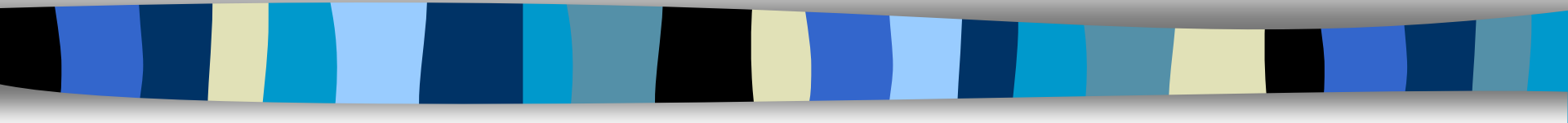


# 植物細胞 (Plant Cell)



# Plant cell

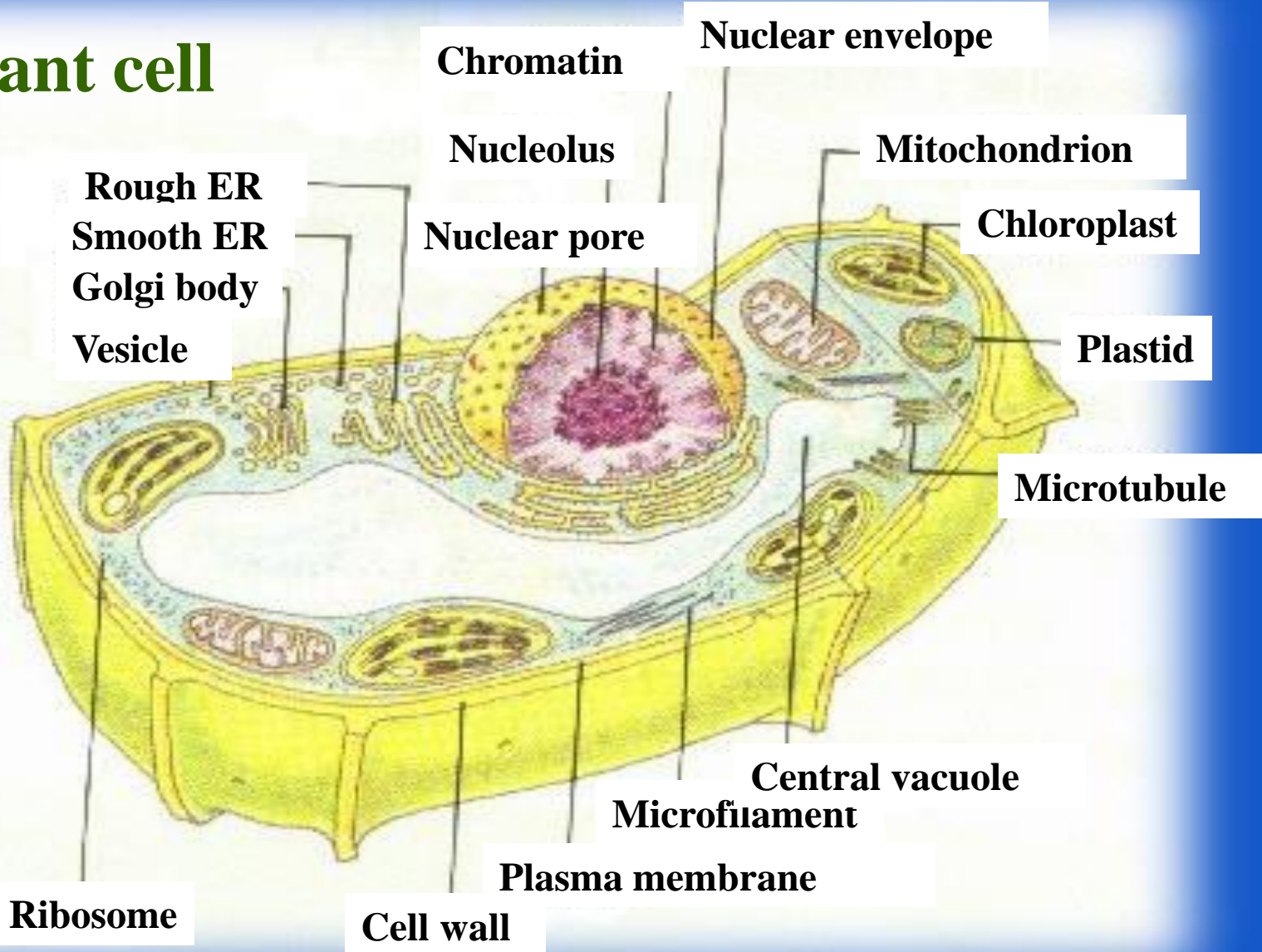


Table 2-1 An Inventory of Plant Cell Components

Cell wall	Middle lamella Primary wall Secondary wall Plasmodesmata	
Protoplast	Nucleus	Nuclear envelope Nucleoplasm Chromatin Nucleolus
	Cytoplasm	Ground substance Organelles bounded by two membranes: Plastids Mitochondria Organelles bounded by one membrane: Microbodies Vacuoles (tonoplast) Endomembrane system Endoplasmic reticulum Dictyosomes Vesicles Plasma membrane Cytoskeleton Microtubules Actin filaments Ribosomes
.....		
Ergastic substances*	Crystals Anthocyanins Starch grains Tannins Fats, oils, and waxes Protein bodies	



## 實驗材料(Materials )

- Leaf of *Egeria densa* (水蘊草)
- Leaf of *Rhoeo discolor* (紫背萬年青)
- Scale leaf and root of *Allium cepa* (洋蔥)
- Fruit of *Lycopersicon esculentum* (番茄)
- Fruit of *Capsicum annuum* (辣椒)
- Tuber of *Solanum tuberosum* (馬鈴薯)
- Endosperm of *Oryza sativa* (稻米)
- Pulp of *Musa sapientum* (香蕉)
- Leaf of *Ficus elastica* (印度橡膠樹)
- Stem of *Tradescantia virginiana* (紫鴨跖草)
- Petiole of *Begonia* sp. (秋海棠)
- Solutions

