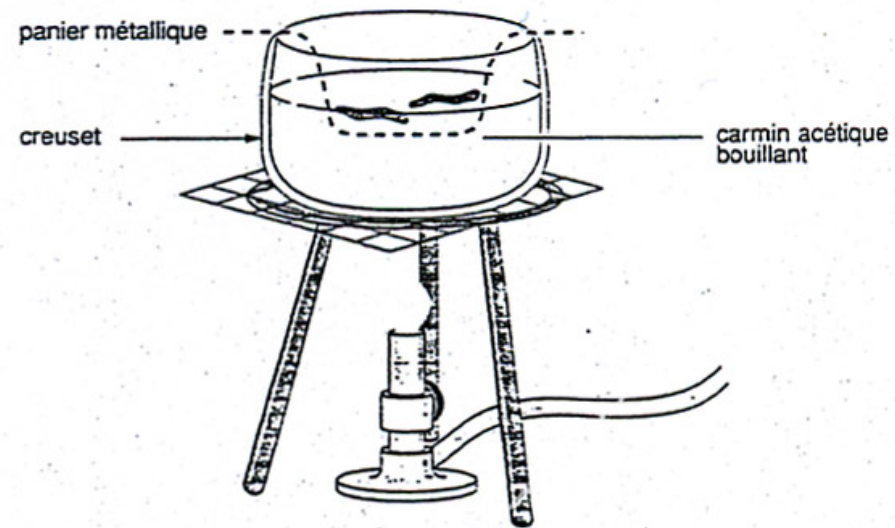
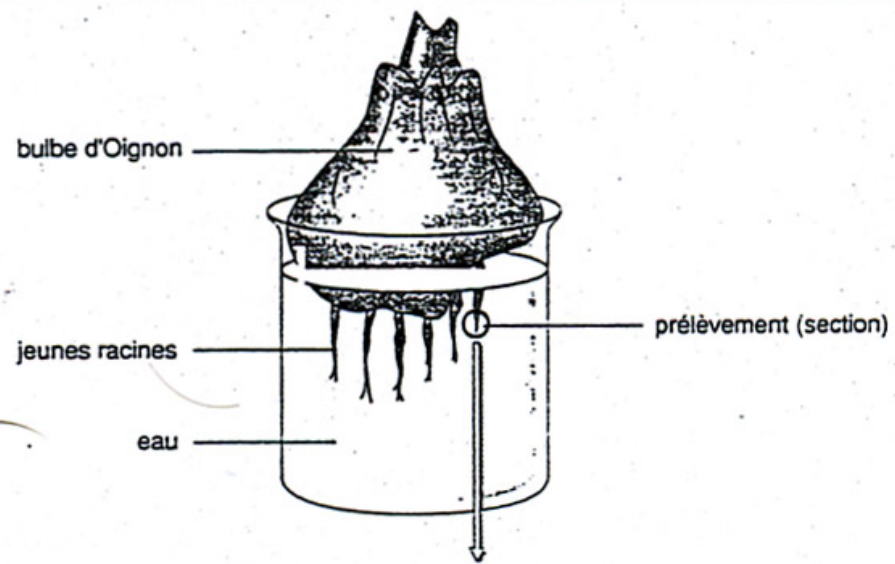
OBSERVER LES PHASES DE LA MITOSE

Légende

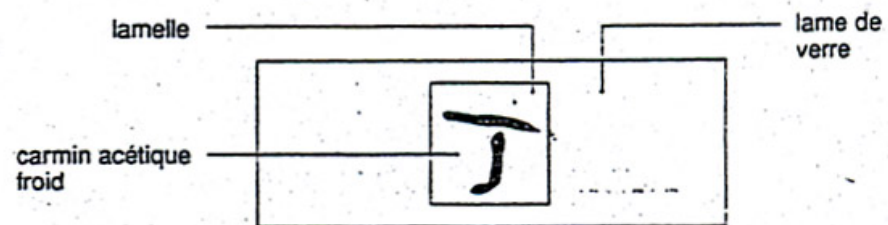
- Tissu de revêtement
- Tissu fondamental
- Tissu conducteur





