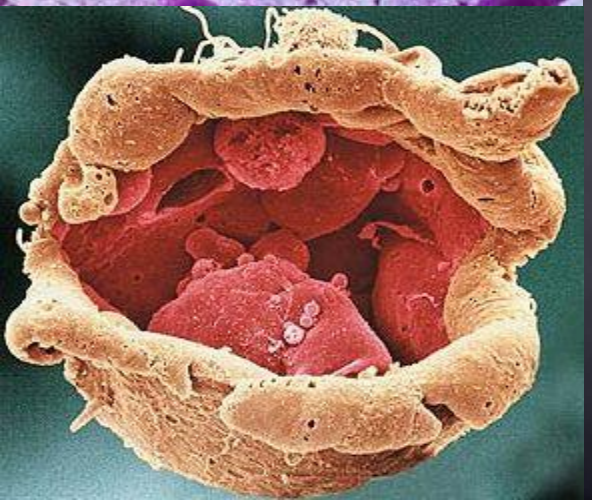


Diversidade e Unidade Biológica

Módulo A1

A CÉLULA – unidade estrutural e funcional dos seres vivos

CONHECIMENTO DA CÉLULA

Conhecimento da Célula

- O entendimento dos processos biológicos depende do conhecimento da célula enquanto unidade fundamental da Vida.
- As dimensões das células, geralmente muito reduzidas, fizeram com que permanecessem desconhecidas até à invenção do **microscópio**.

Microscópio de Antoni Van Leewenhoek

CONHECIMENTO DA CÉLULA

Primórdios do estudo da célula

1590

Jansen
Inventa o microscópio composto

Anton van Leeuwenhoek
Observa bactérias, pela primeira vez, designando-as por *animálculos*

1676

1838 - 39

Schleiden e Schwann
Enunciam a *Teoria Celular*

1665

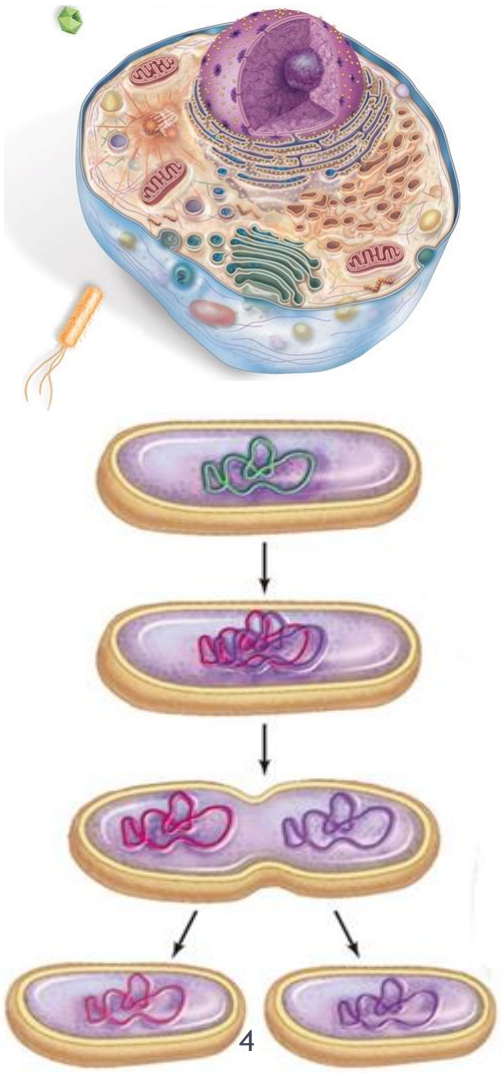
Robert Hooke
Usando um microscópio composto, examinou cortiça e usou o termo "célula" pela primeira vez