Salt water / Methylene blue/ Iodine solution

0.02% Eosin solution/ 0.01% Neutral red

# 實驗方法

## ■ 綠色植物細胞 (Green plant cells)

取水蘊草的嫩葉一片(2-3層cell)，置於載玻片上，加一滴水，蓋上蓋玻片，於顯微鏡下觀察。

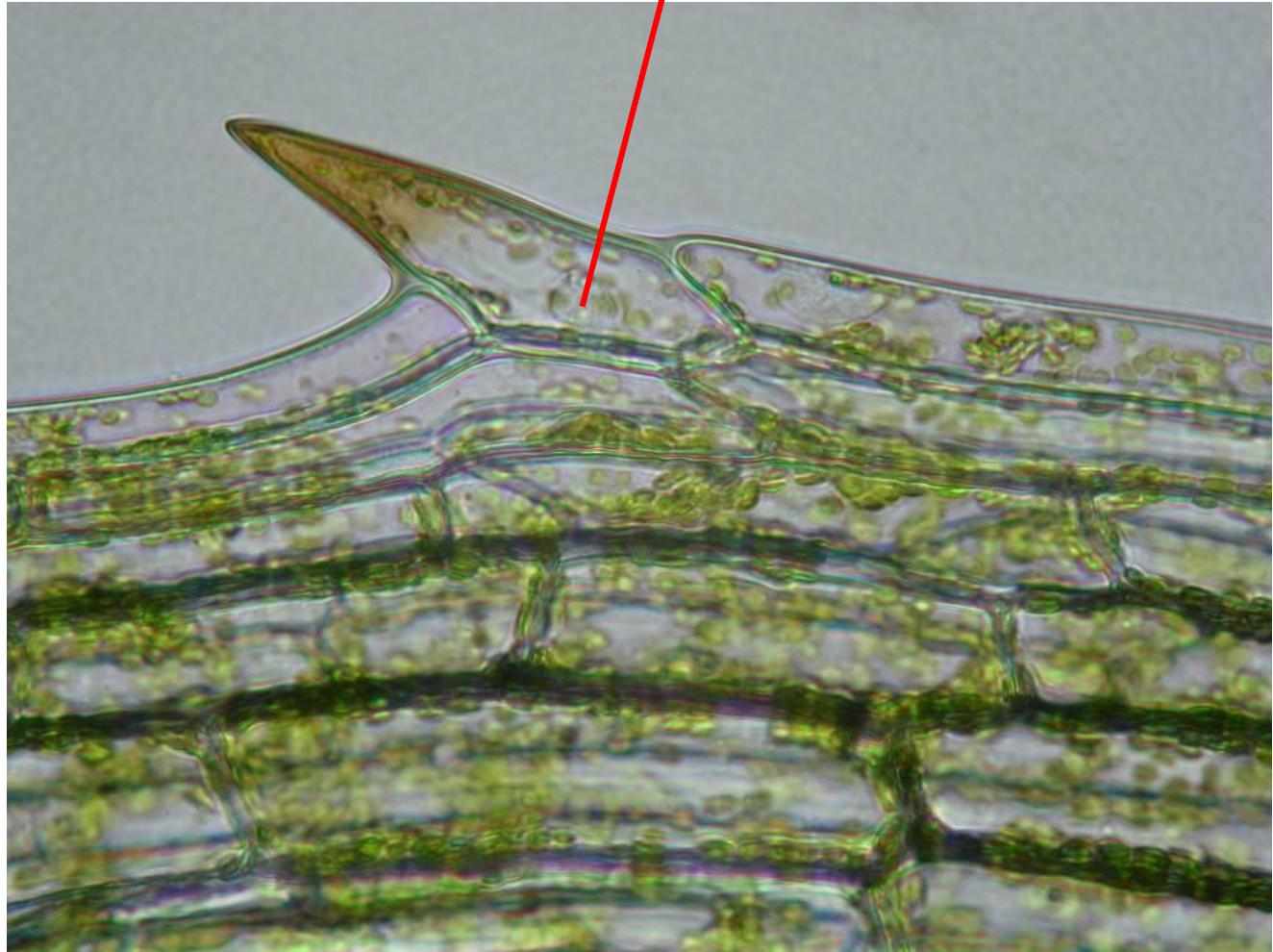
1. 細胞形狀及排列方式。
2. 葉片邊緣的細胞與葉片中間的細胞之差異。
3. 細胞壁、細胞質、葉綠體、細胞核及液胞。
4. 細胞質迴流(cytoplasmic streaming)。





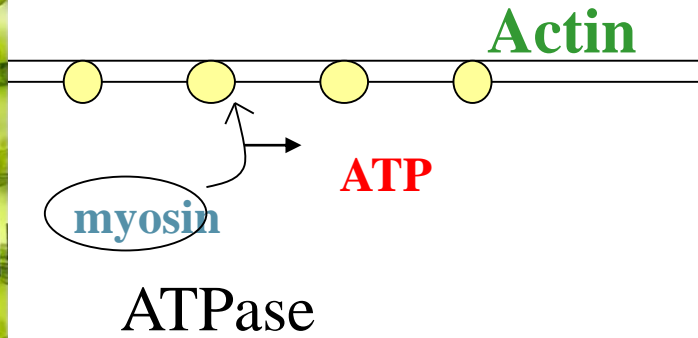
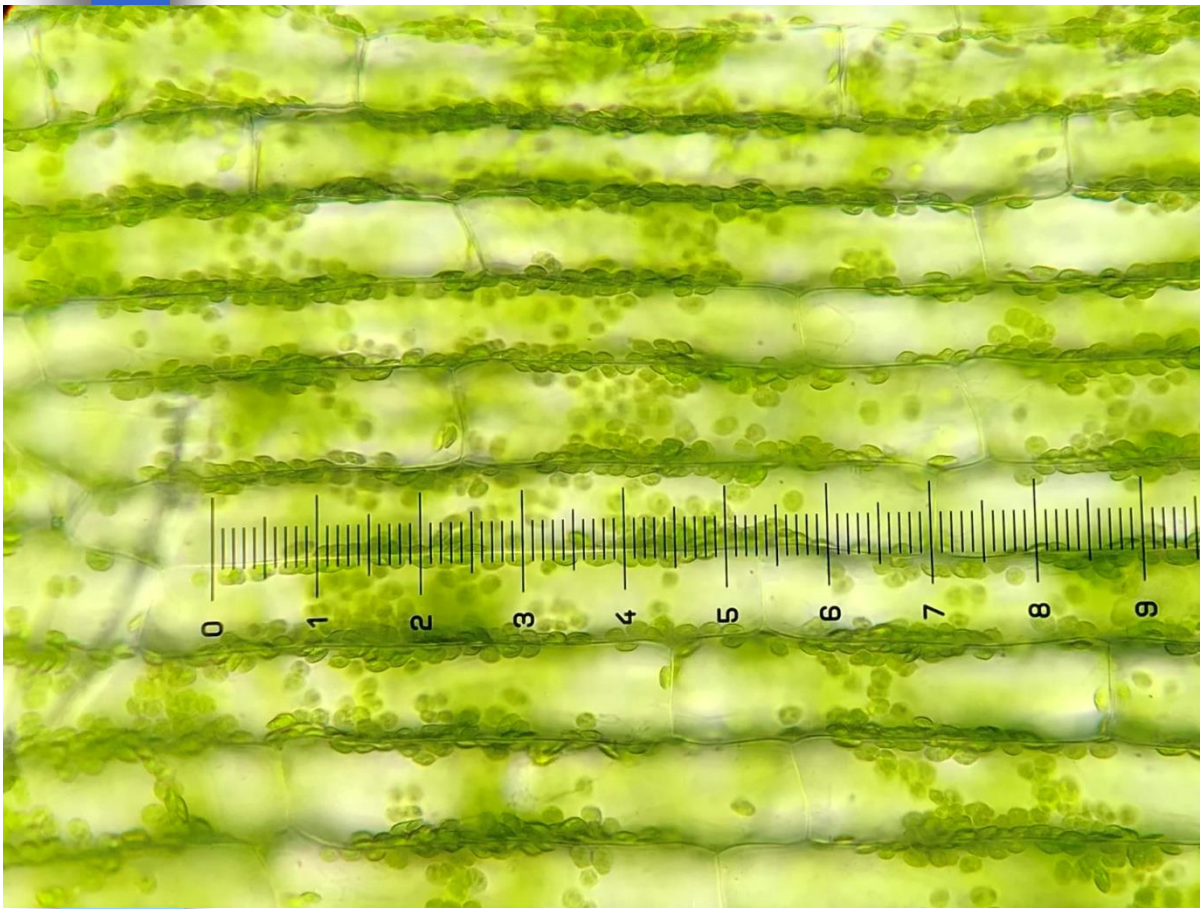
# 水蘊草 (*Egeria densa*)