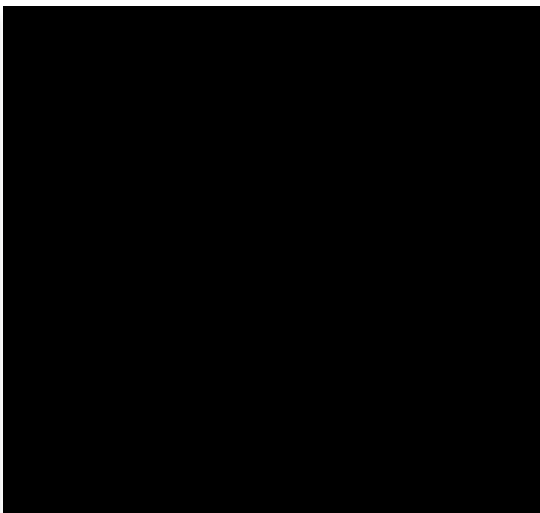


d'après georges.dolisi.free.fr

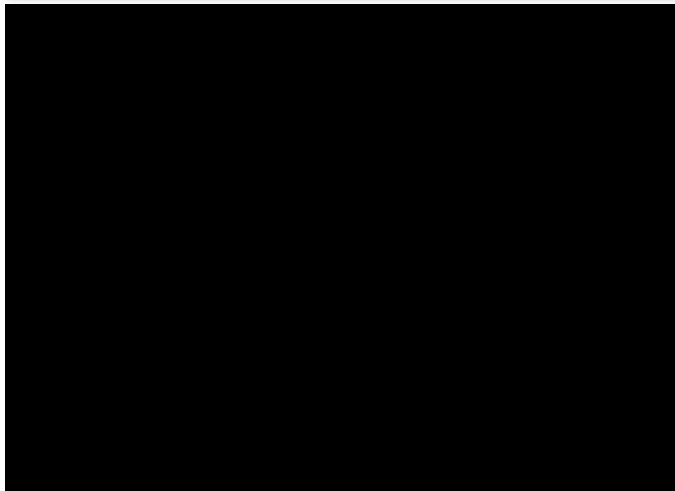




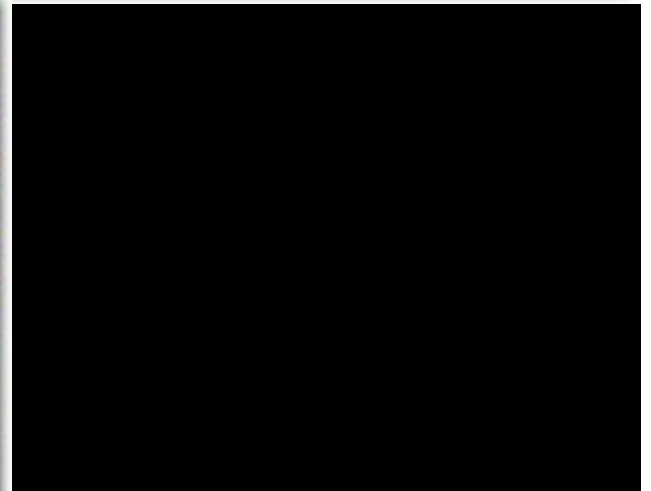
INTERPHASE



PROPHASE



METAPHASE



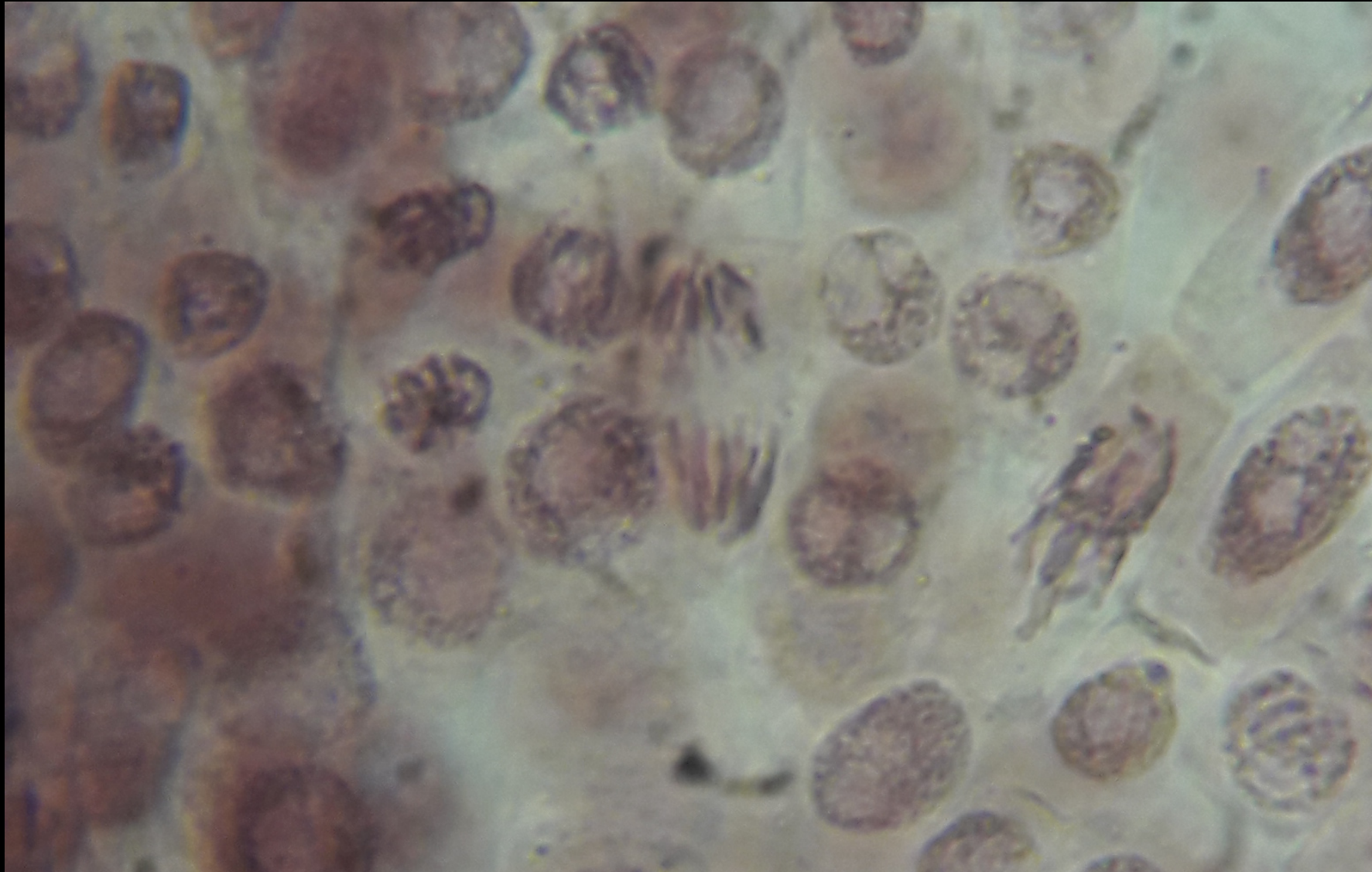
ANAPHASE

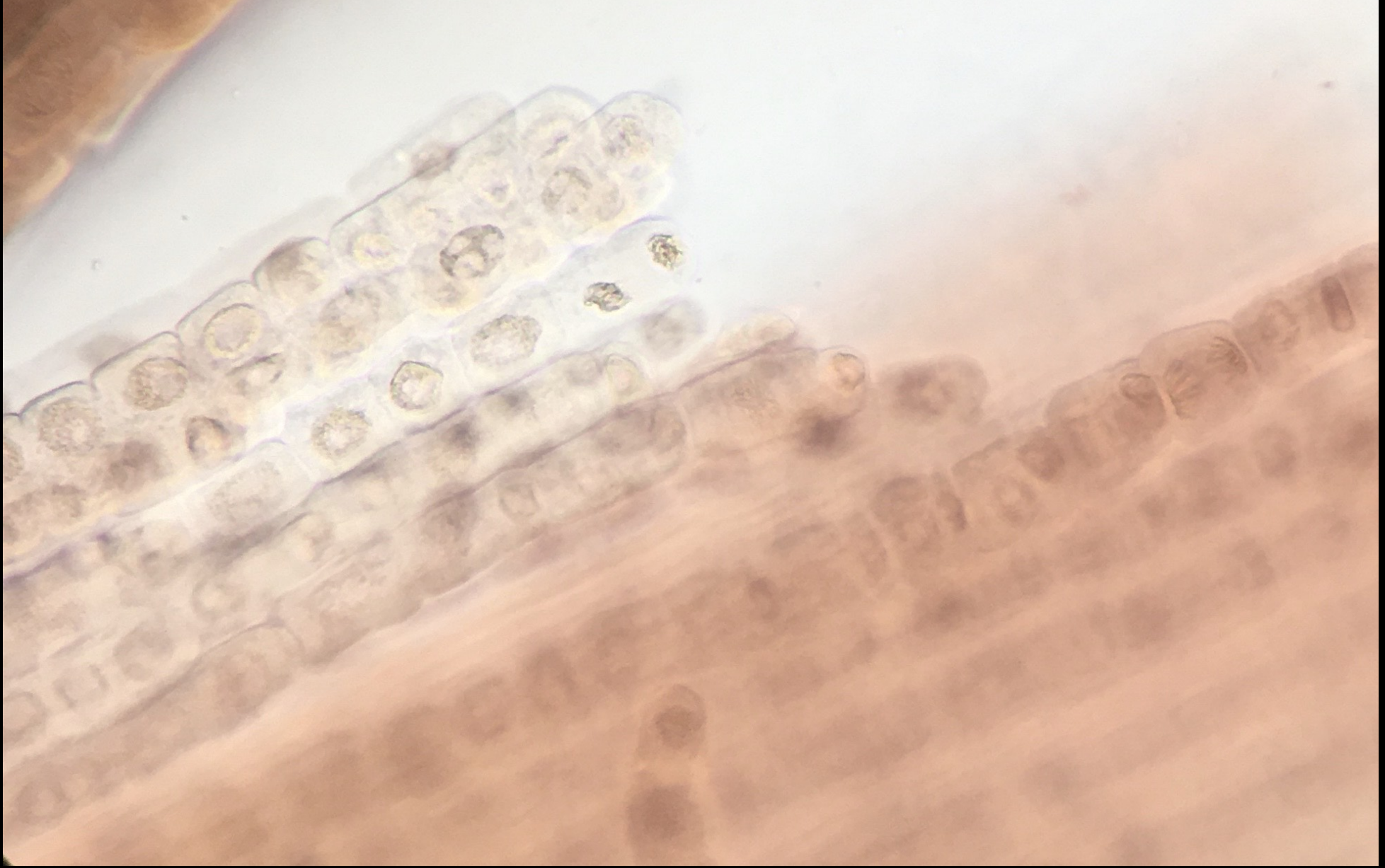


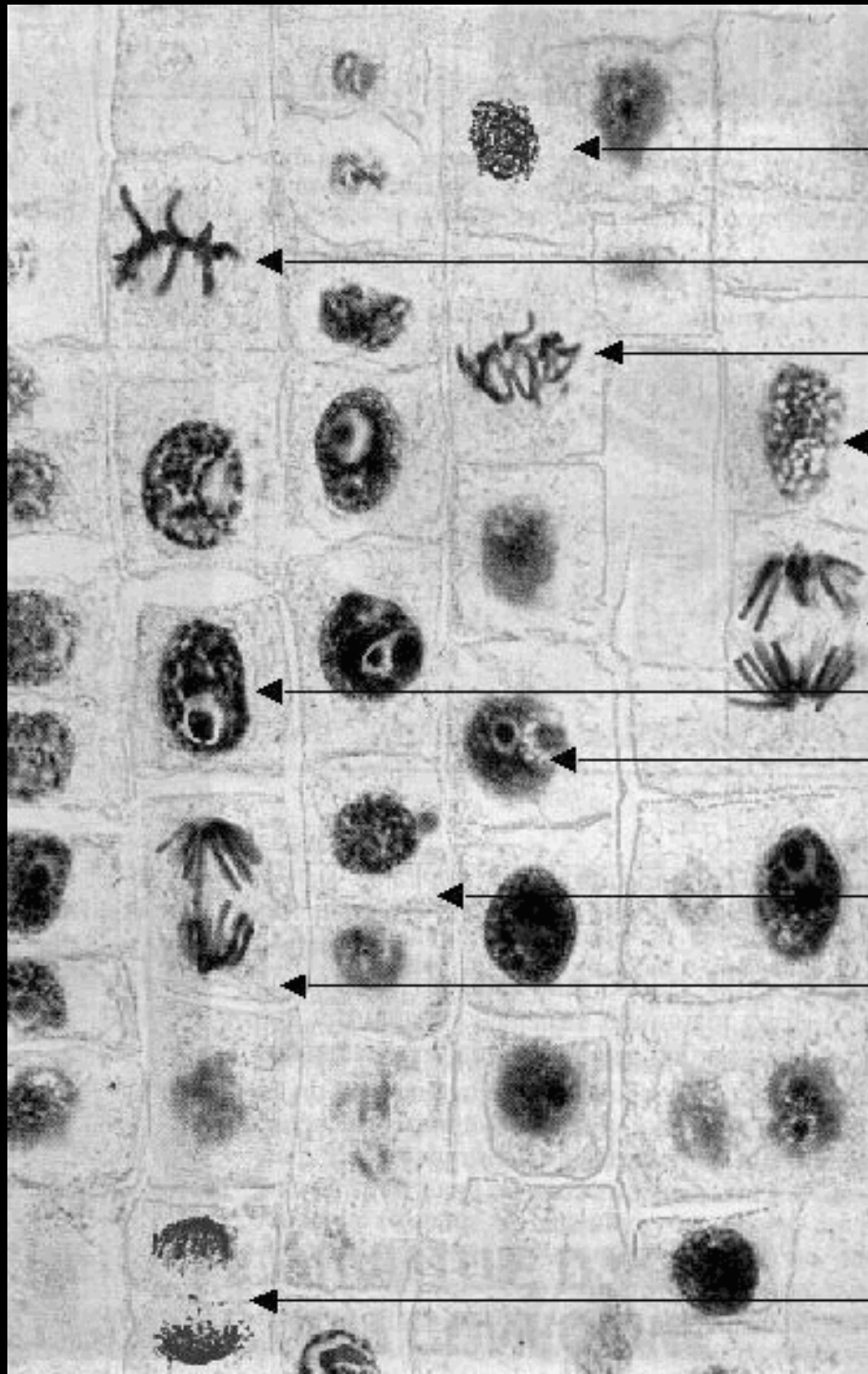
TELOPHASE

Résultats 2018
carmin









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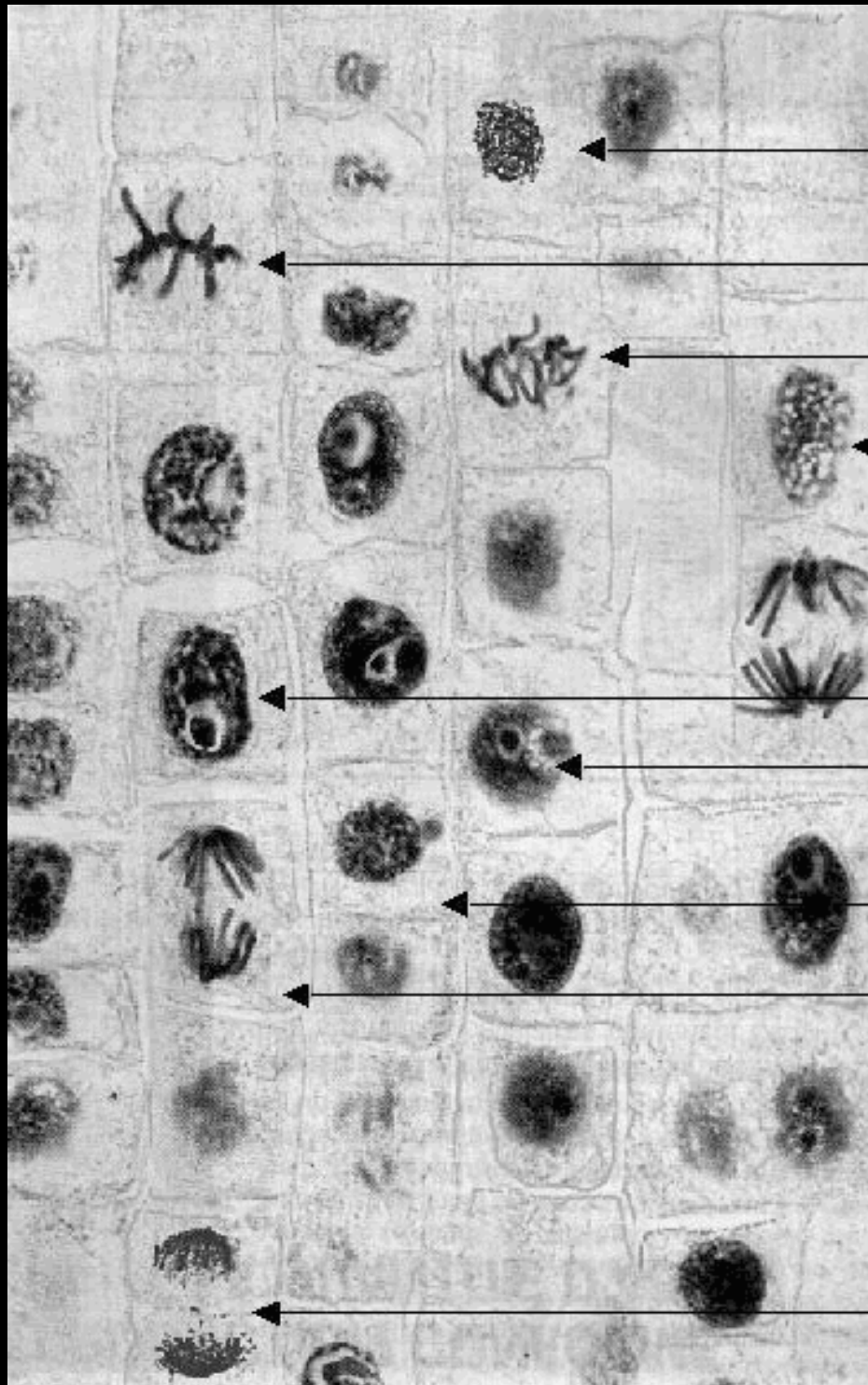
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prophase

métaphase

métaphase

prophase

anaphase

interphase

début de
prophase

télophase

anaphase

cytodiérèse

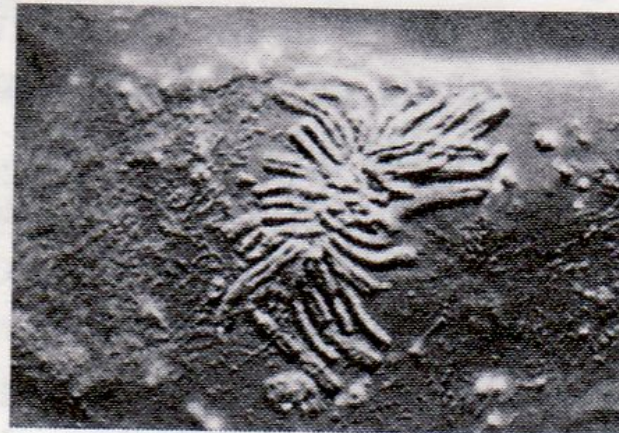
(A)



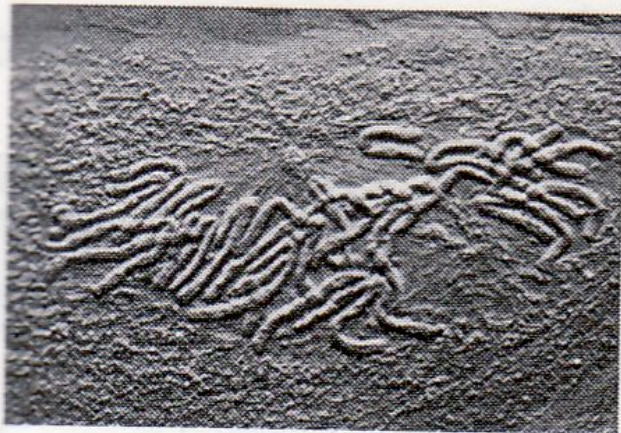
(B)



(C)



(D)



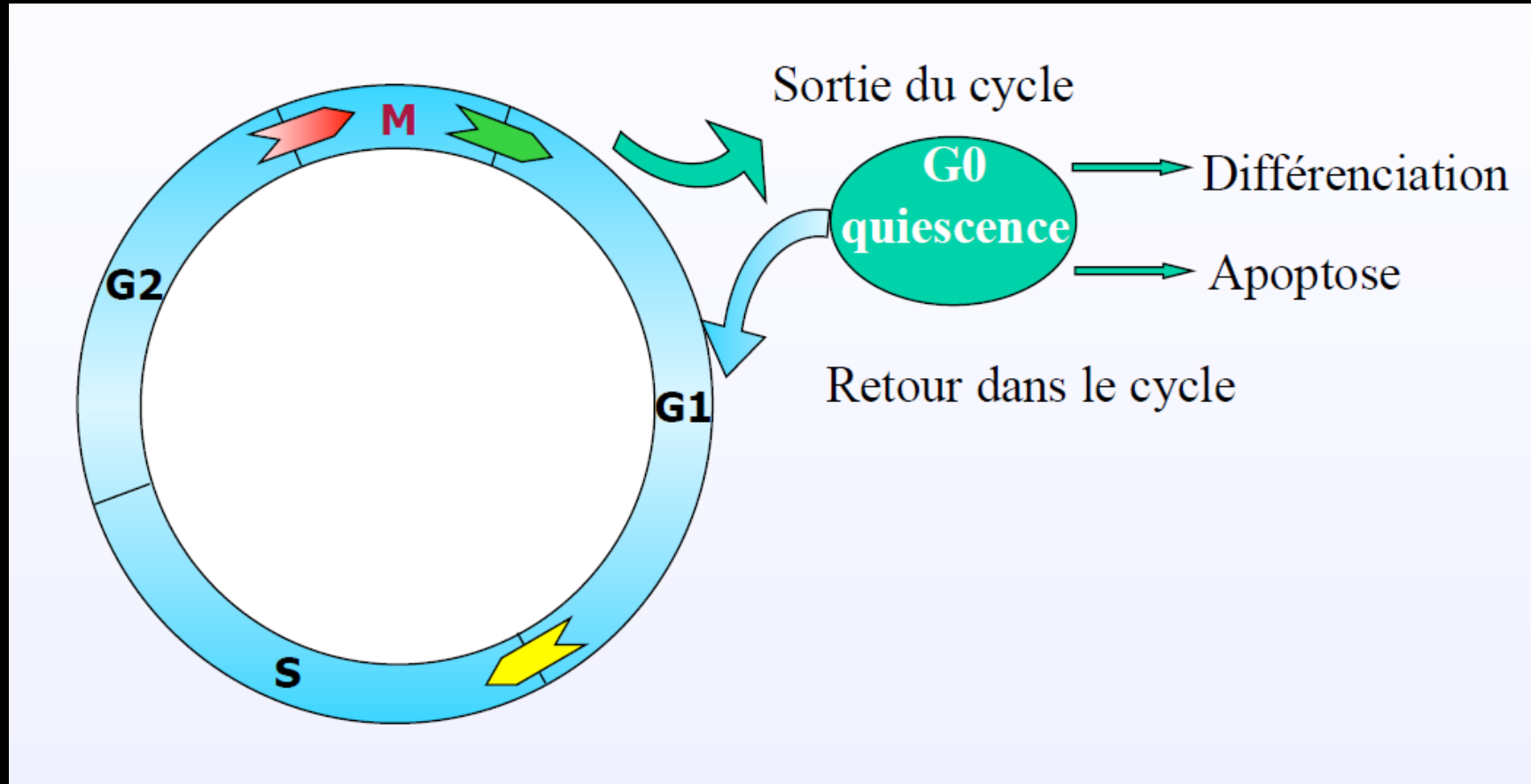
(E)



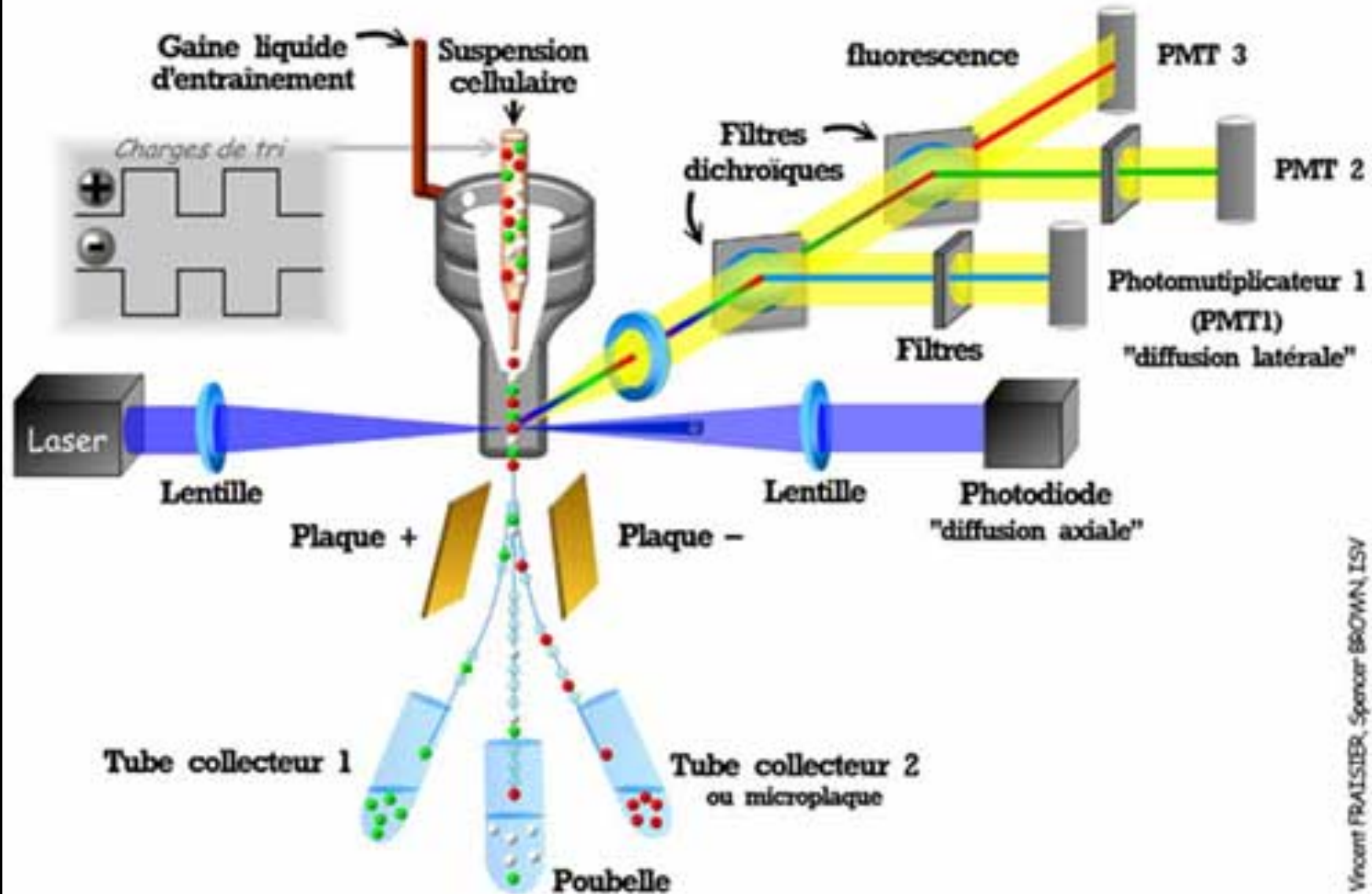
(F)