Nucleus



水蘊草之葉緣尖細胞

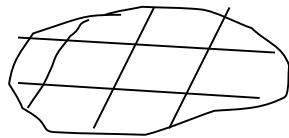
# cytoplasmic streaming



## ■ 非綠色植物細胞(Non-green plant cells)

載玻片上，先滴上一滴水，再取一小片洋蔥鱗葉的**內表皮**(**撕裂面朝下**)，上蓋玻片，於顯微鏡下觀察。

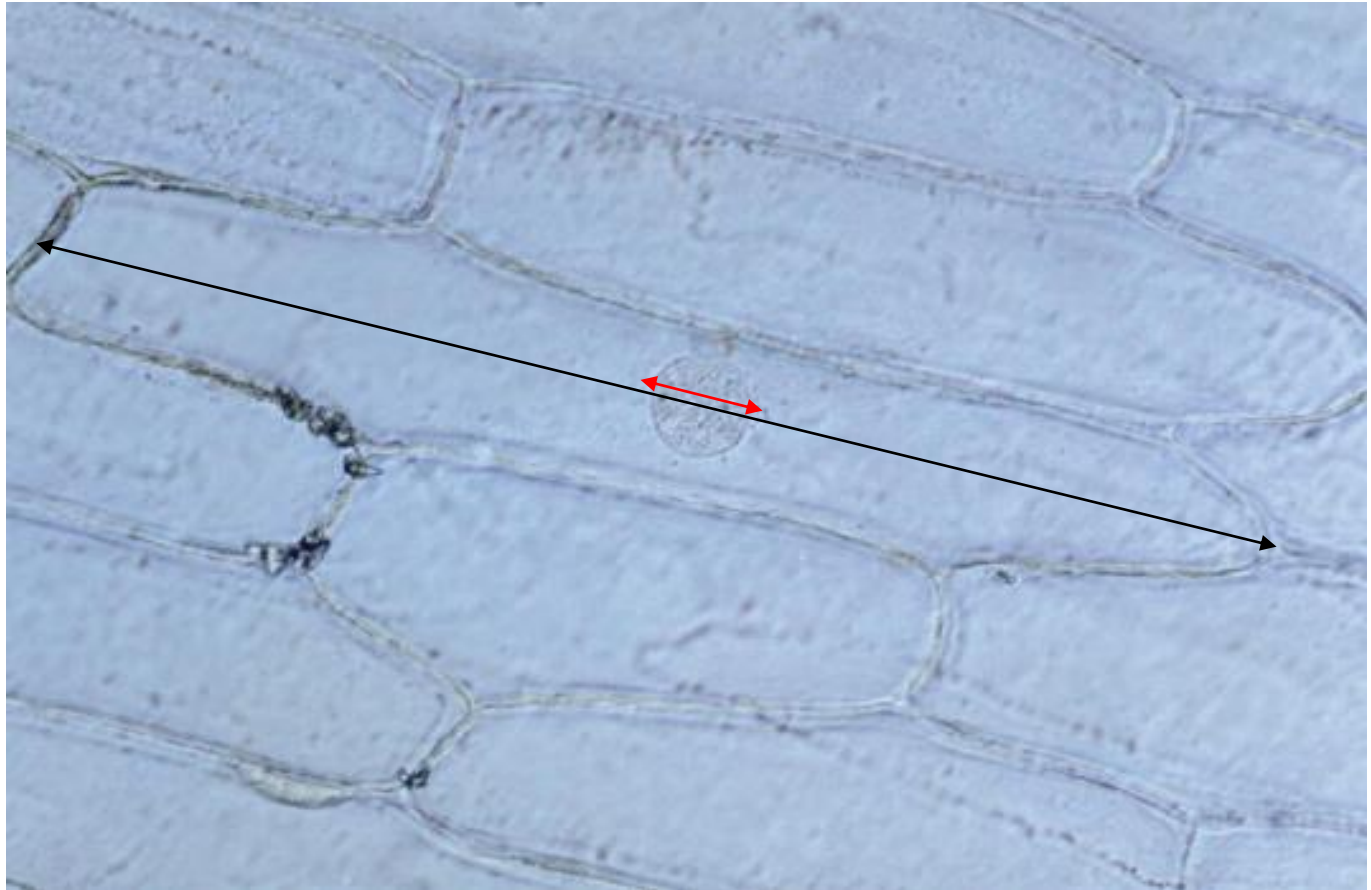
1. 細胞形狀及排列方式。
2. 半透明的細胞壁，灰色的細胞質，液胞及細胞核。
3. 細胞內有無色素體(plastids)? (**特指葉綠體**)
4. 再以亞甲基藍染色，觀察細胞中哪一部份經染色後更為清楚。





# 洋蔥鱗葉內表皮細胞

(the inner epidermis of *Allium cepa* )



# 染劑的染色部位

\*活體染色(vital staining)-材料新鮮效果佳

- 0.01% neutral red→vacuole

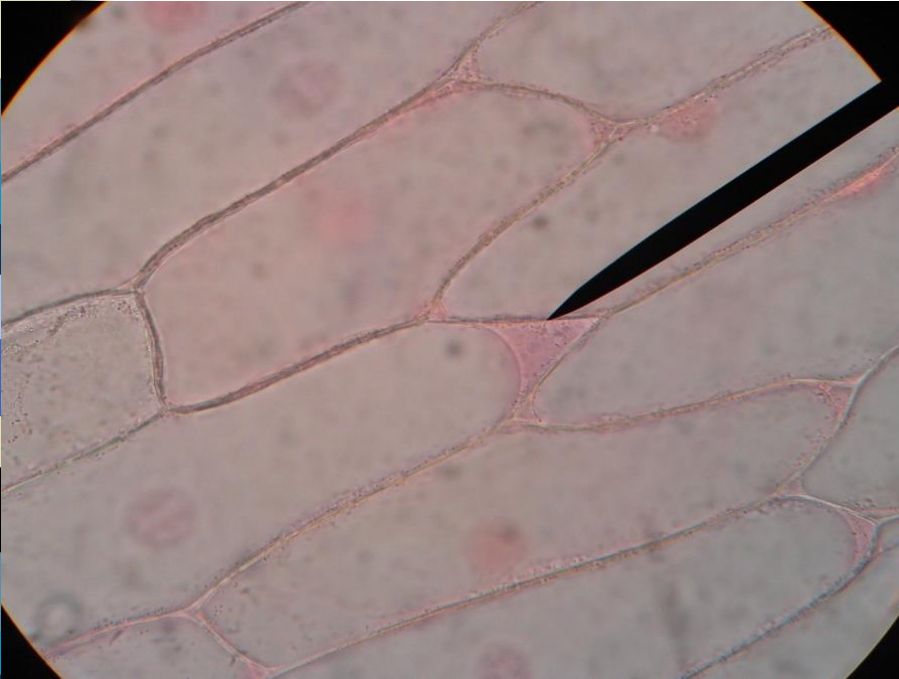
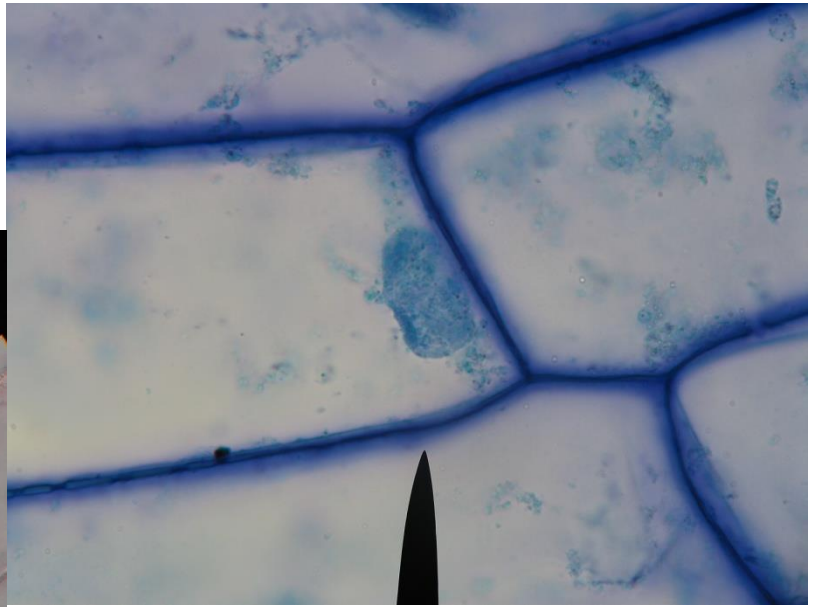
- 0.02% eosin→ cytoplasm

- 1.先滴一滴 0.01% Neutral red或 0.02% Eosin Solution於載玻片上

- 2.再取一小片洋蔥鱗葉的內表皮(撕裂面朝下) , 蓋上玻片, 靜置10-15分鐘中(即可觀察)