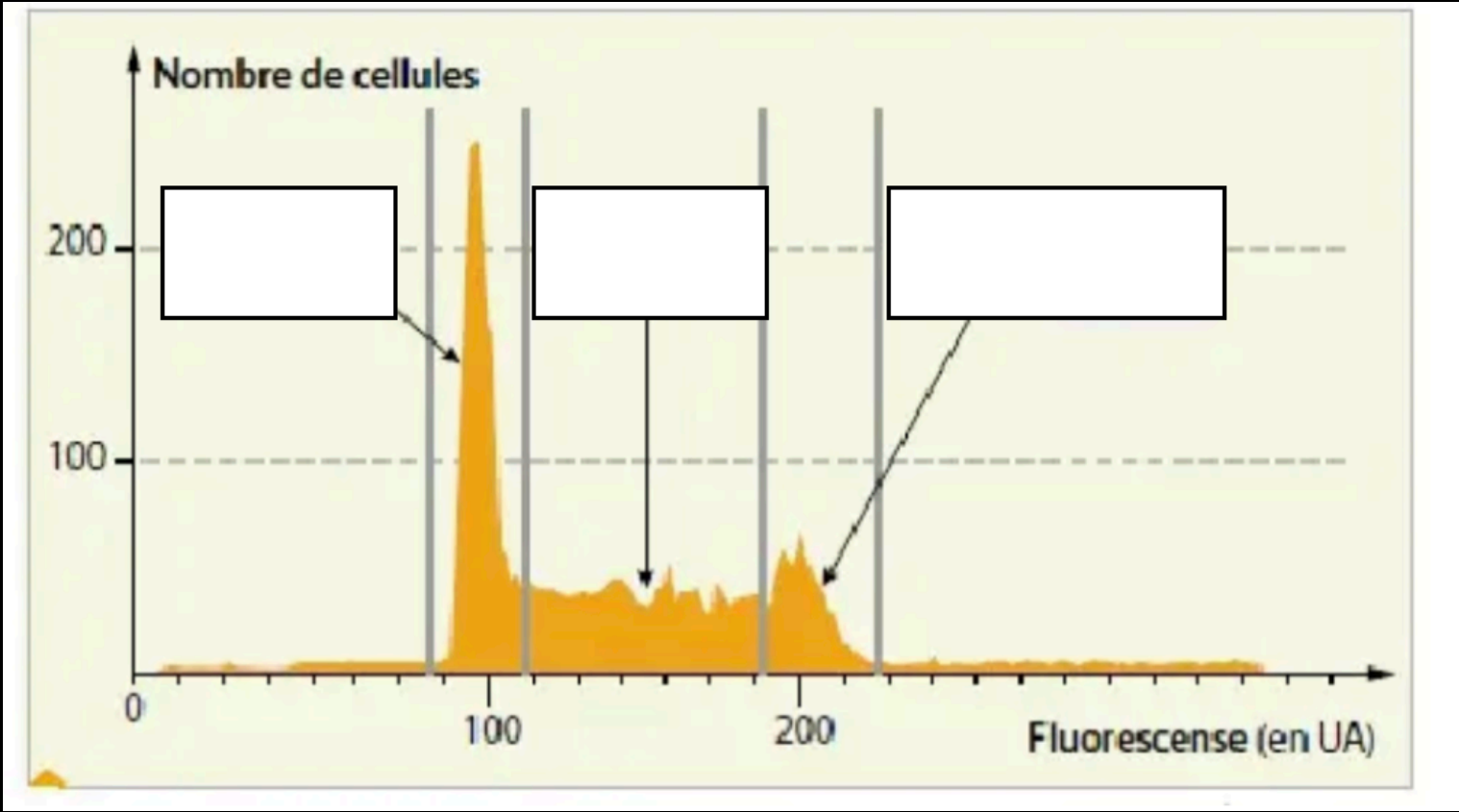


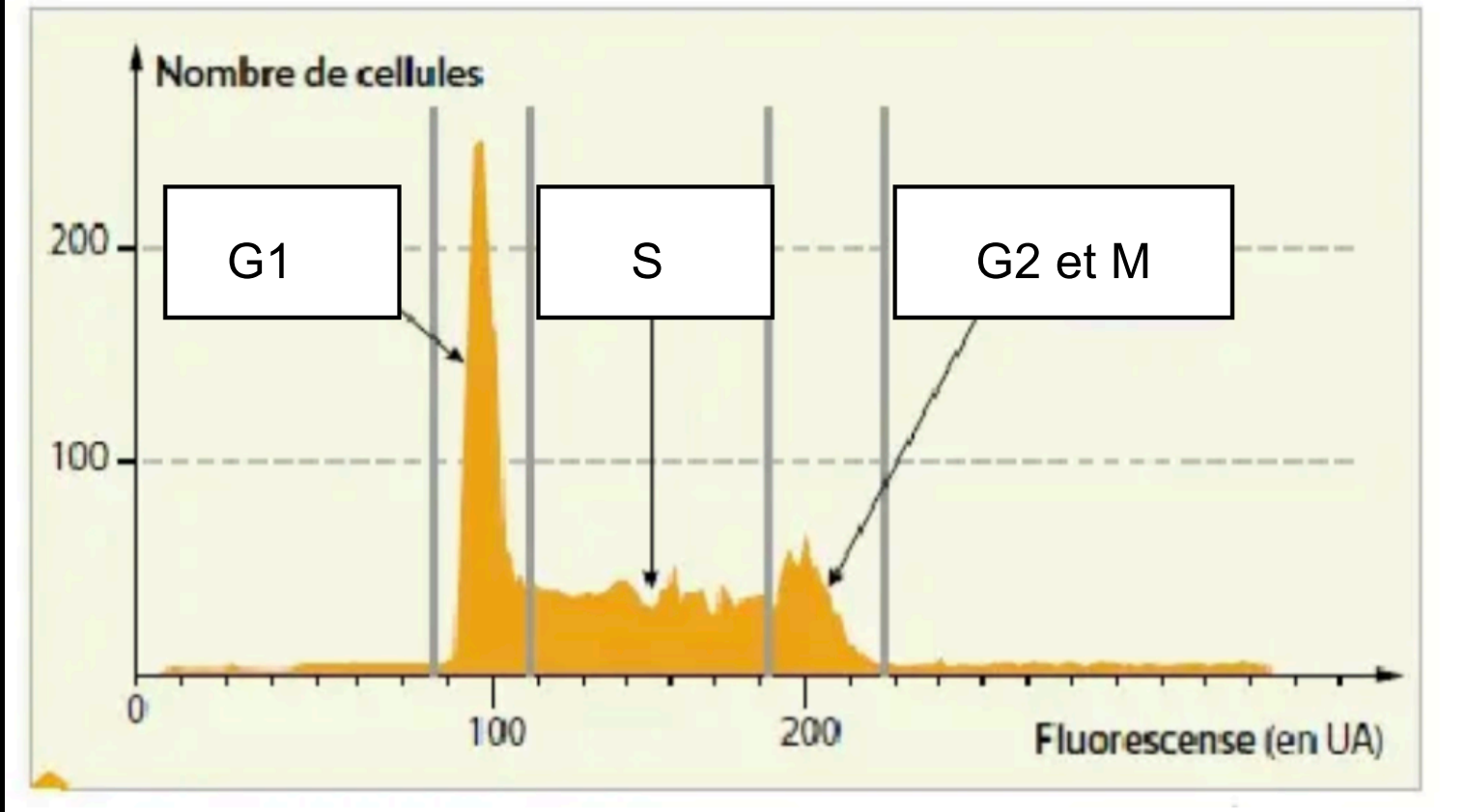
Cycle cellulaire



Représentation schématique d'un cytomètre de flux



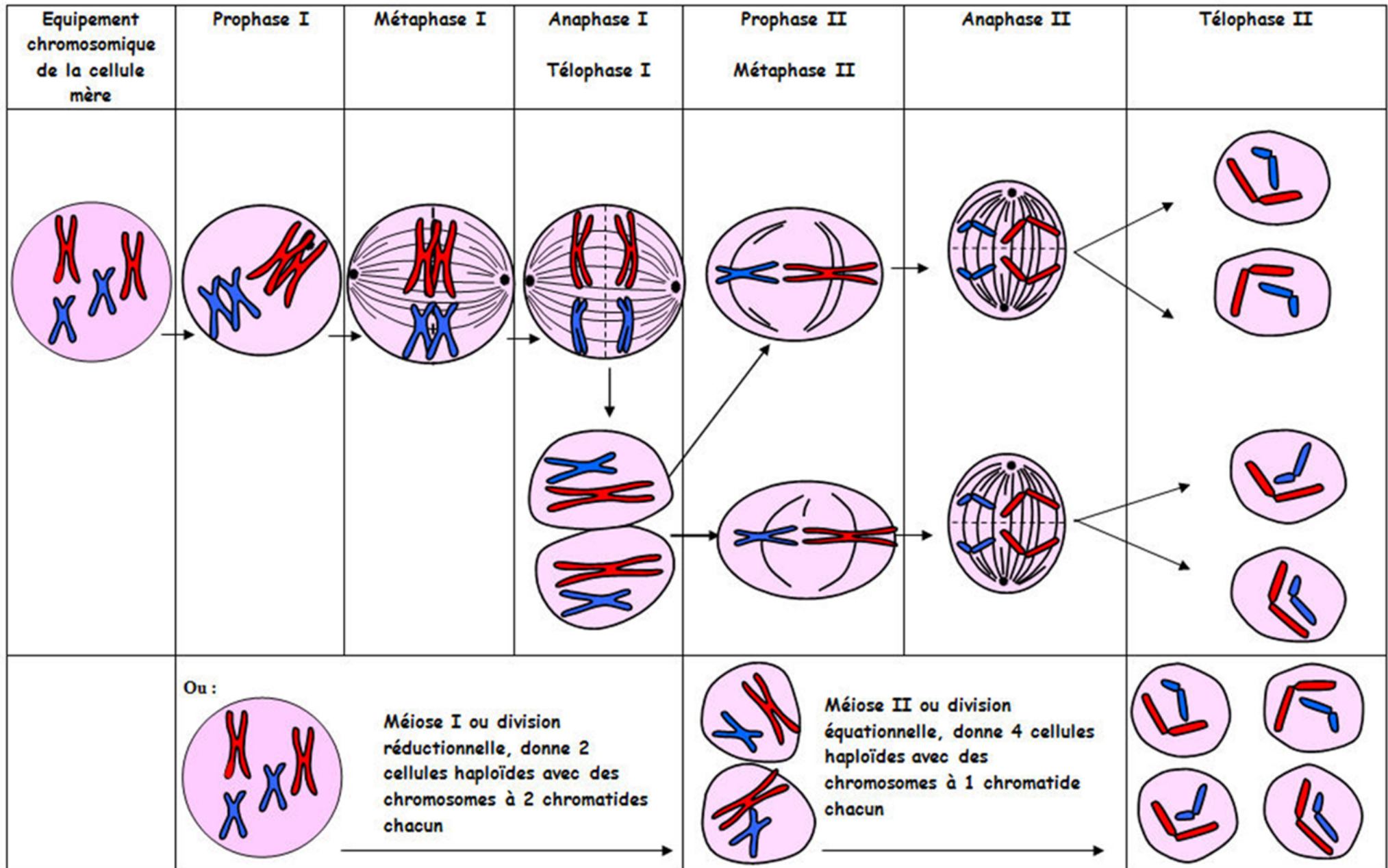


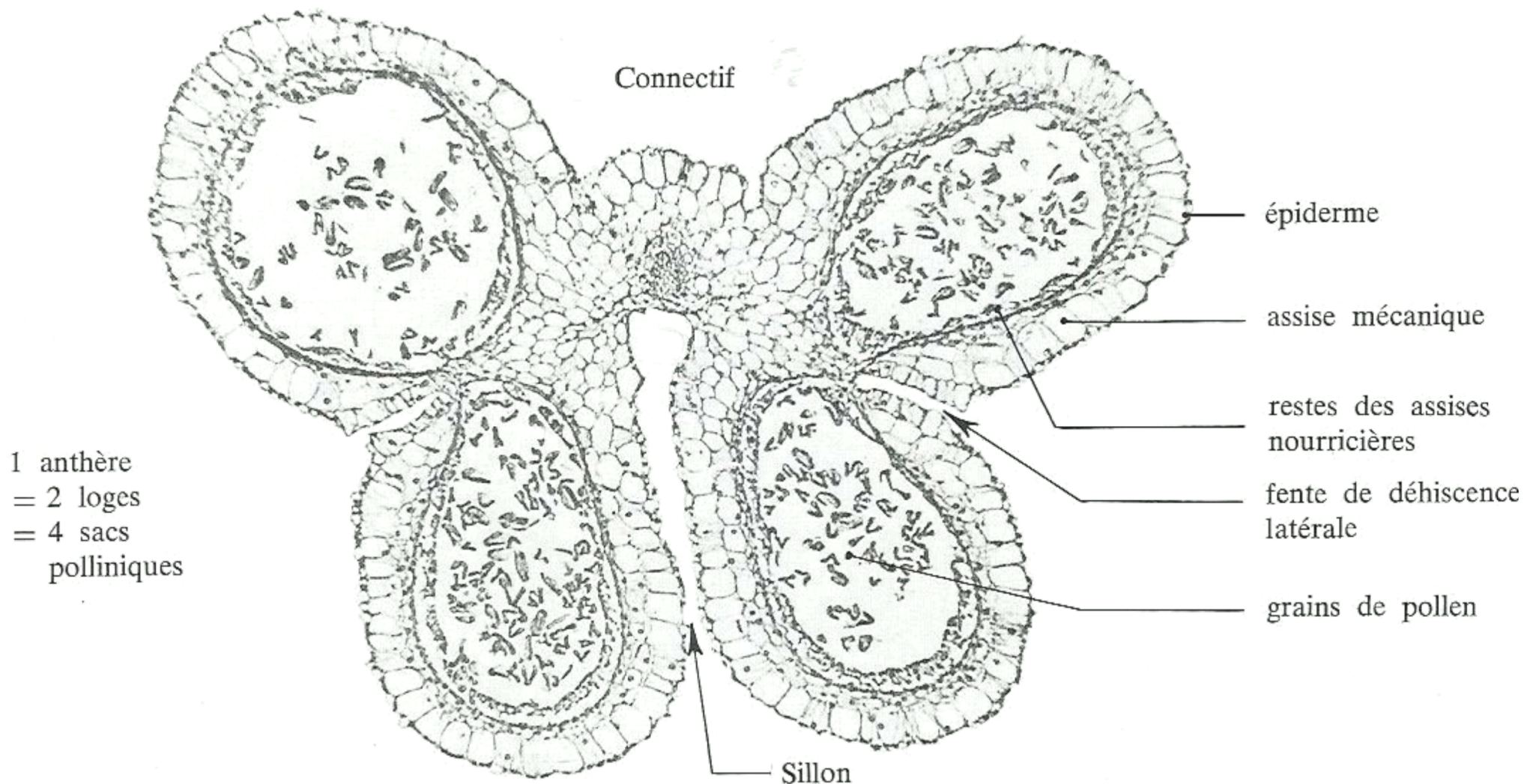


OBSERVER LES PHASES DE LA MEIOSE

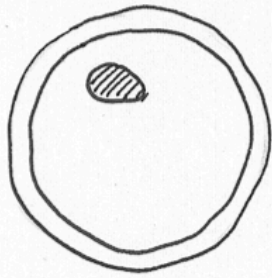
Rappel sur la méiose

Correction : Schéma bilan des étapes de la méiose pour une cellule à $2n=4$

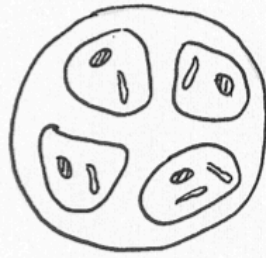




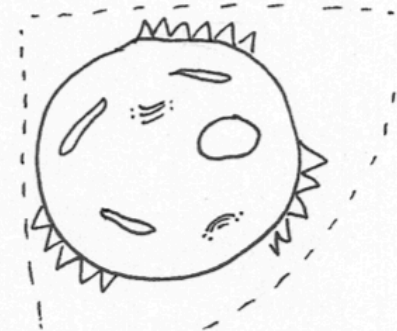
Anthère mûre. Coupe transversale. Lis ($\times 20$).