- methylene blue→nucleus

methylene blue先染5分鐘再要換置成distilled water觀察



## ■ 細胞質離(plasmolysis)

1. 取兩片載玻片上，一片滴上一滴水，另一片滴上一滴鹽水
2. 各取一片紫背萬年青葉片下表皮貼上(撕裂面朝下)，蓋上蓋玻片，於顯微鏡下觀察。

### 紫背萬年青(*Rhoeo discolor*)葉片



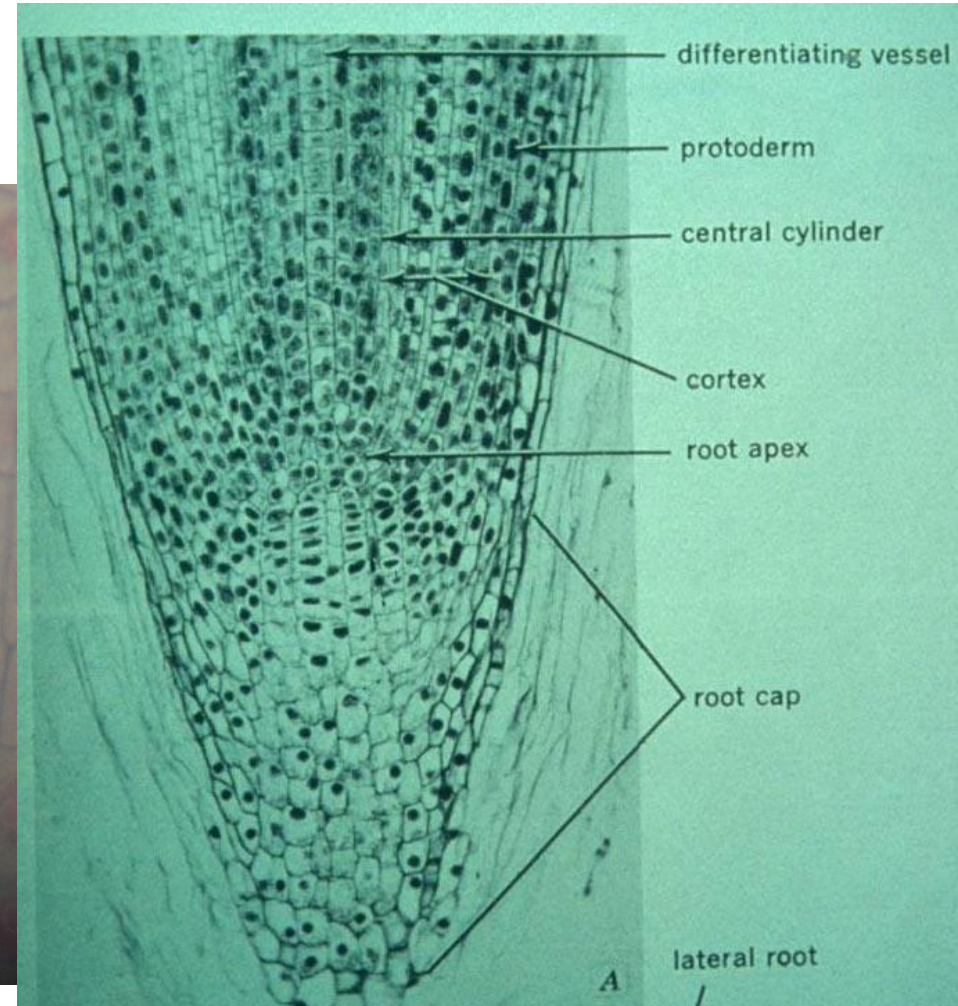
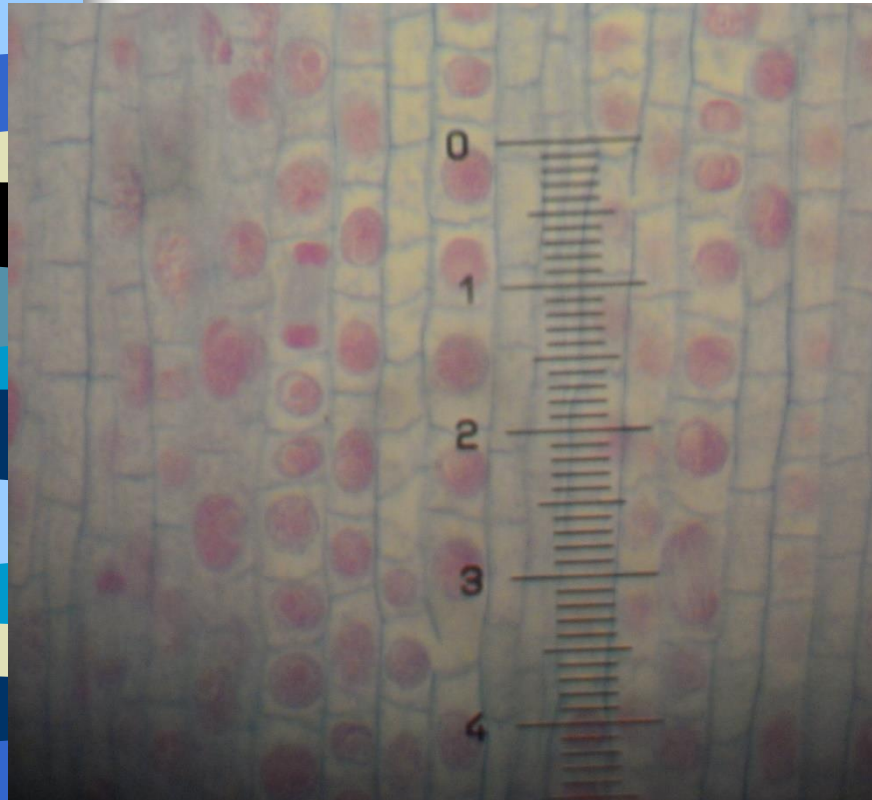


# 紫背萬年青葉下表皮之細胞質離現象



# 根尖細胞(root tip cell)

- 洋蔥根尖縱切面永久片
- 觀察細胞內之構造

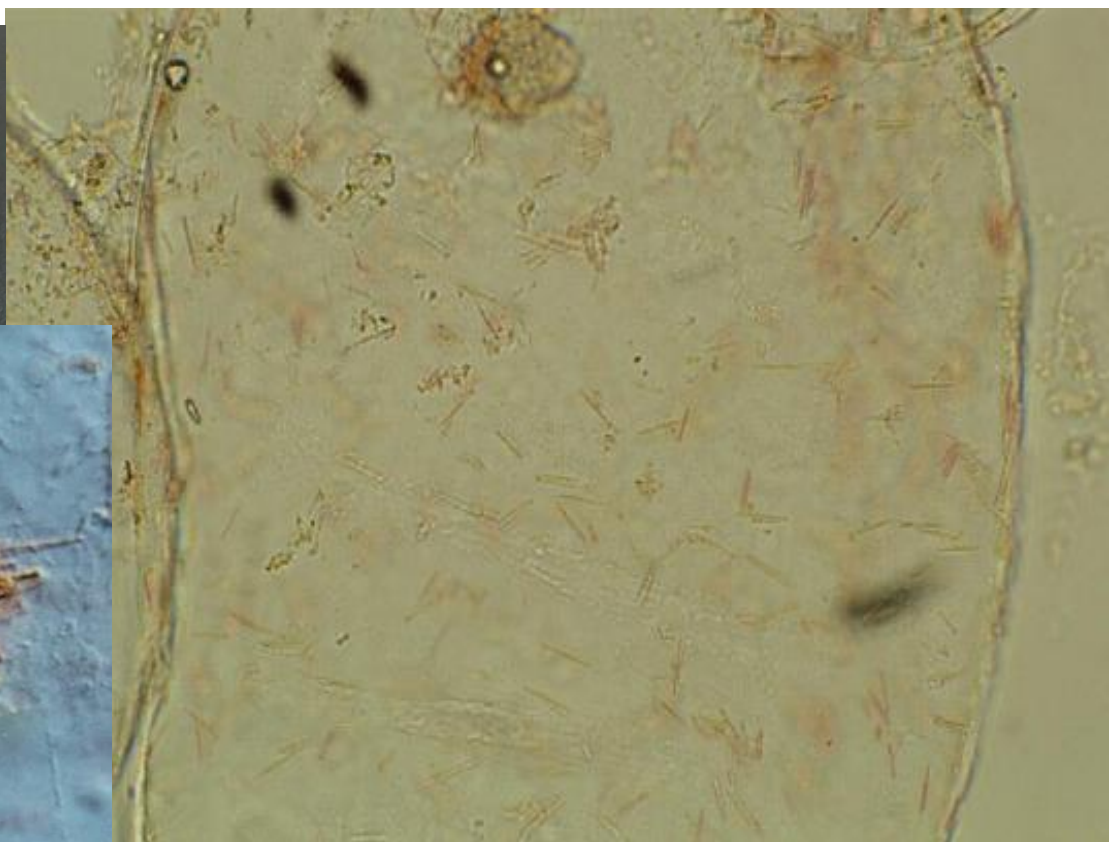


## ■ 細胞中之雜色體 (chromoplast)

取成熟之蕃茄果實細胞少許，置於載玻片上，加一滴水，蓋上蓋玻片，於顯微鏡下觀察。

1. 果肉細胞的形狀。蕃茄 (*Lycopersicon esculentum*)

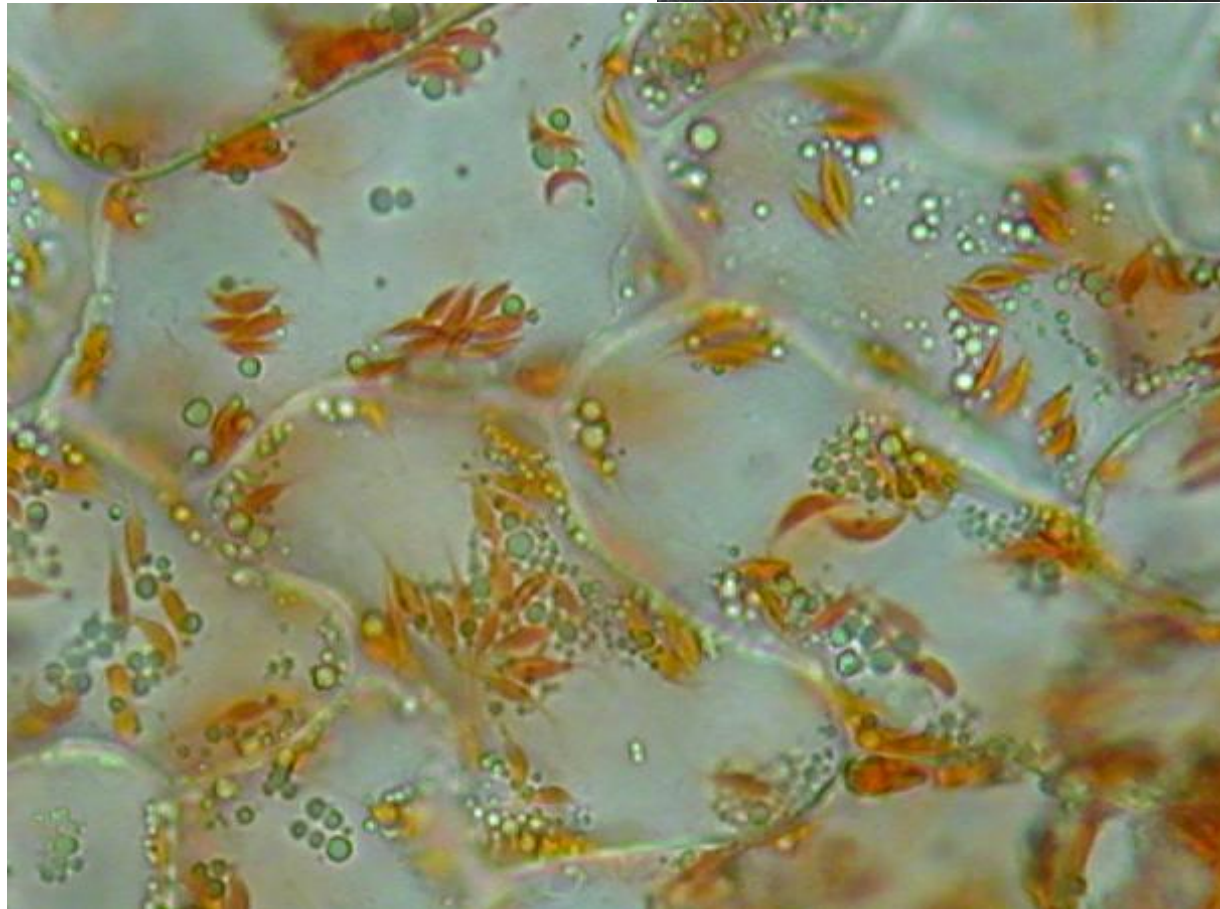
2. 雜色體





雜色體 (chromoplast) :

辣椒 (*Capsicum frutescens*)







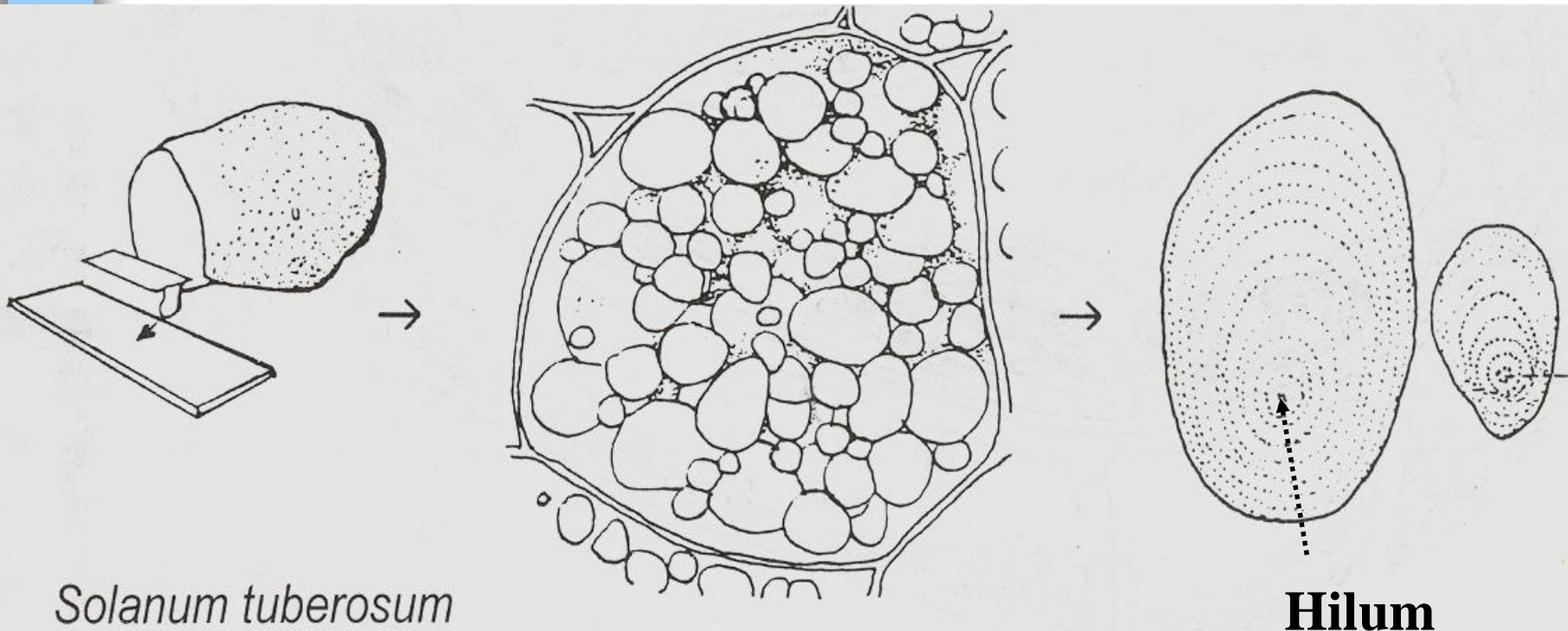
## ■ 細胞的後生物質(ergastic substance)