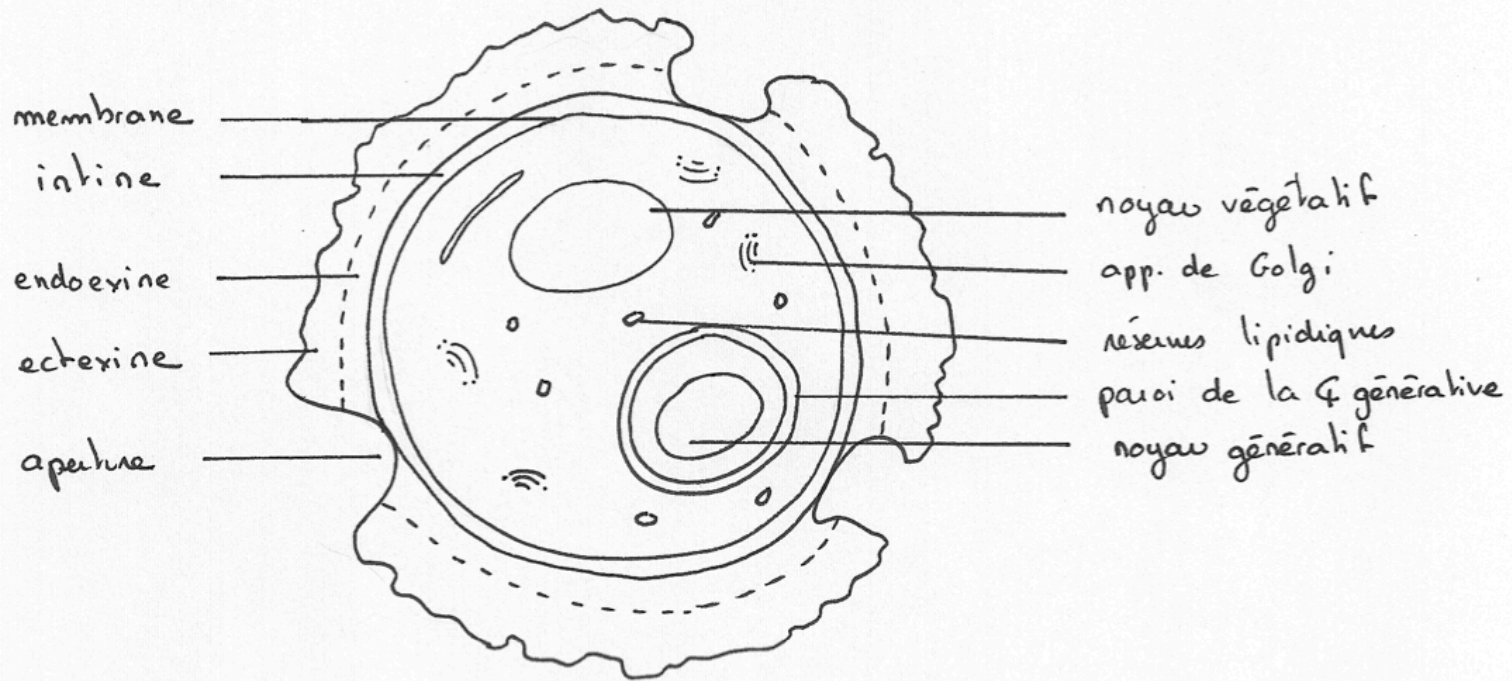
cellule mère des
microspores



une tétrade de
microspores

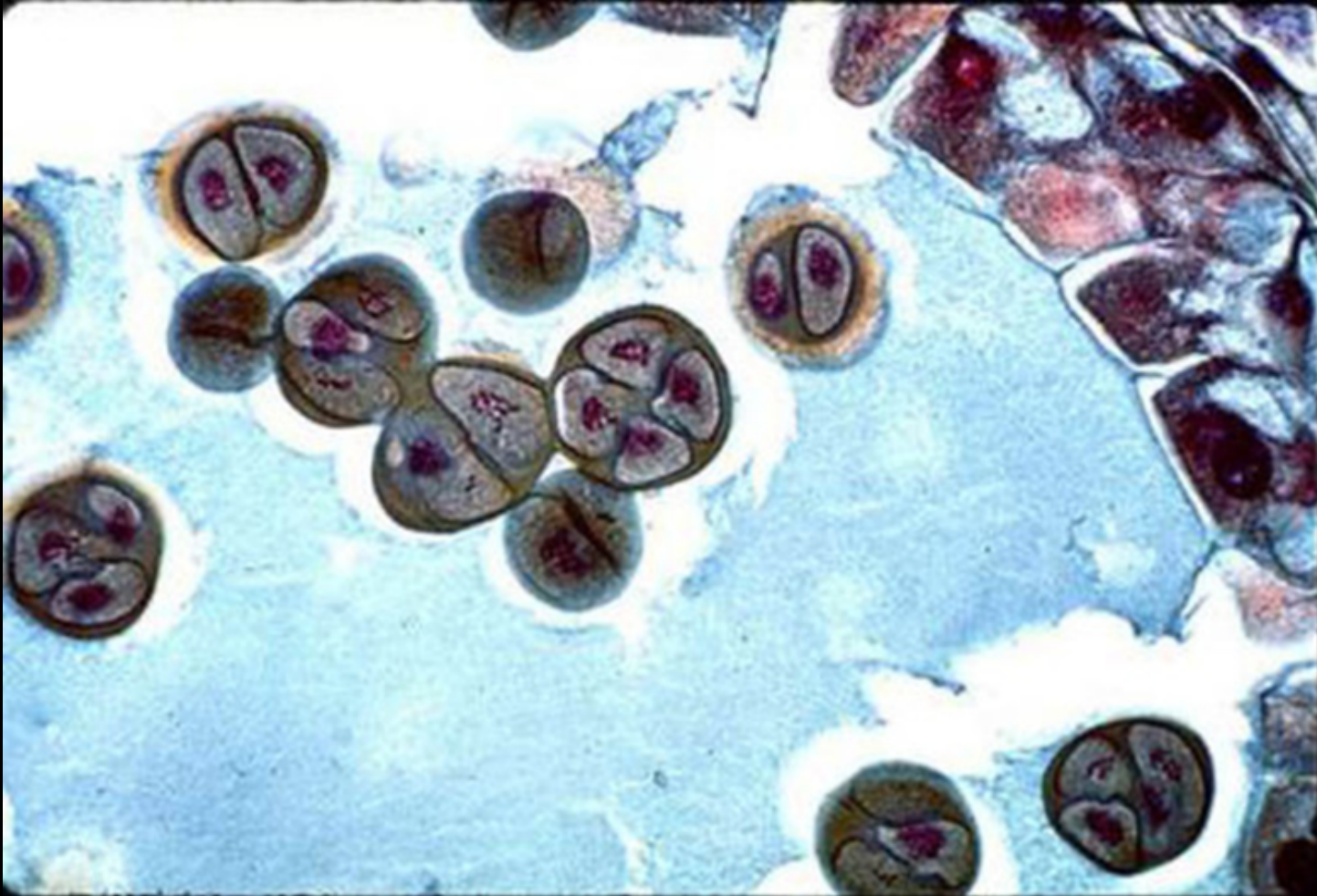


une tétrasporangie en
maturation

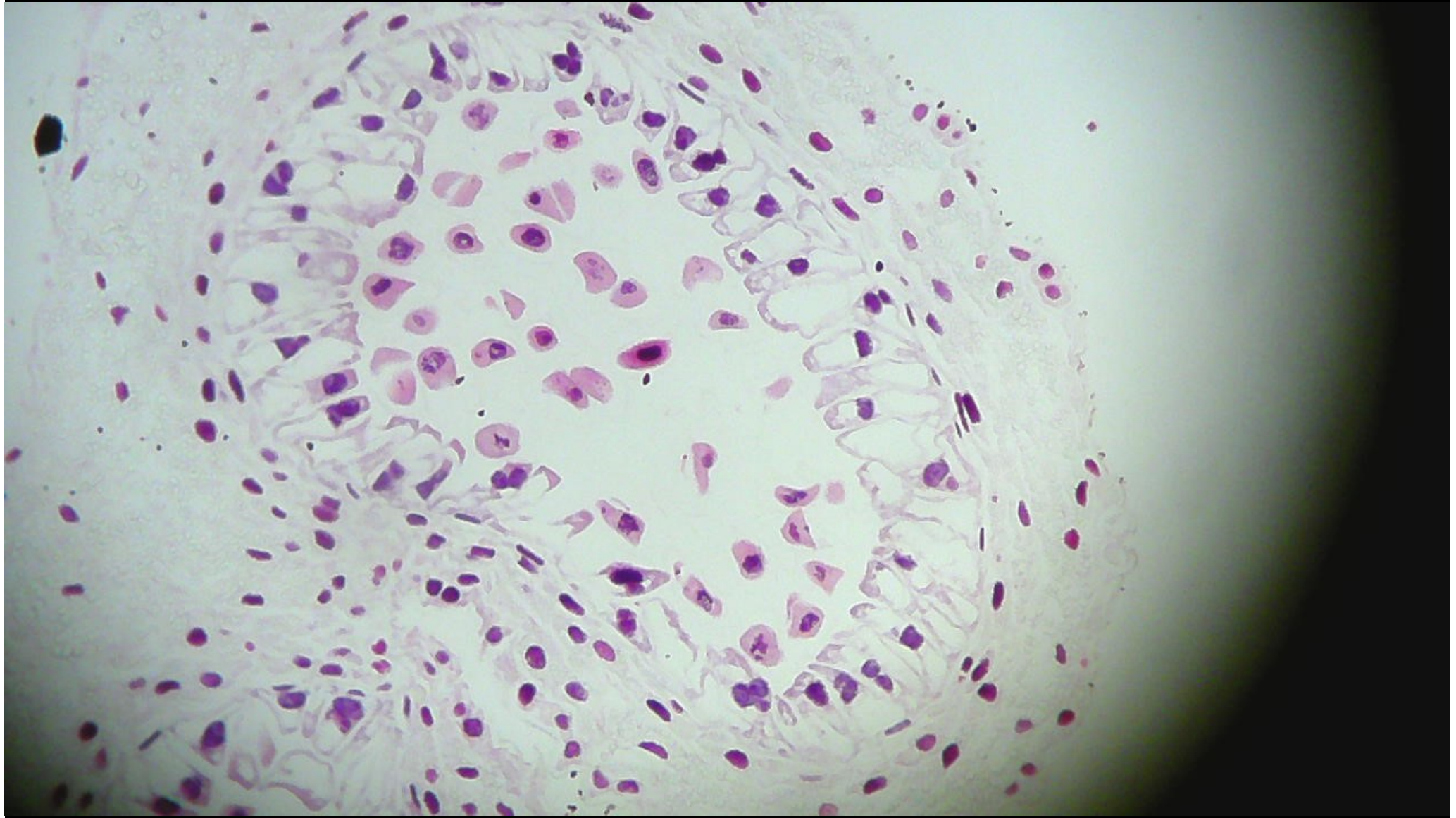


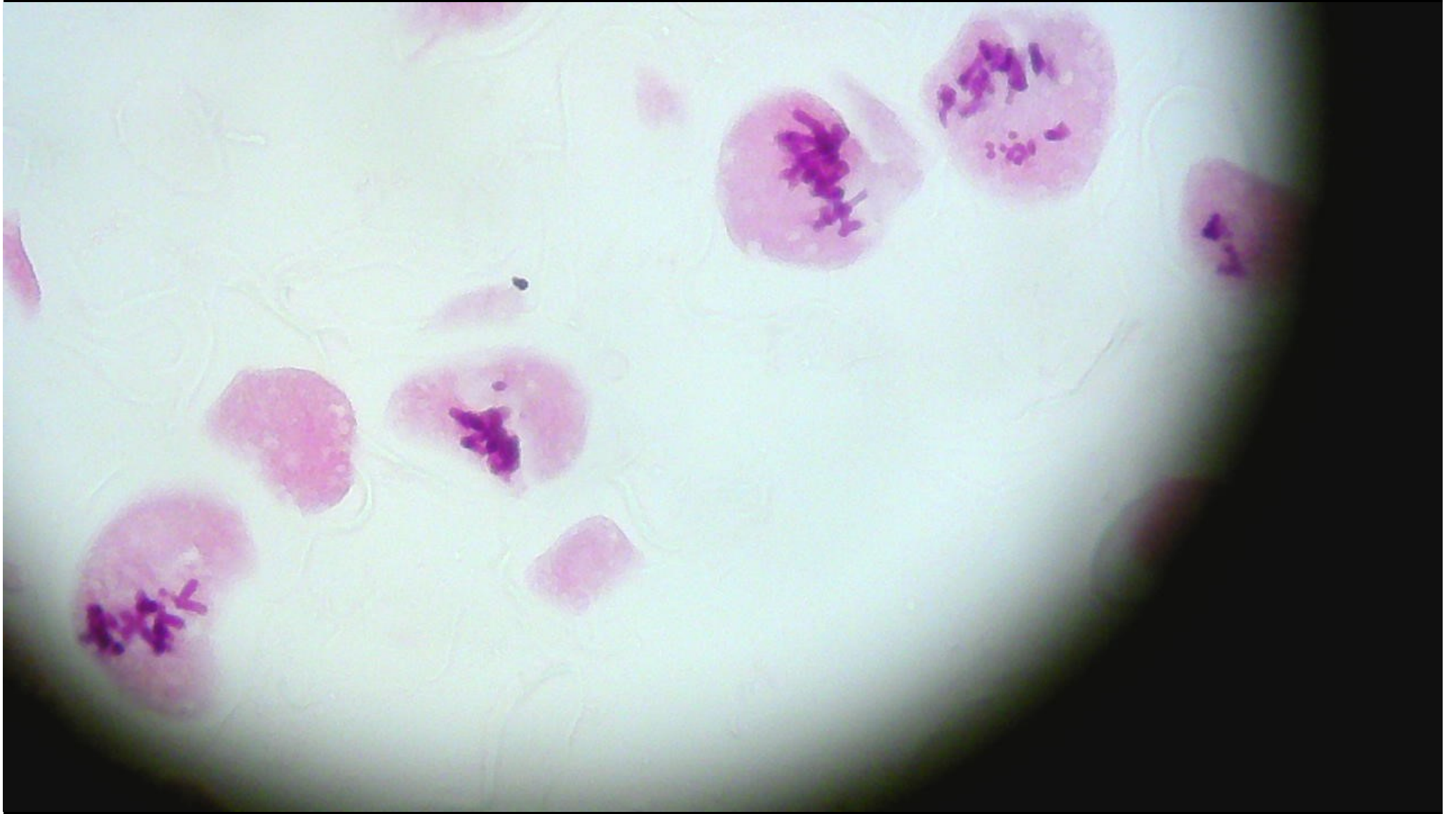
un grain de pollen

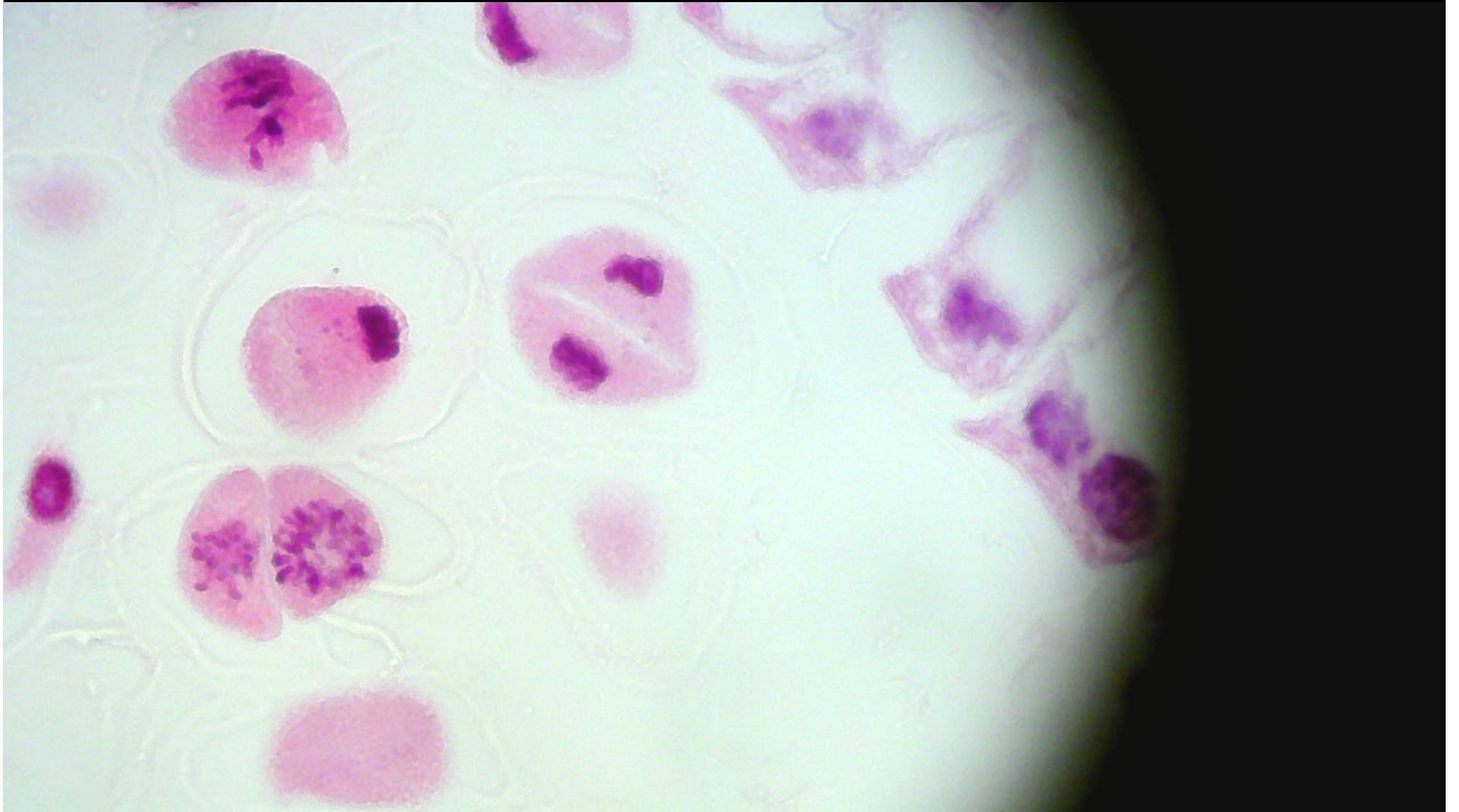
Méiose dans les anthères de fleurs d'Angiospermes



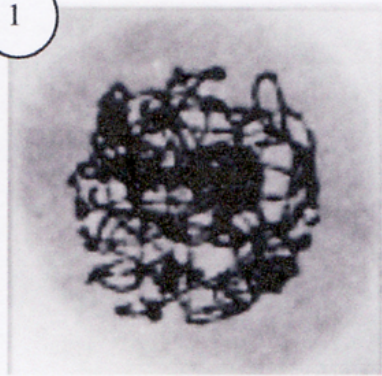
Fin de méiose II : observation de tétrades de spores







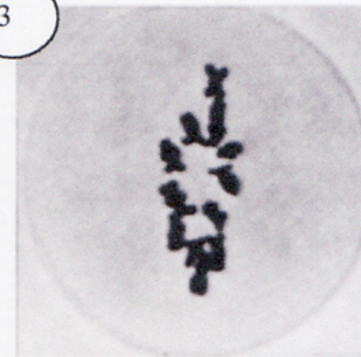
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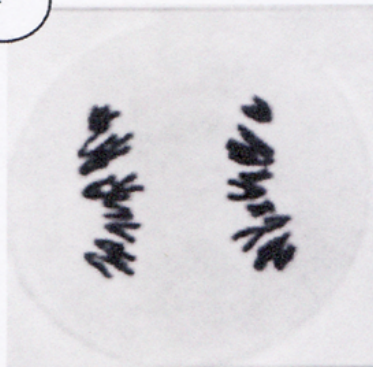
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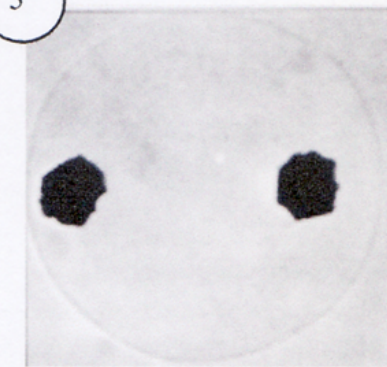
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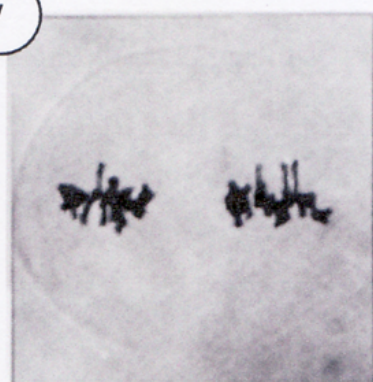
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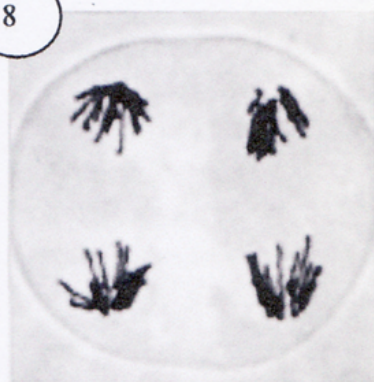
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7



8



9

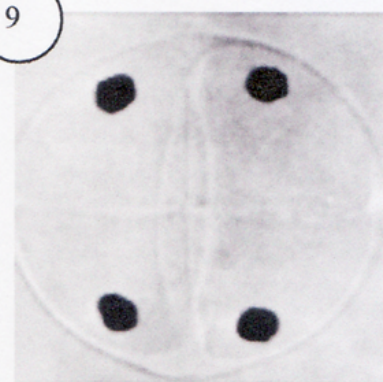
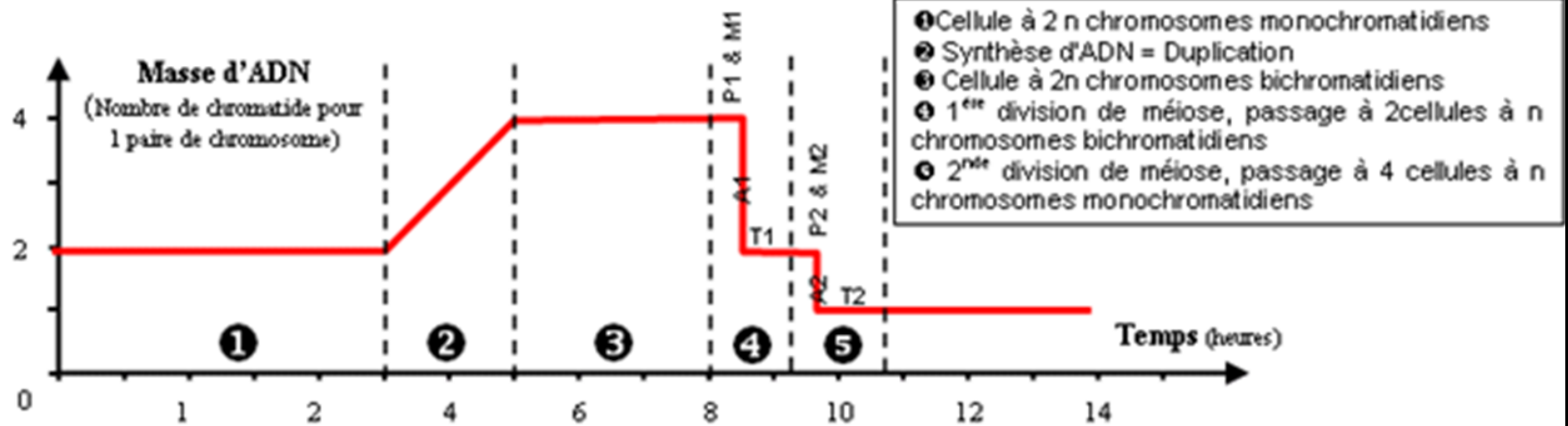
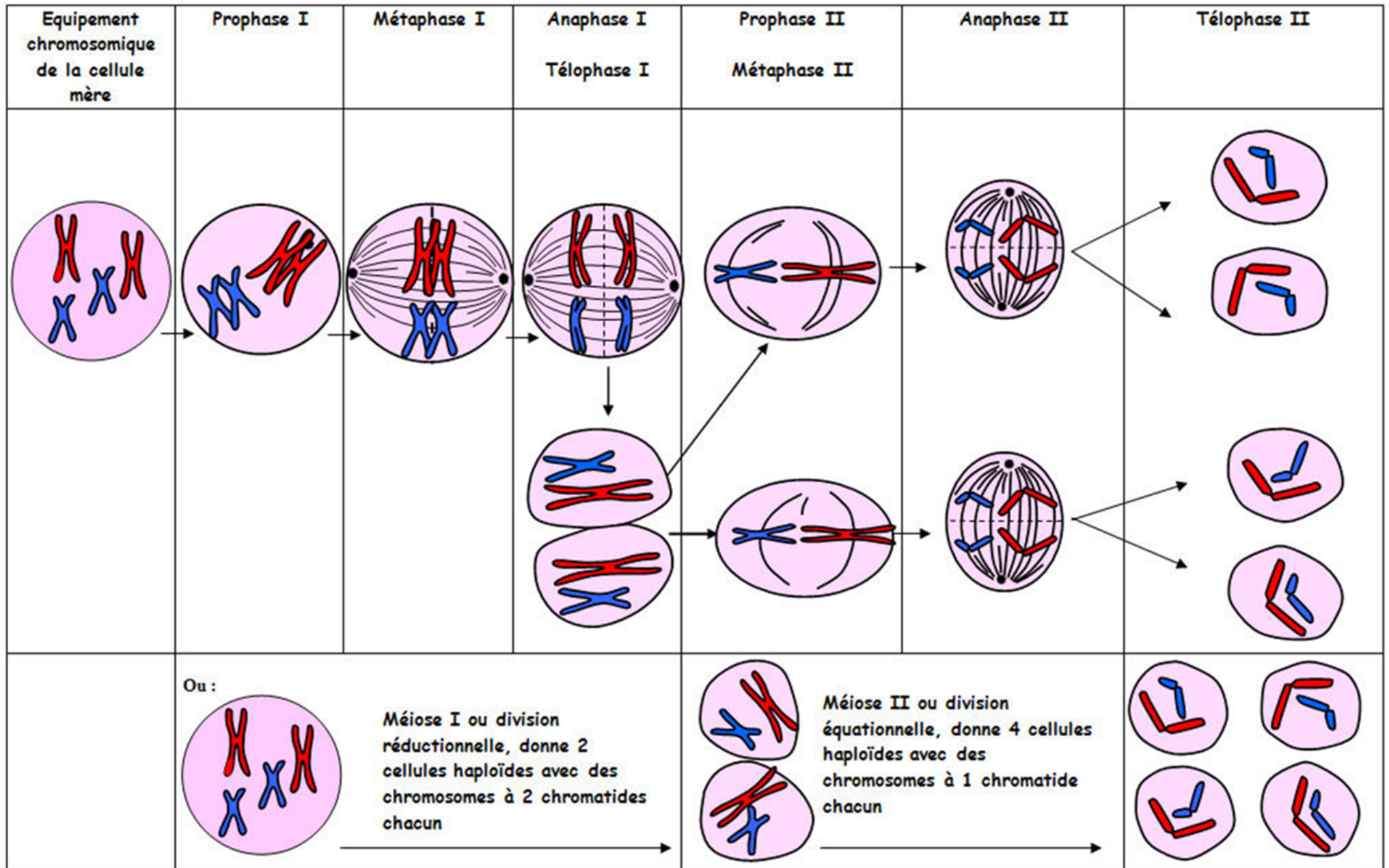