### (A)澱粉粒(starch grains)

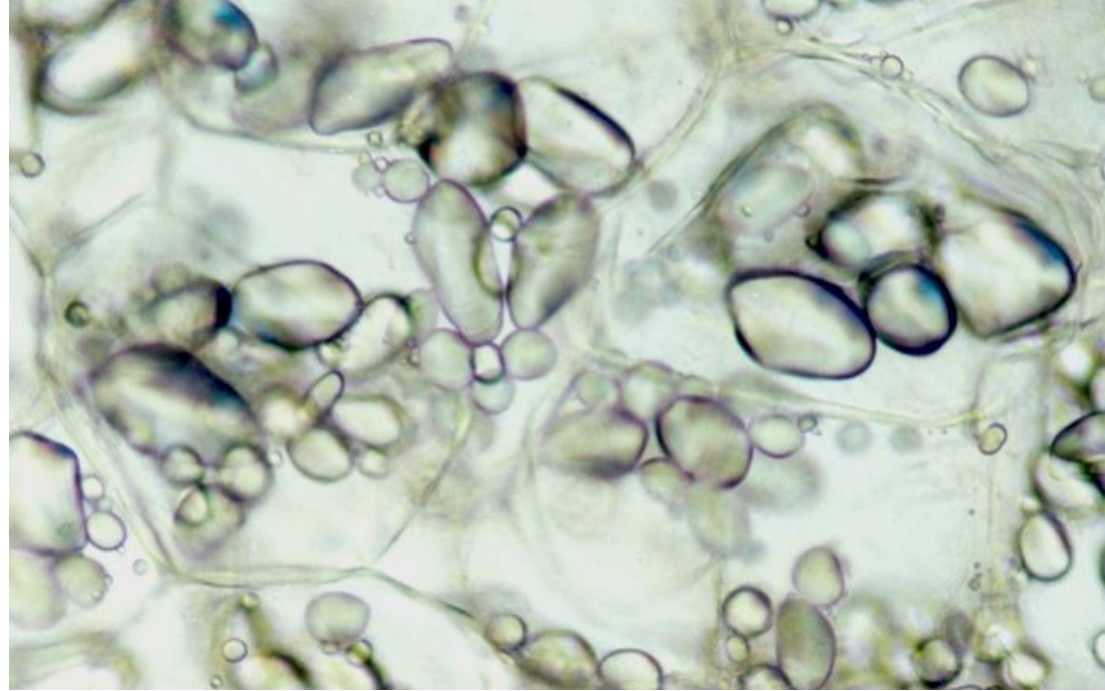
以**專用**鑷子取少許(**愈少愈好**)馬鈴薯塊莖、稻米胚乳及香蕉果肉，分別置於載玻片上，加一滴水，蓋上蓋玻片，於顯微鏡下觀察。

1. 不同植物體內，澱粉粒的形狀是否相同？
2. 加一滴碘液在蓋玻片下，有何變化？

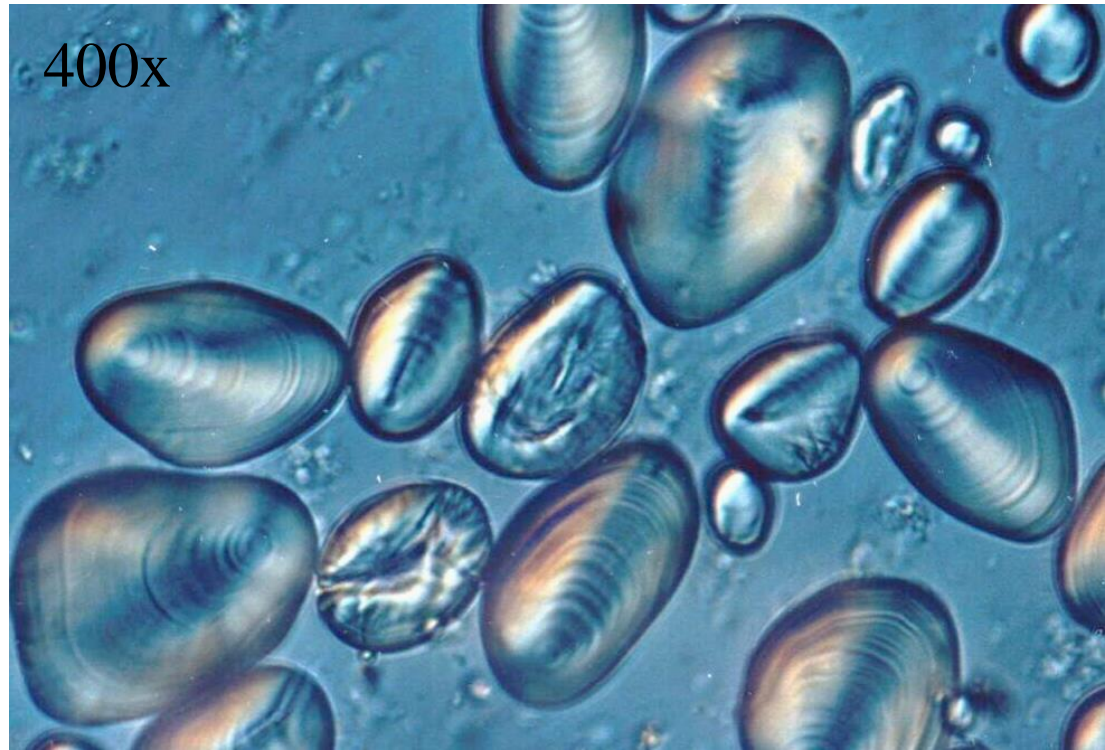
澱粉粒 (starch grains) :  
馬鈴薯  
(*Solanum tuberosum*)  
- 塊莖 (tuber)