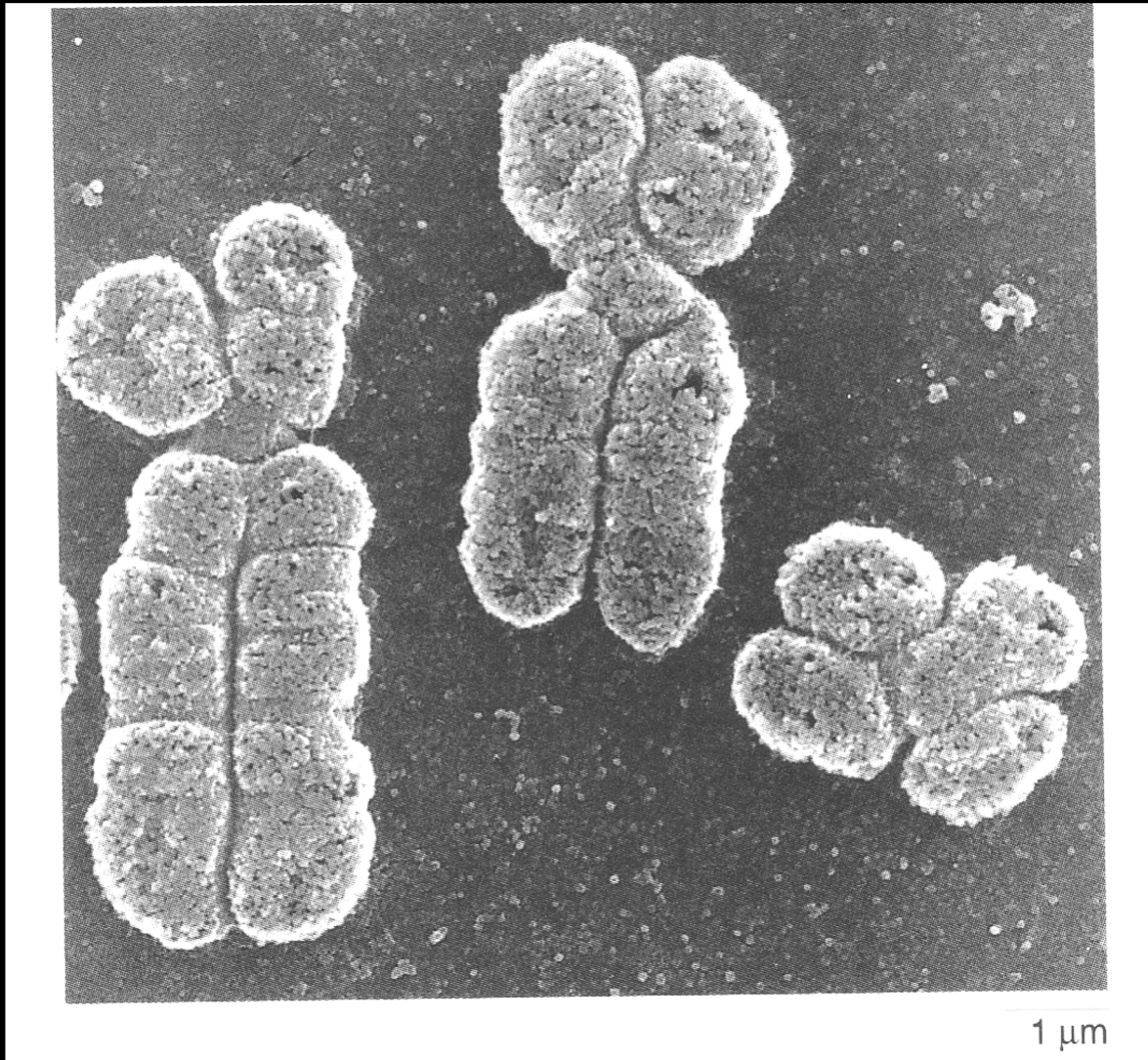
Diagramme de variation de la quantité d'ADN

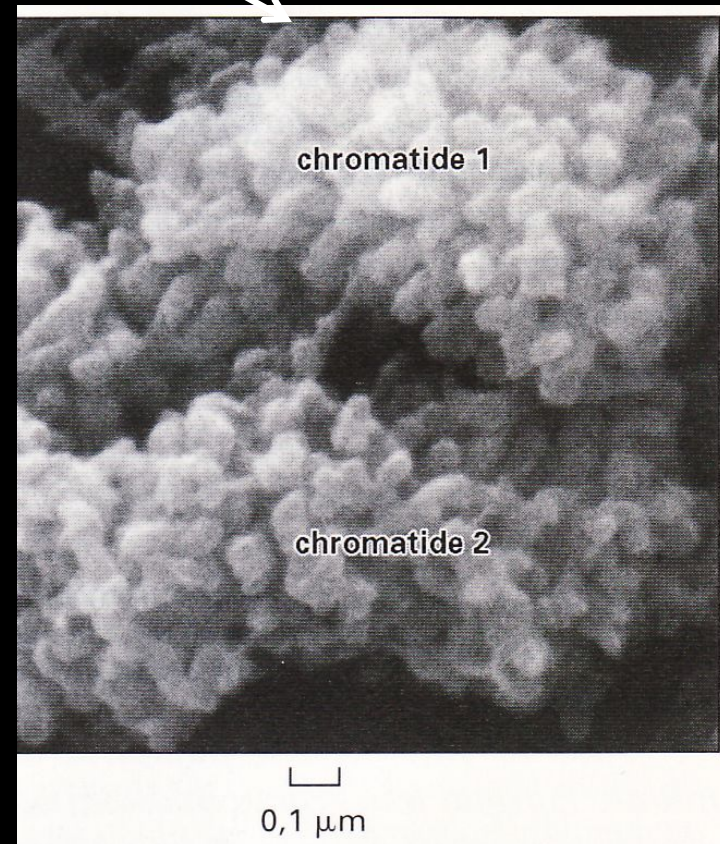
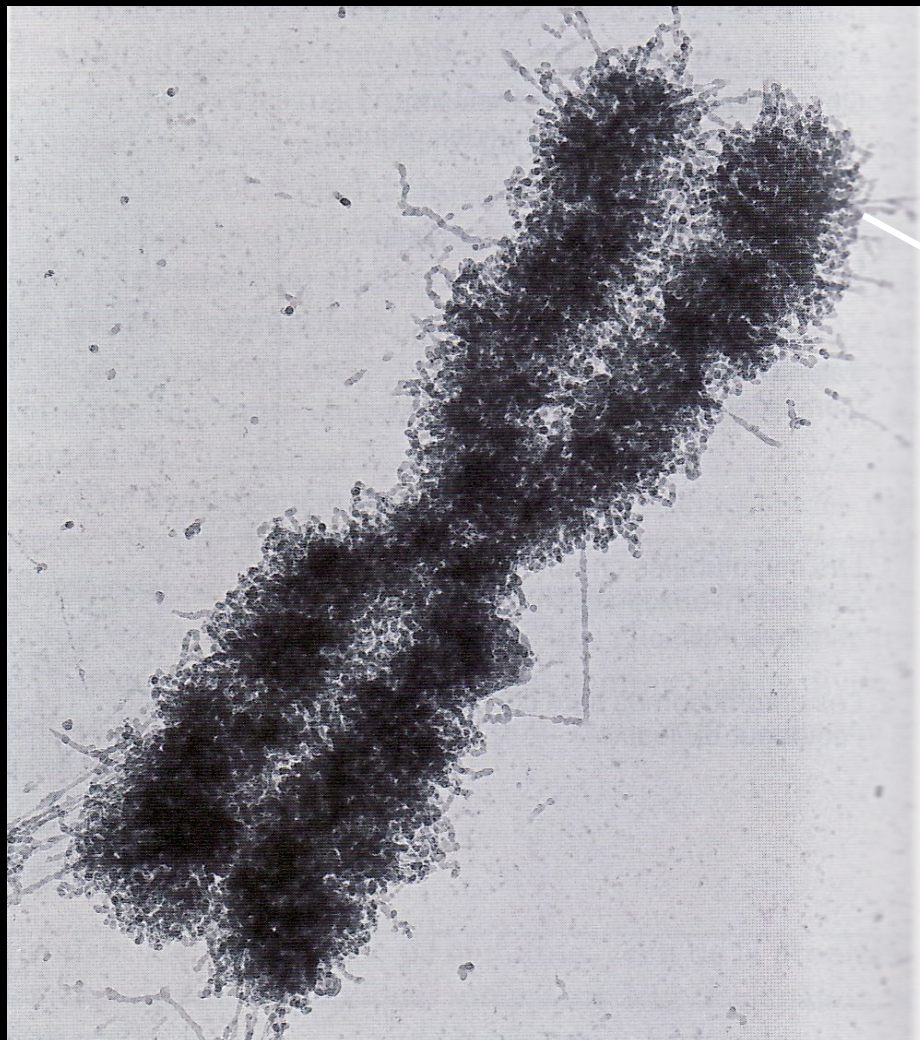


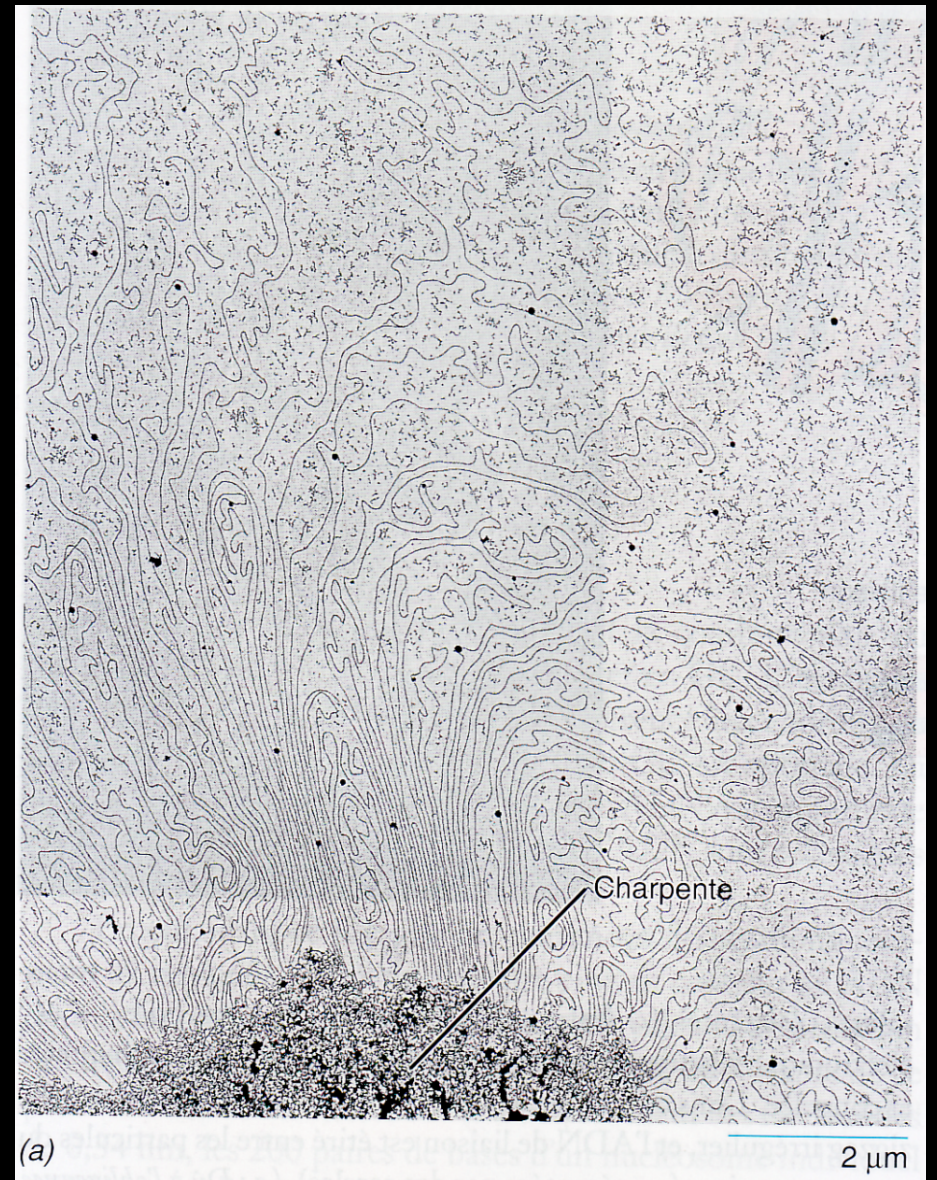
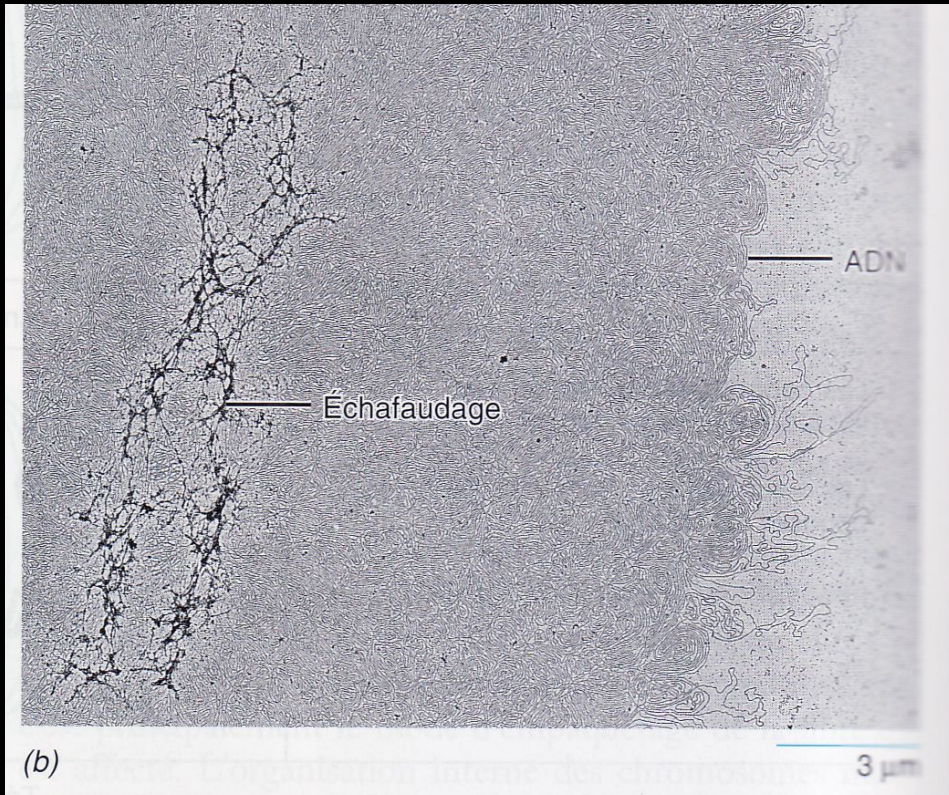
Correction : Schéma bilan des étapes de la méiose pour une cellule à $2n=4$



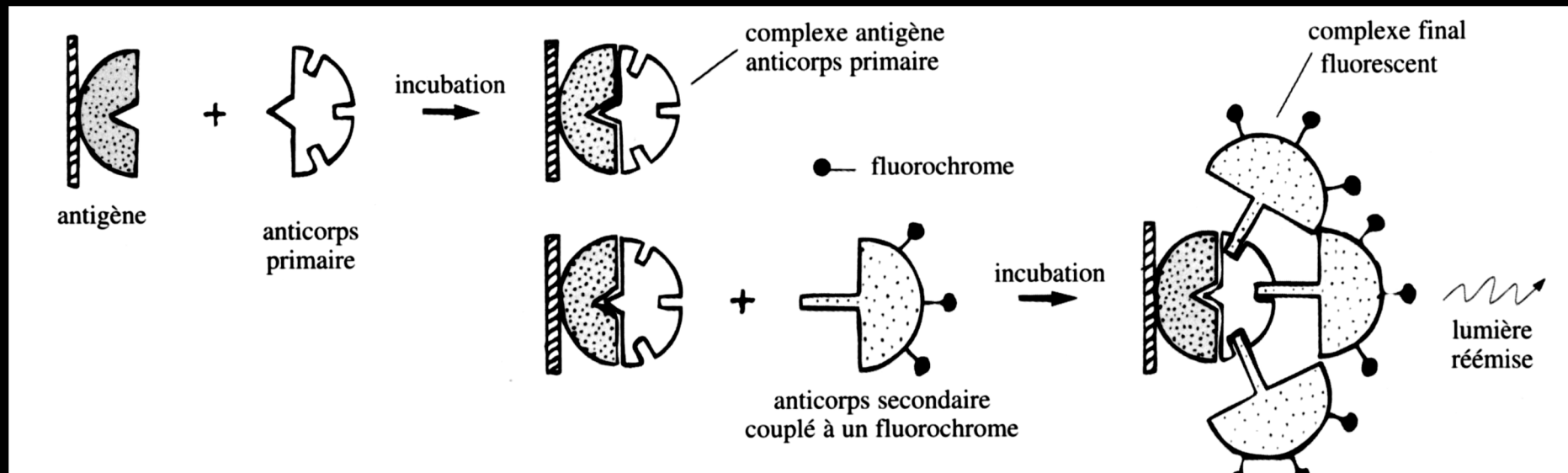
**CARACTERISTIQUES CELLULAIRES
DES DIVISIONS CELLULAIRES :
Organisation du chromosome
métaphasique**

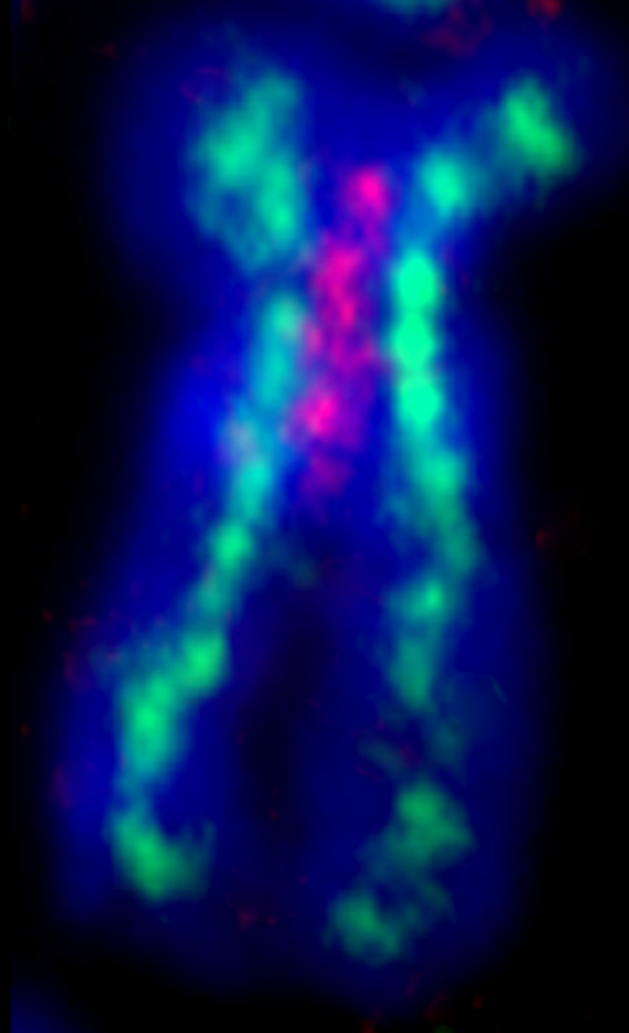
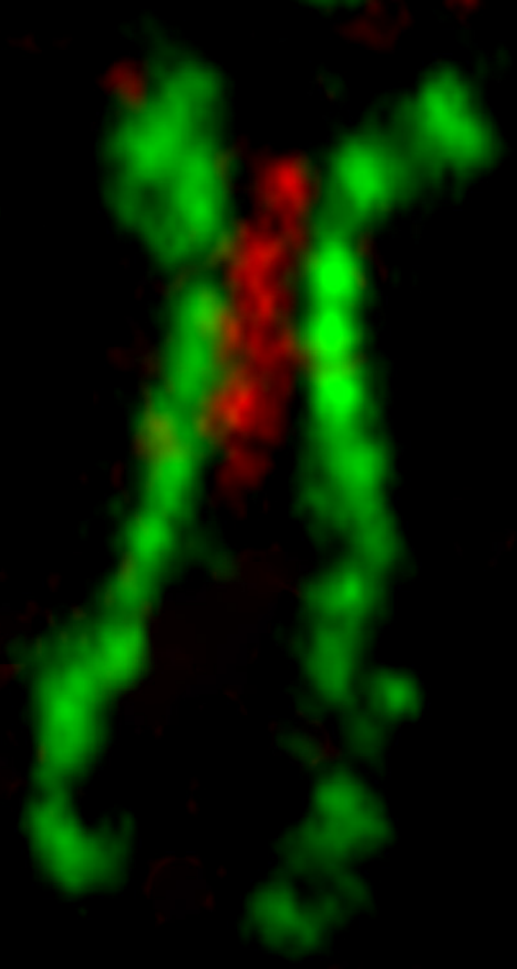


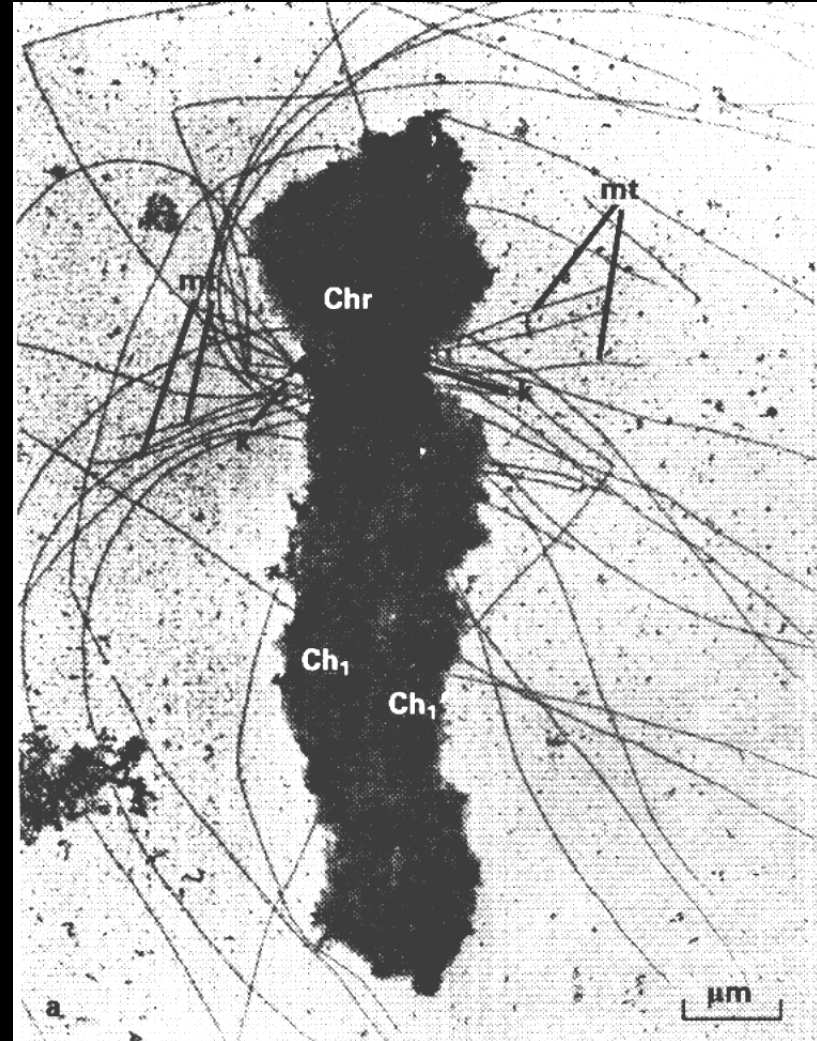
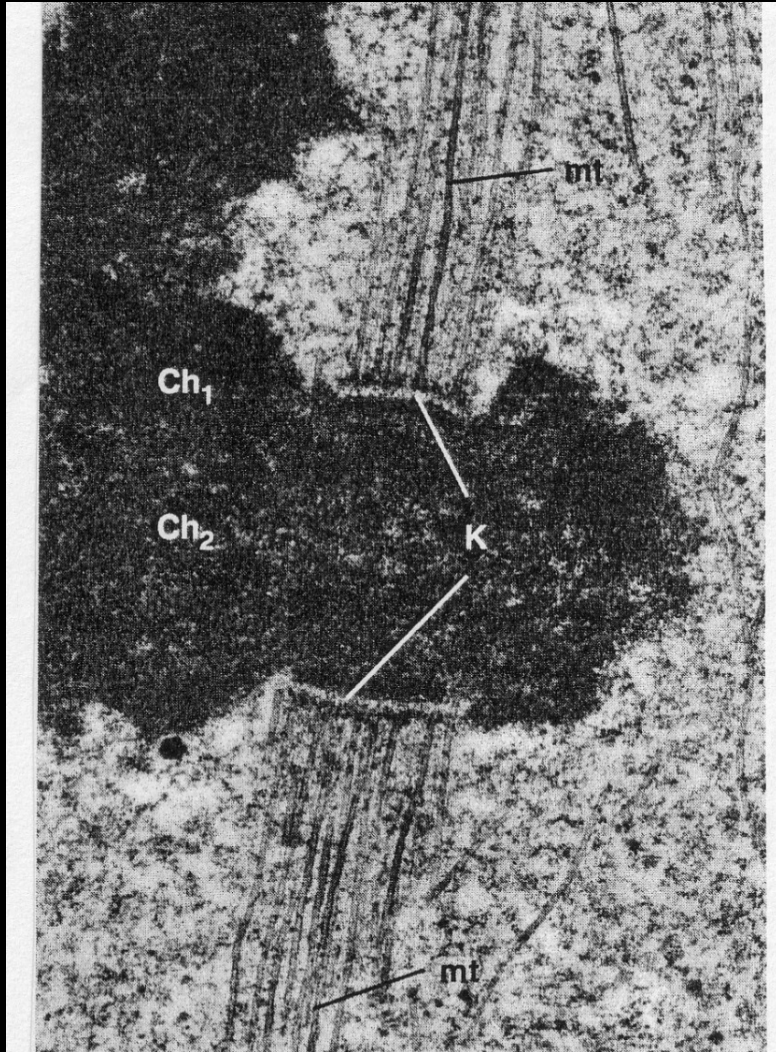




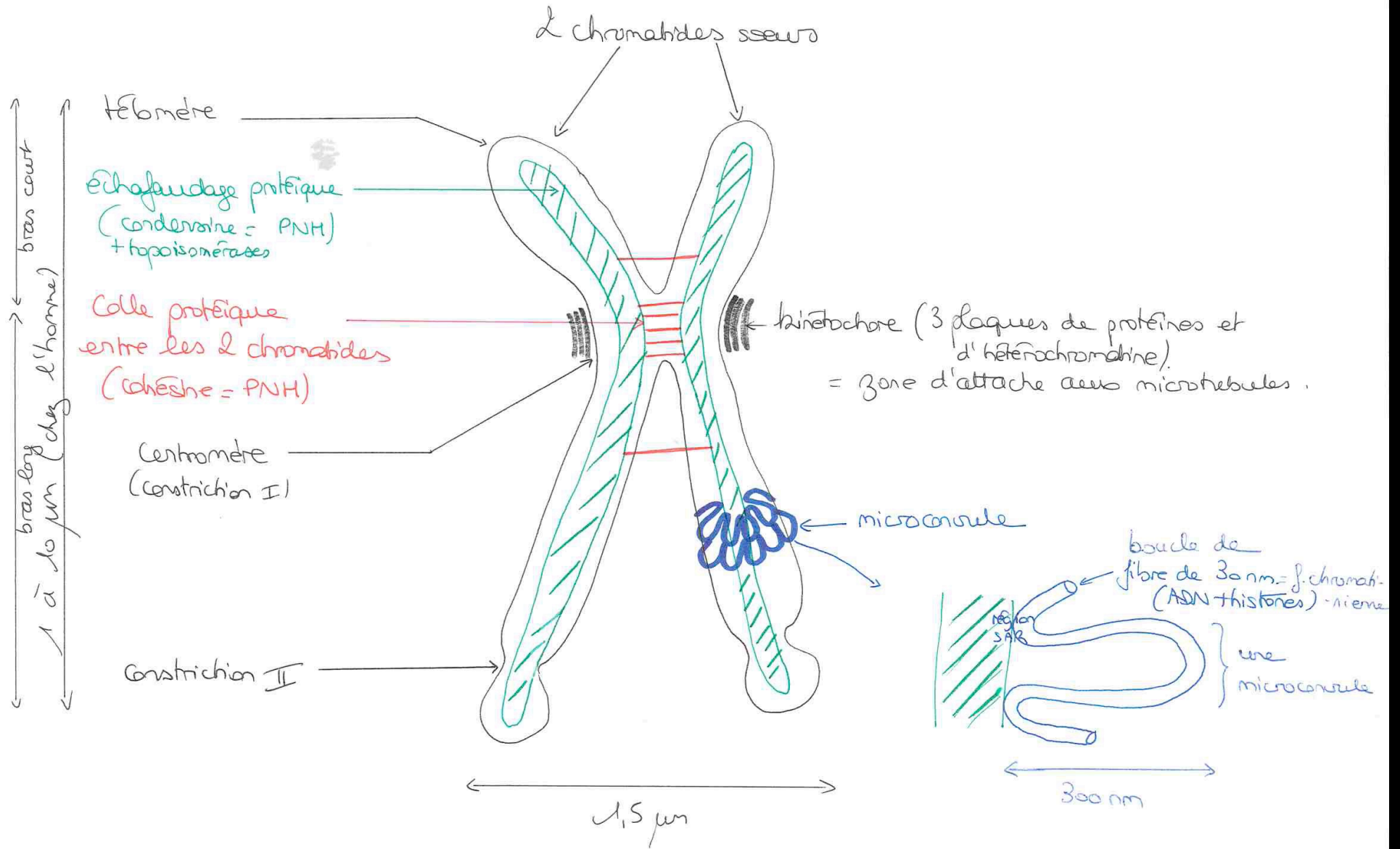
Technique d'immunomarquage



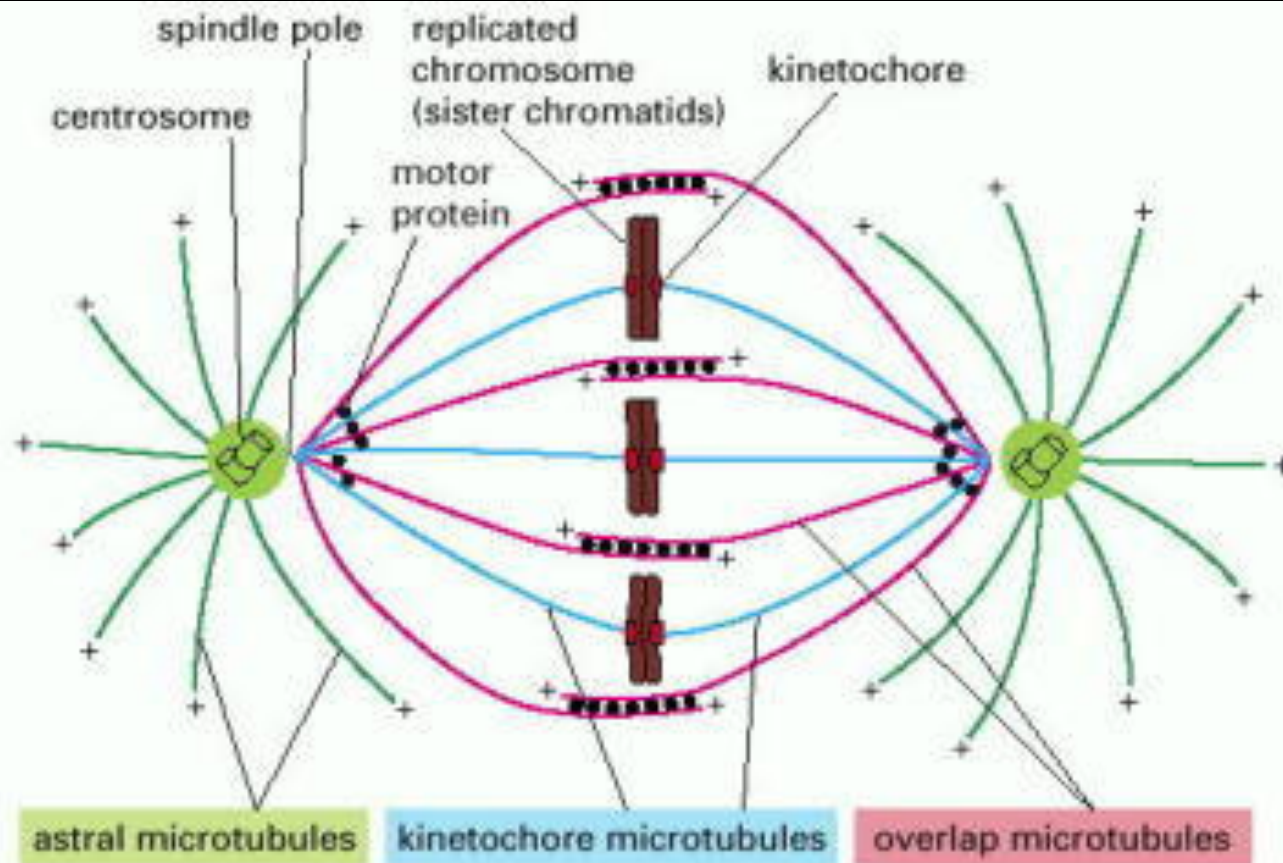




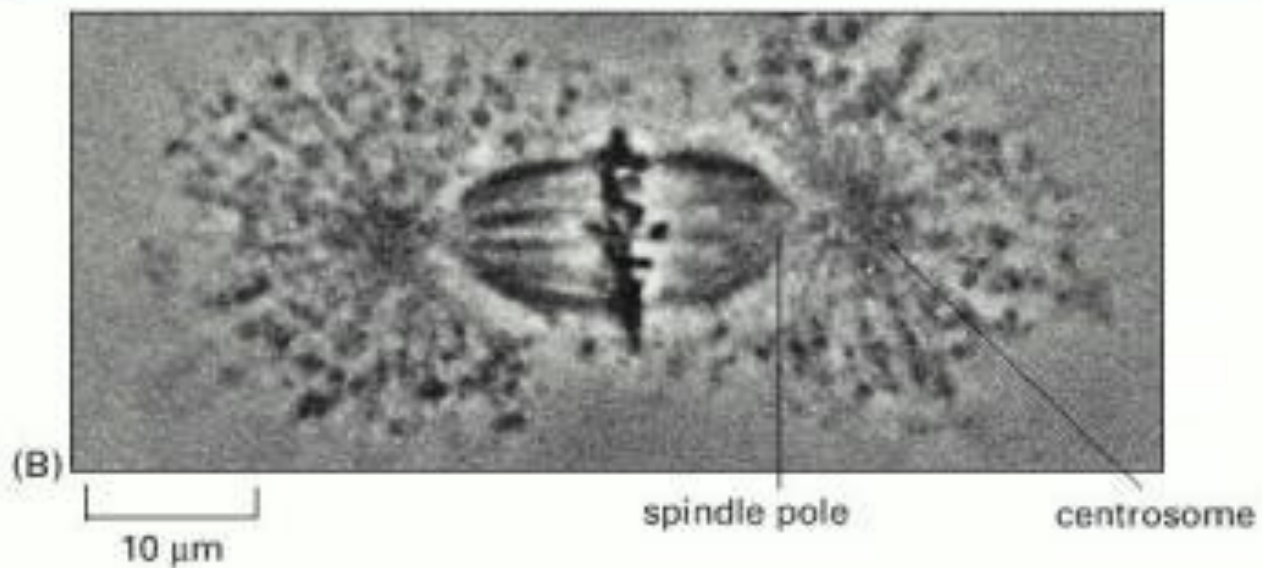
Organisation d'un chromosome métaphasique.

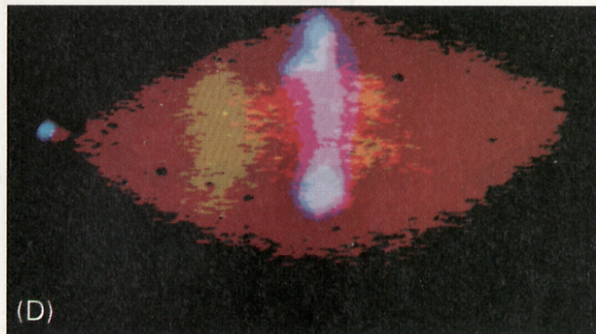
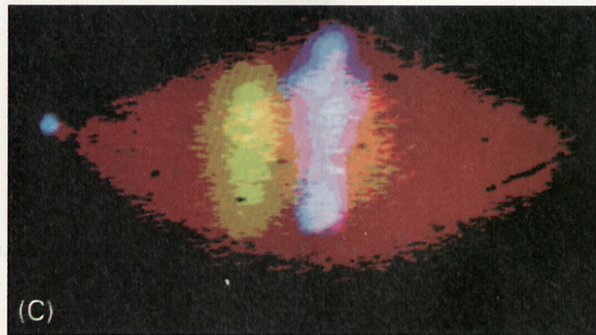
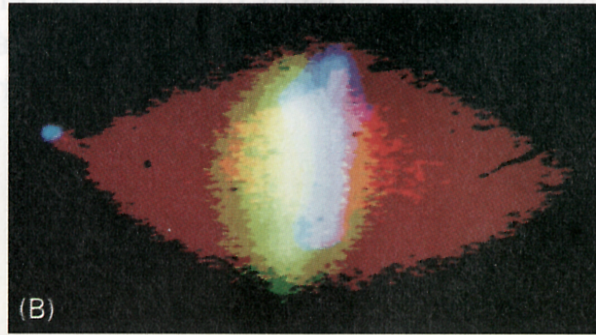
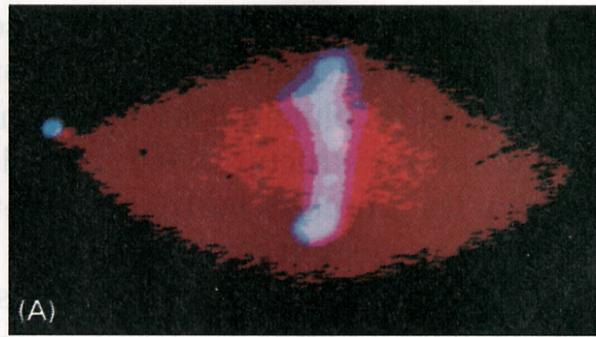


**CARACTERISTIQUES CELLULAIRES
DES DIVISIONS CELLULAIRES :
Organisation et dynamique du fuseau de
division**



(A)