馬鈴薯的塊莖的  
切片

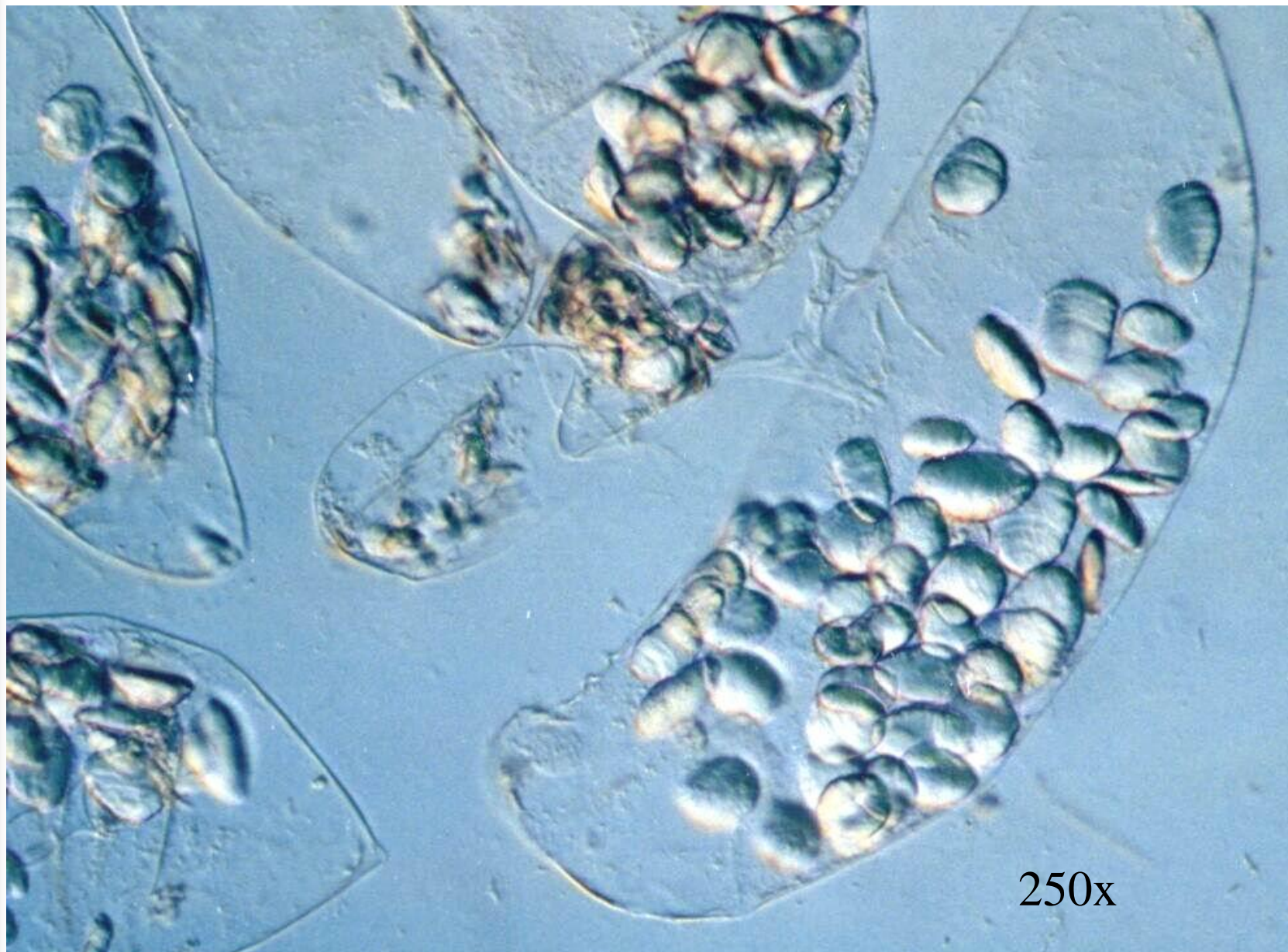


馬鈴薯的澱粉粒





澱粉粒 (starch grains) : 香蕉 (*Musa sapientum*) 的果肉



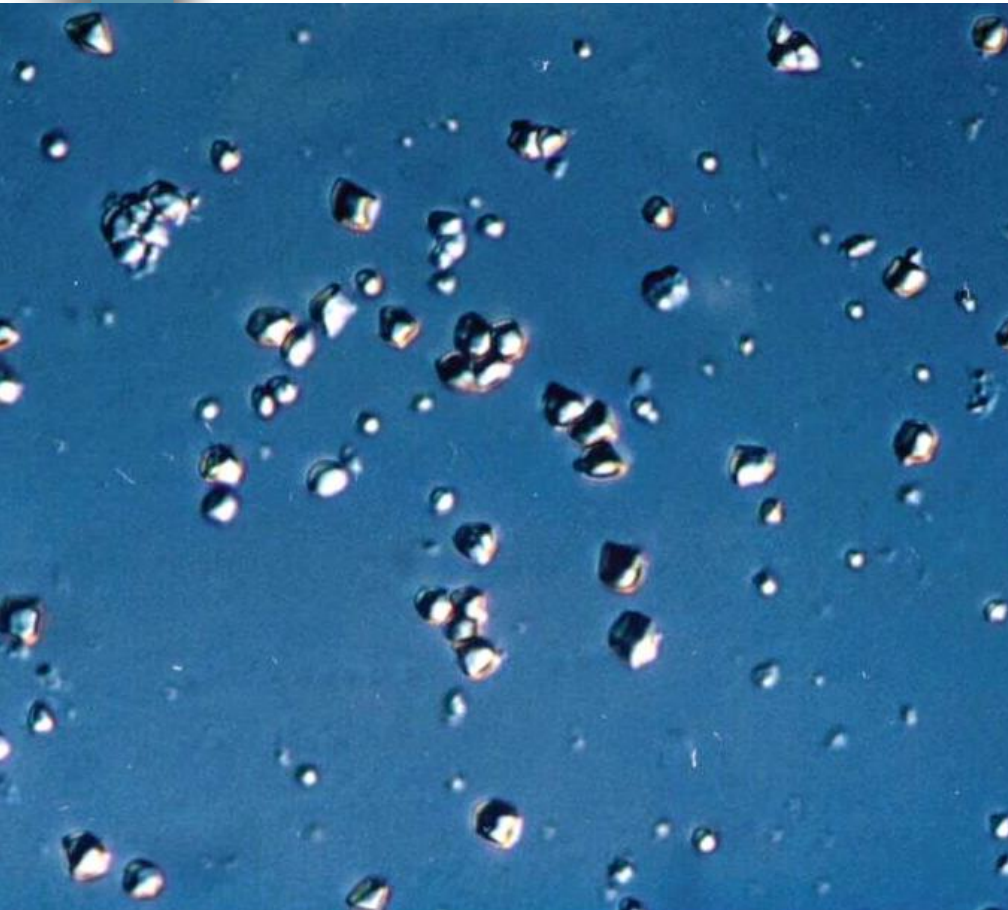




400x



澱粉粒 (starch grains) : 稻米 (*Oryza sativa*)的胚乳



400x

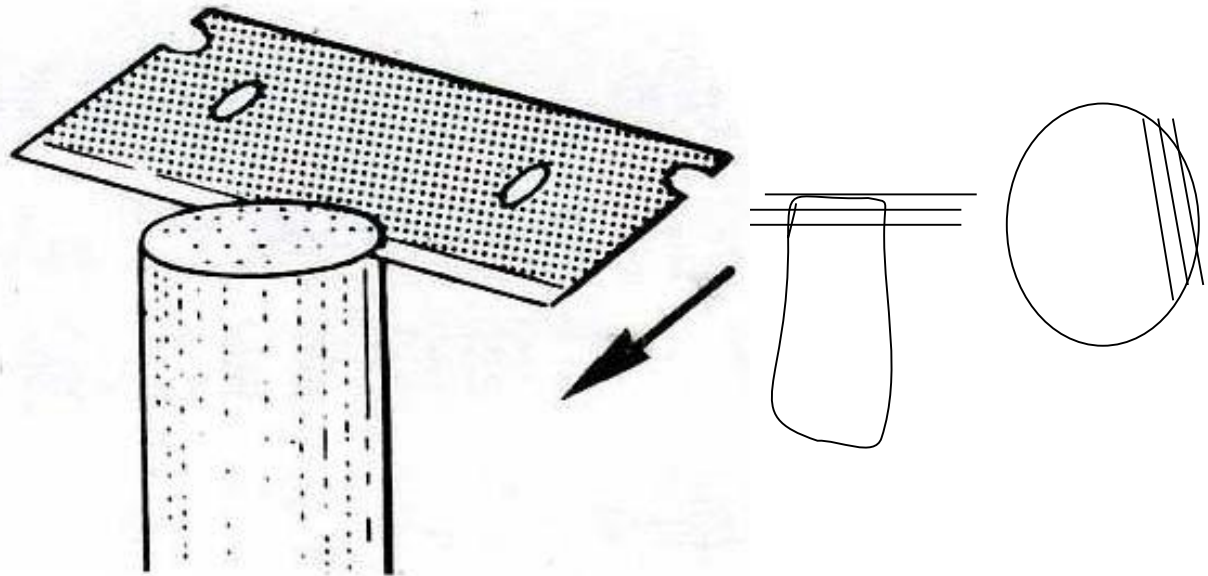


1000x

## ■ (B)結晶體(crystals)

將印度橡膠葉、紫鴨跖草的莖或秋海棠葉柄的橫切面切片(徒手切片-Free Hand Section)，分別置於載玻片上，加一滴水，蓋上蓋玻片，於顯微鏡下觀察。

- 1.觀察各種結晶體的型態。
- 2.含結晶體的細胞與鄰近的細胞大小及形狀是否相同？
- 3.各結晶體的成分為何？



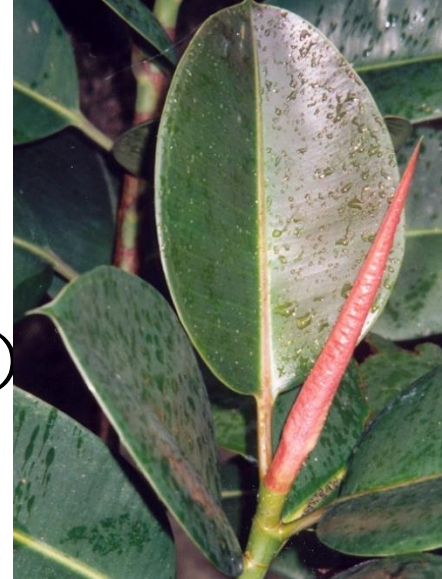


# 結晶 (crystals) :

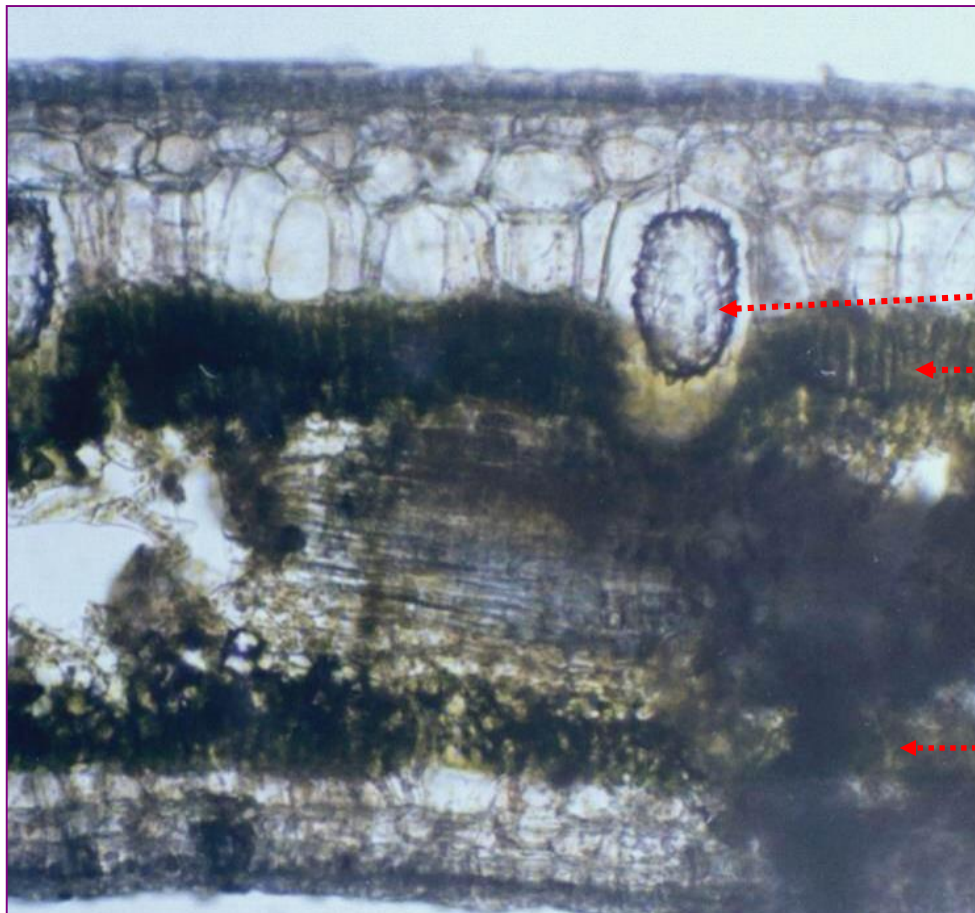
印度橡膠 (*Ficus elastica*)

葉片 (leaf)