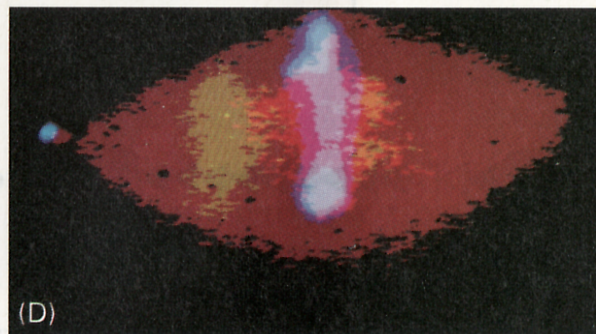
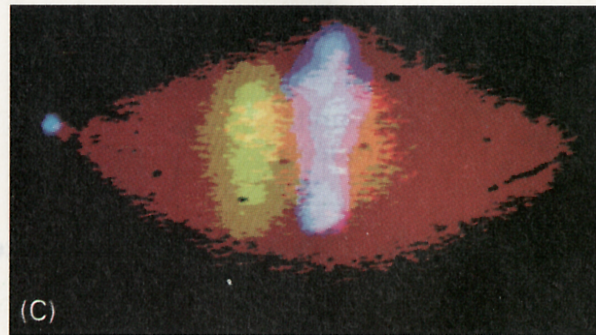
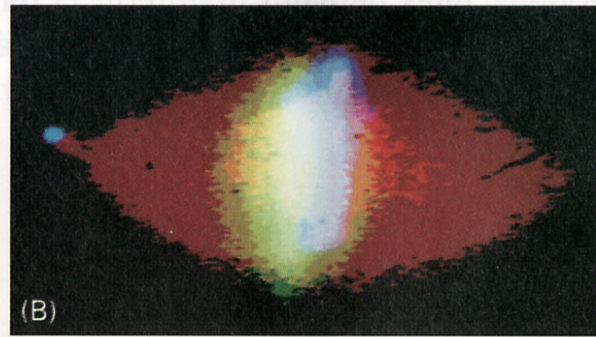
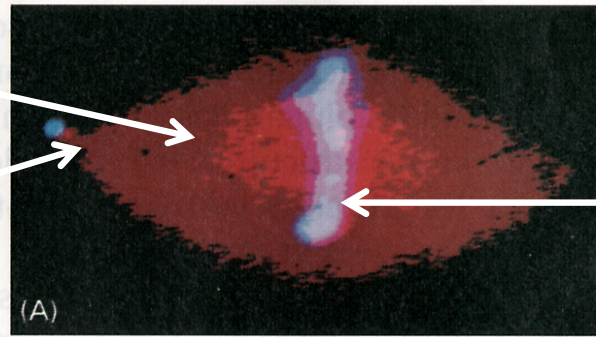


10 μm

Fuseau de microtubules

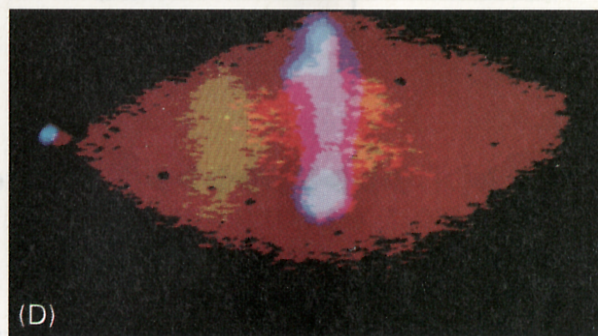
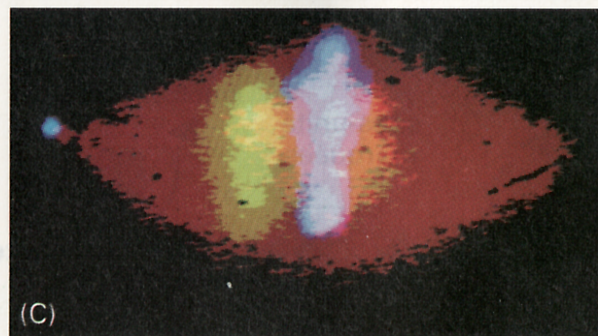
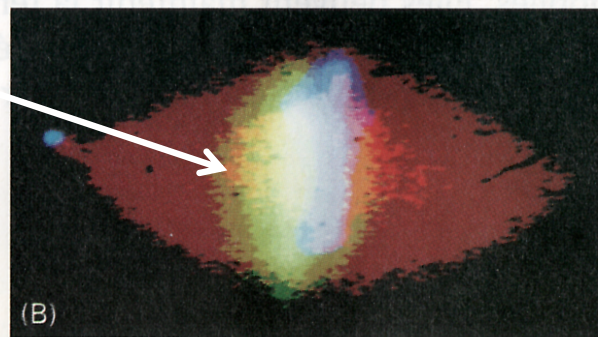
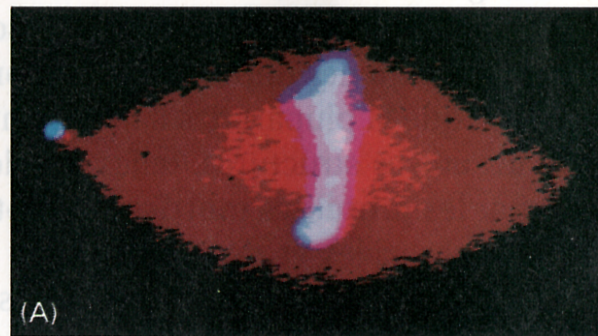
Centrosome (1 à chaque pôle du fuseau)

Chromosomes alignés sur la plaque métaphasique



10 μm

photoactivation



10 μm

Photoactivation à $t=0$.

UV

Métaphase

départ de tubuline

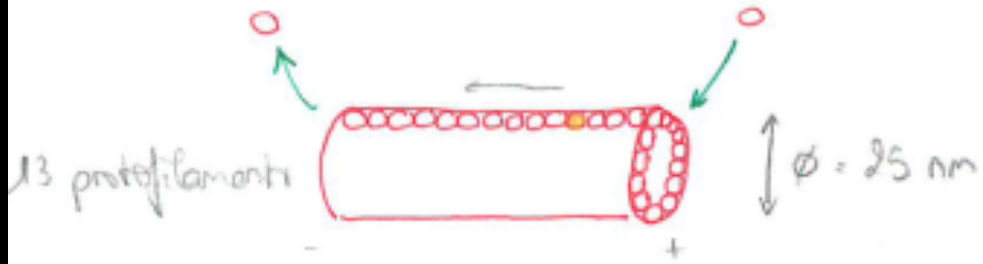
ajout de tubuline

Centrosome

instabilité dynamique en tapis roulant

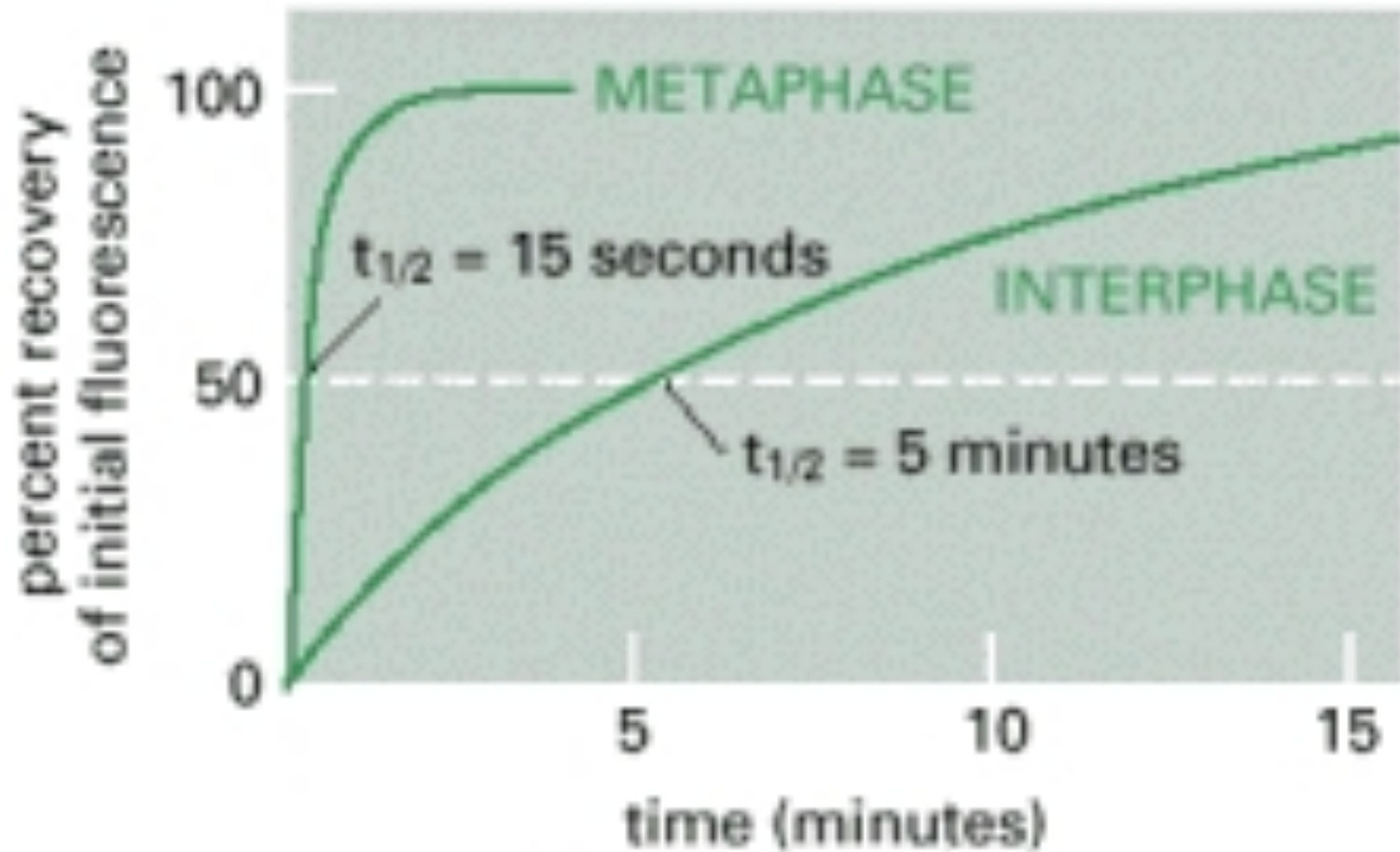
longueur constante des microtubules

chromosomes alignés sur plaque métaphasique



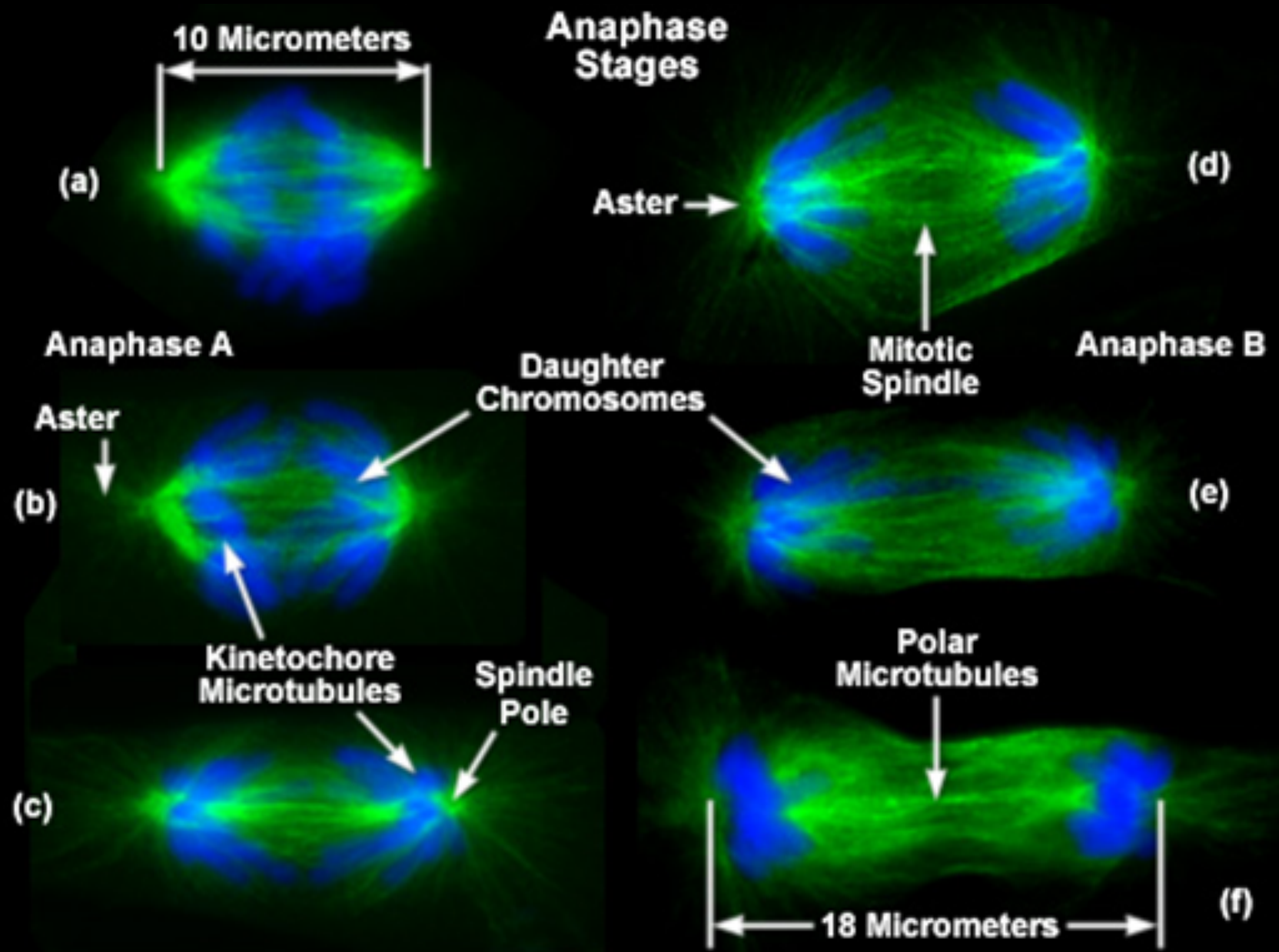
changement de

A metaphase spindle formed in vitro by adding *Xenopus* sperm to an extract of *Xenopus* eggs (see Figure 17-9) has incorporated three fluorescent markers: rhodamine-labeled tubulin (*red*) to mark all of the microtubules, a *blue* DNA-binding dye that labels the chromosomes, and **caged-fluorescein-labeled tubulin, which is also incorporated into all of the microtubules but is invisible because it is nonfluorescent until activated by ultraviolet light.** (A) The distribution of the chromosomes and microtubules in the spindle. (B) A beam of ultraviolet light was used to uncage the caged-fluorescein-labeled tubulin locally, mainly just to the left side of the metaphase plate. Over the next few minutes (after 1.5 minutes in C, after 2.5 minutes in D), the uncaged fluorescein-tubulin signal is seen to move toward the left spindle pole, indicating that tubulin is continuously moving poleward, even though the spindle (visualized by the *red* rhodamine-tubulin fluorescence) remains largely unchanged. The caged fluorescein signal also diminishes in intensity, indicating that the individual microtubules are continually depolymerizing and being replaced.



Étude montrant que les microtubules dans une cellule en phase M sont beaucoup plus dynamiques, en moyenne, que les microtubules en interphase. On a injecté, dans des cellules de mammifères en culture, de la tubuline qui a été liée de façon covalente à un colorant fluorescent. Lorsque la tubuline fluorescente est totalement incorporée dans les microtubules d'une cellule, toute la fluorescence d'une petite région est éteinte par un faisceau laser intense. La récupération d'une fluorescence normale dans la région éteinte des microtubules, provoquée par l'échange de leurs sous-unités de tubuline éteintes contre de la tubuline fluorescente non éteinte à partir du pool soluble, est ensuite enregistrée en fonction du temps. On pense que le temps $t_{1/2}$ nécessaire pour que 50 p. cent de la fluorescence soient récupérés est égal au temps nécessaire pour que la moitié des microtubules dans cette région se dépolymérisent et se reforment.

Microtubules in an M-phase cell are much more dynamic, on average, than the microtubules at interphase. Mammalian cells in culture were injected with tubulin that had been covalently linked to a fluorescent dye. After the fluorescent tubulin had become incorporated into the cell's microtubules, an **intense laser beam was used to bleach all the fluorescence in a small region**. The recovery of fluorescence in the bleached region of microtubules, caused by their replacement by microtubules formed from unbleached fluorescent tubulin from the soluble pool, was then monitored as a function of time. The time for 50% recovery of fluorescence ($t_{1/2}$) is thought to be equal to the time required for half of the microtubules in the region to depolymerize and re-form.



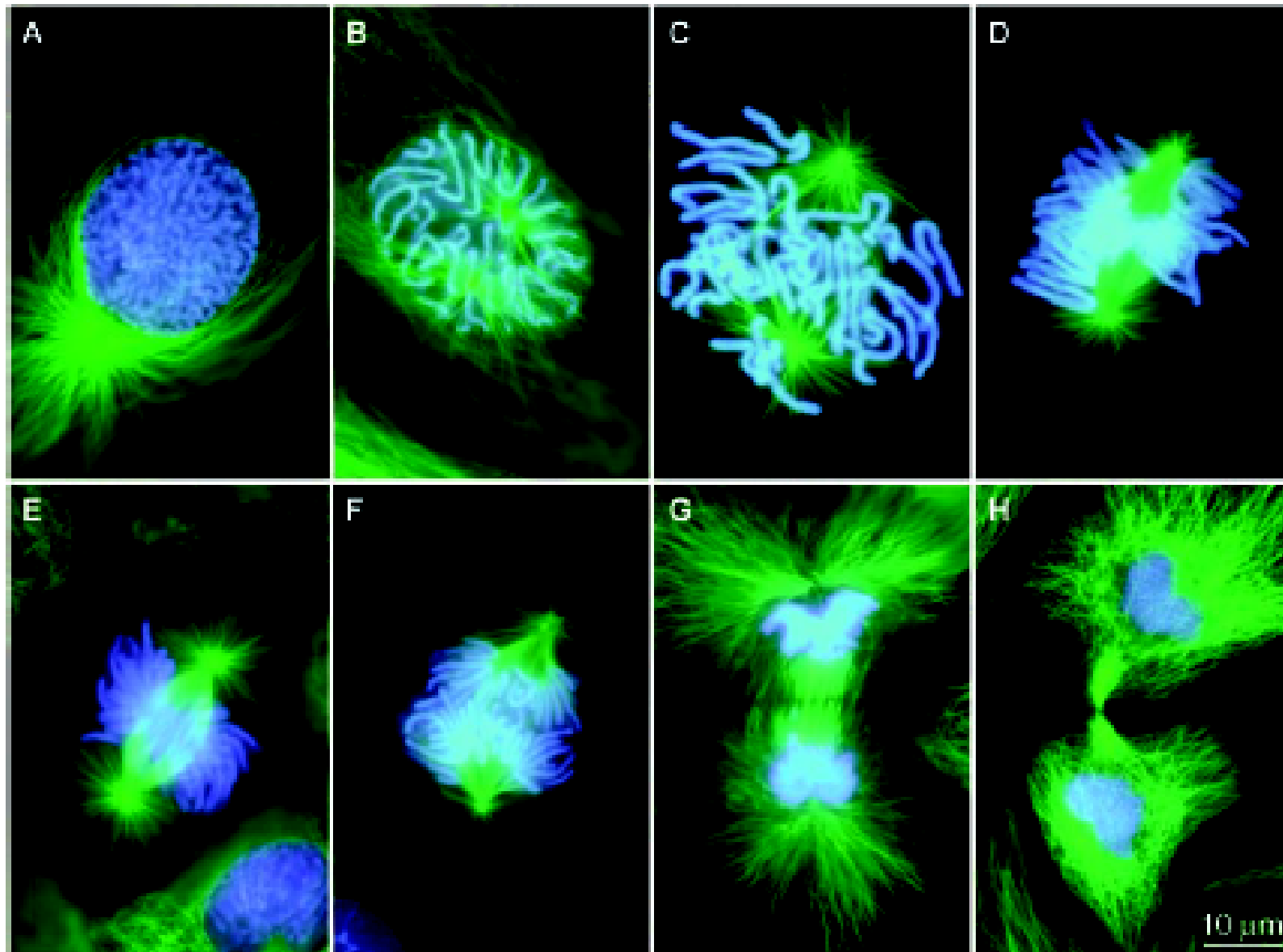
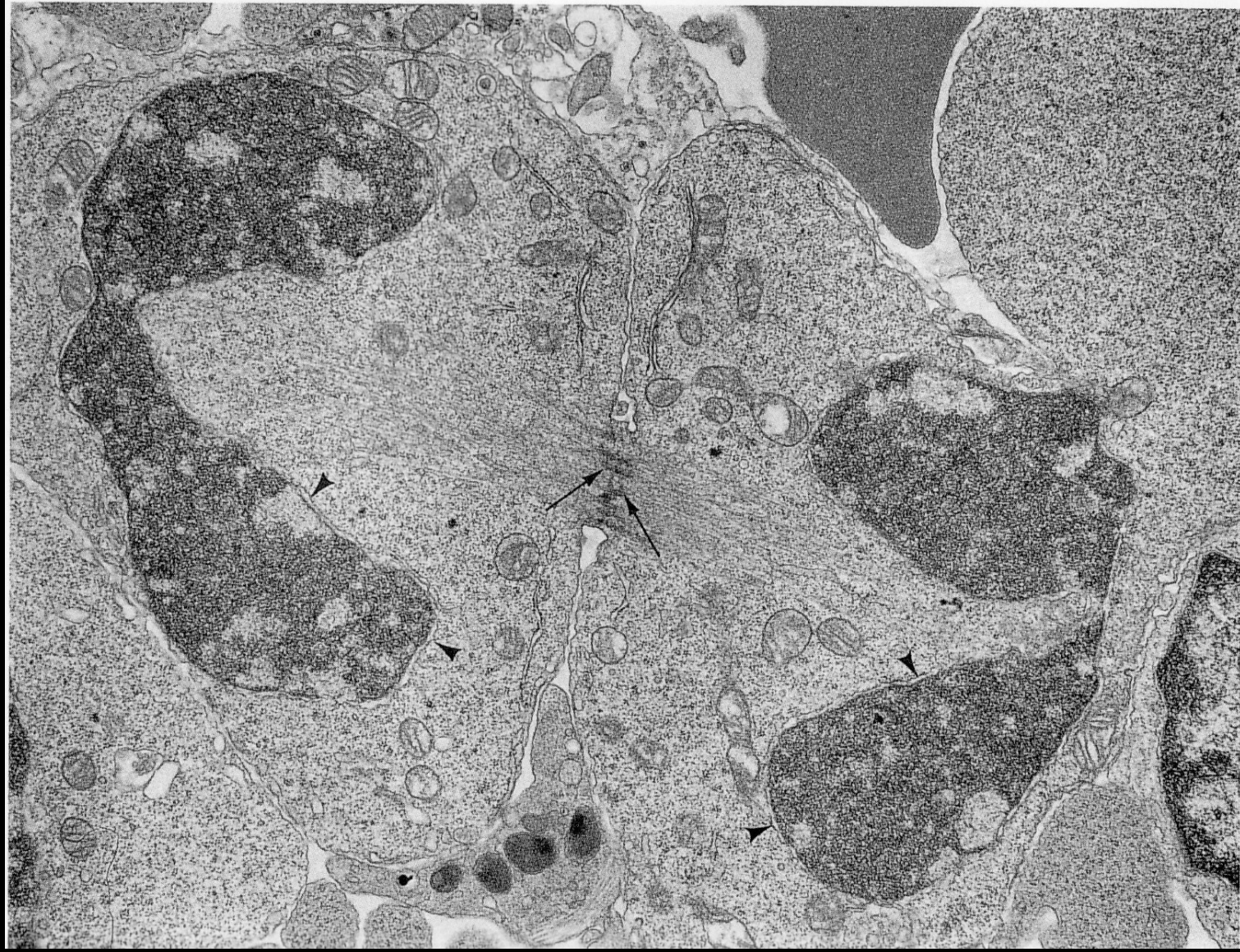
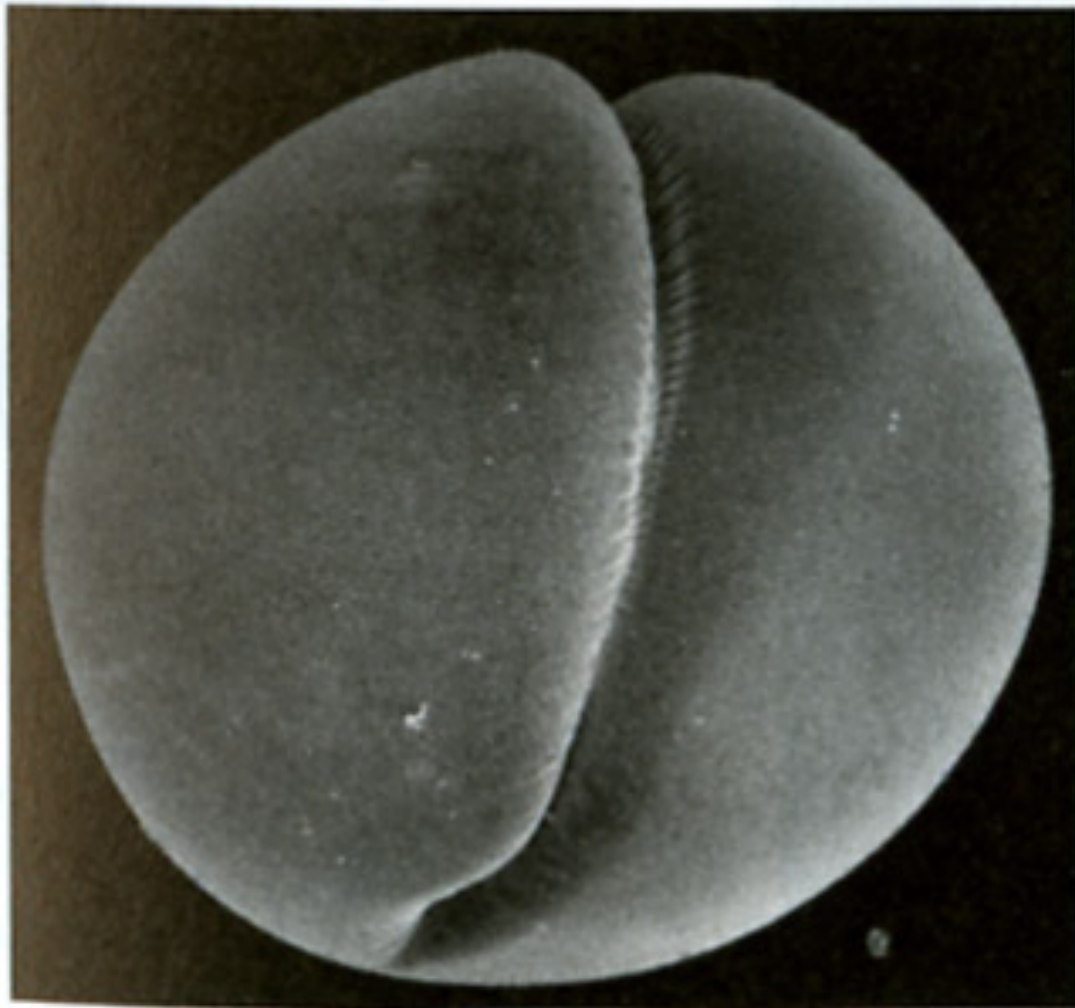


Fig. 3. (A to H) Fluorescence micrographs of mitosis in fixed newt lung cells stained with antibodies to reveal the microtubules (green), and with a dye (Hoechst 33342) to reveal the chromosomes (blue). The spindle forms as the separating astral MT arrays, associated with each centrosome (A to C), interact with the chromosomes. Once the chromosomes are segregated into daughter nuclei (F and G), new MT-based structures known as stem-bodies form between the new nuclei (G). These play a role in cytokinesis (H). Compare with Fig. 1.

CARACTERISTIQUES CELLULAIRES
DES DIVISIONS CELLULAIRES :
la cytotdiérèse = cytokinèse



MIC. : 26 400X



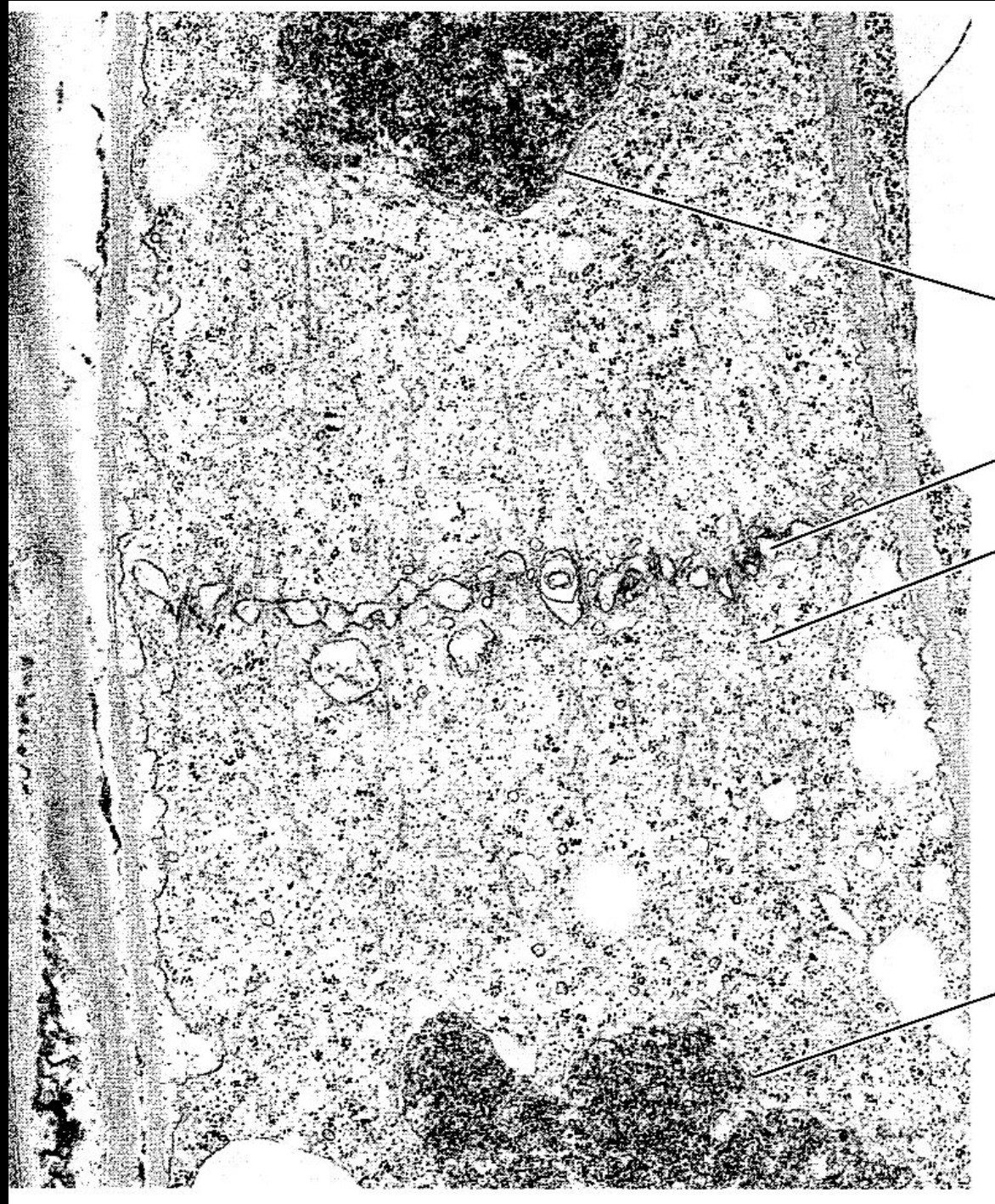
(A)

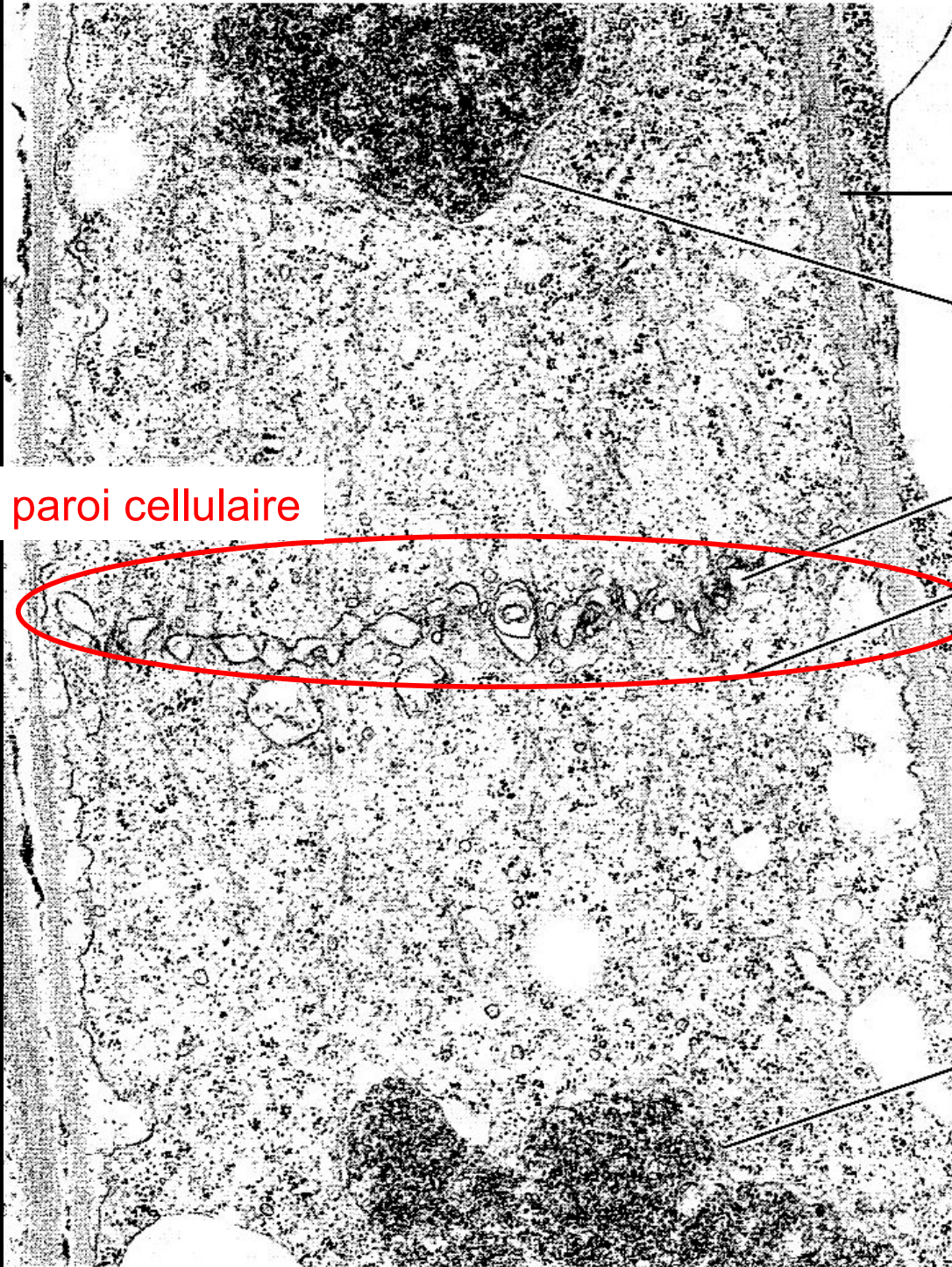
200 μm



(B)

25 μm





paroi

Noyau

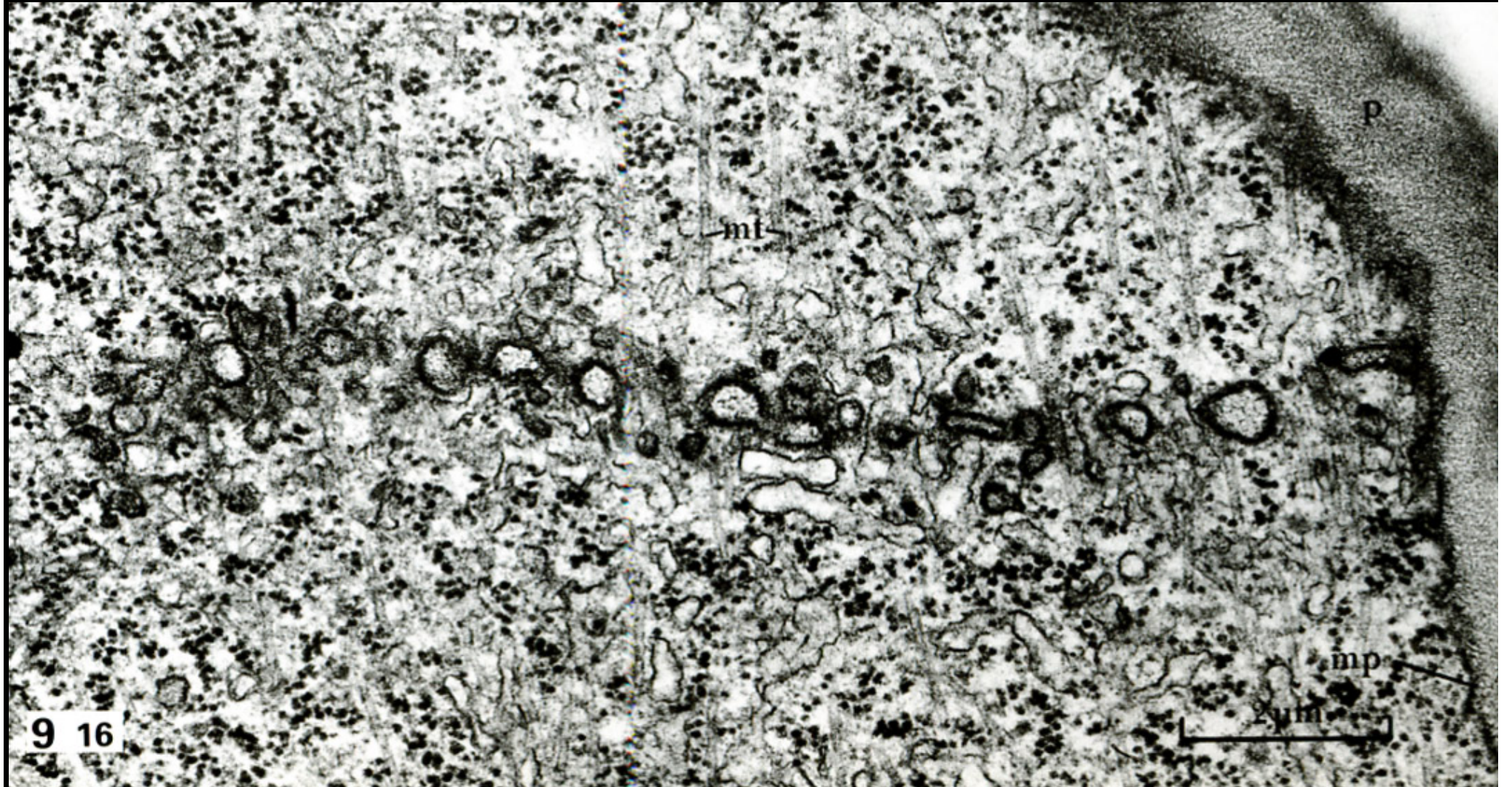
Vésicules
golgiennes

Microtubule

phragmoplaste

Noyau

Future paroi cellulaire



Phase G₂

Télophase

Cytocinèse

Phase G₁