鍾乳狀結晶 (cystolith) ( Calcium carbonate )



Lithocyst



Epidermis

Cystolith

Palisade tissue

Spongy tissue

Palisade tissue

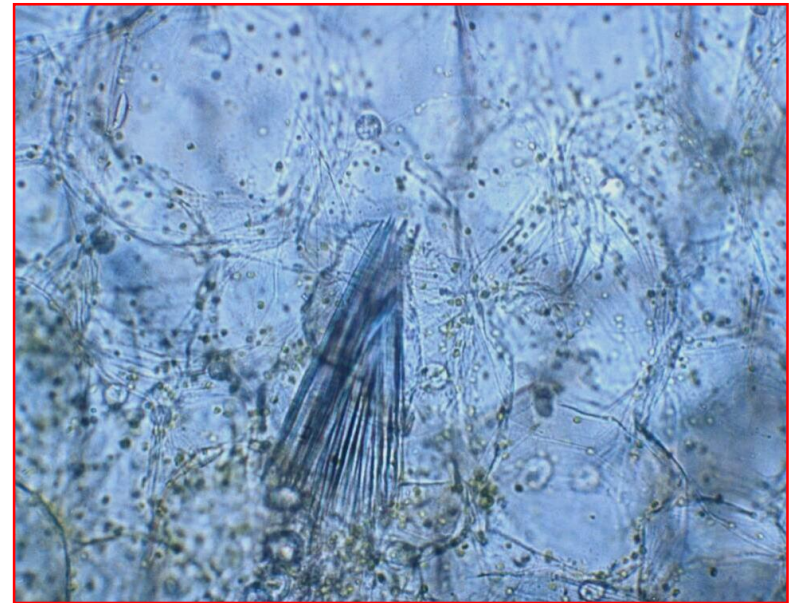
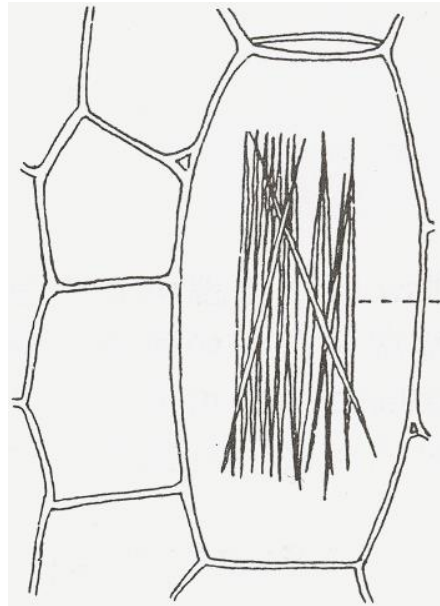
Epidermis

250x 印度橡膠的葉片橫切



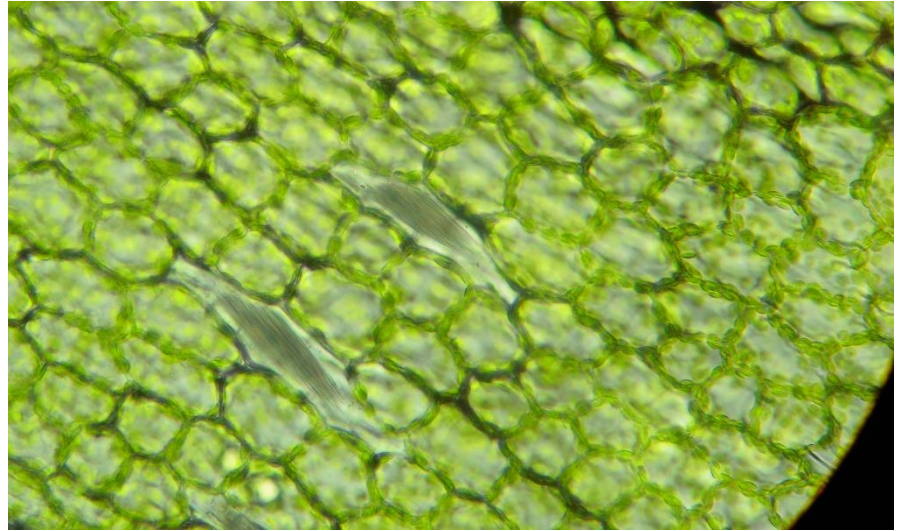
## 結晶 (crystals) :

- 紫鴨跖草 (*Tradescantia virginiana*)
- 莖 (stem)
- 針狀結晶 (raphides)  
(Calcium oxalate)



## 結晶 (crystals) :

- 品萍 (*Lemna trisulca* L.)
- 葉片 (leaf)
- 針狀結晶 (raphides)  
(Calcium oxalate)





## 結晶 (crystals) :

秋海棠 (*Begonia* sp.)

- 葉柄 (petiole)
- 晶簇狀結晶 (druse)
- 多面體形結晶 (prismatic crystal) (Calcium oxalate)