CONHECIMENTO DA CÉLULA

Conhecimento da Célula

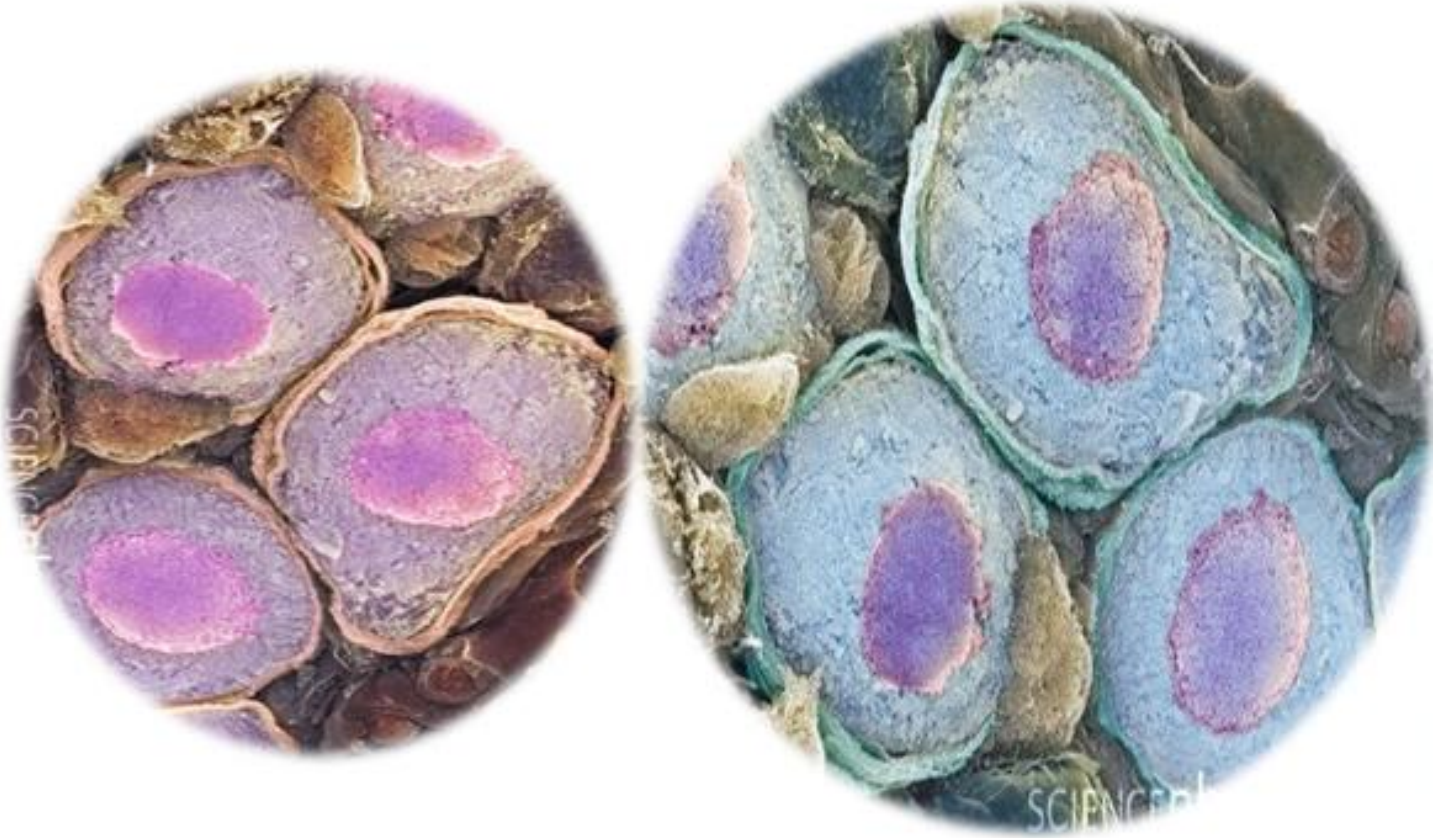
A Teoria Celular, postulada Schleiden e Schwann, assenta nos seguintes pressupostos:

- A célula é a unidade básica estrutural e funcional de todos os seres vivos (isto é, todos os seres vivos são constituídos por células, onde ocorrem os processos vitais);
- Todas as células provêm de células pré-existentes;
- A célula é a unidade de reprodução, de desenvolvimento e de hereditariedade dos seres vivos.



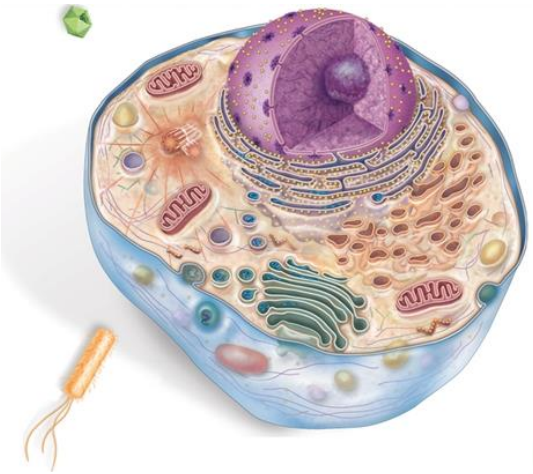
CONHECIMENTO DA CÉLULA

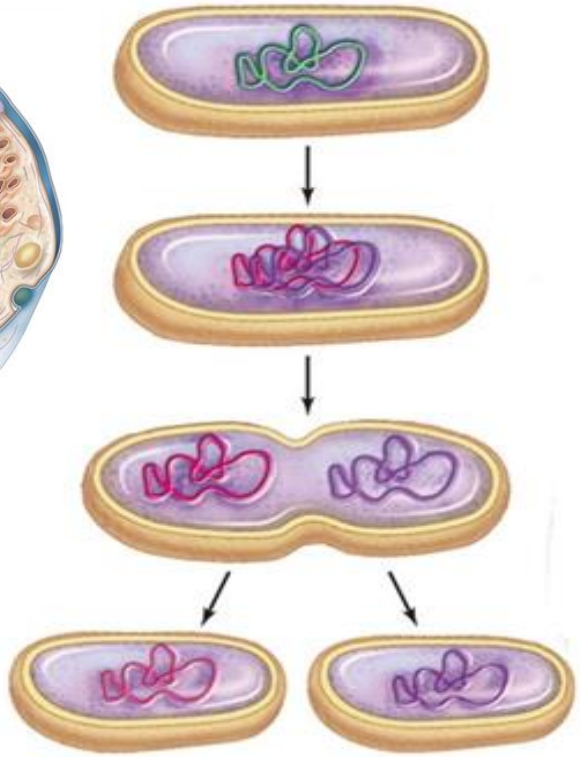
Teoria Celular - Schleiden e Schwann (1918)

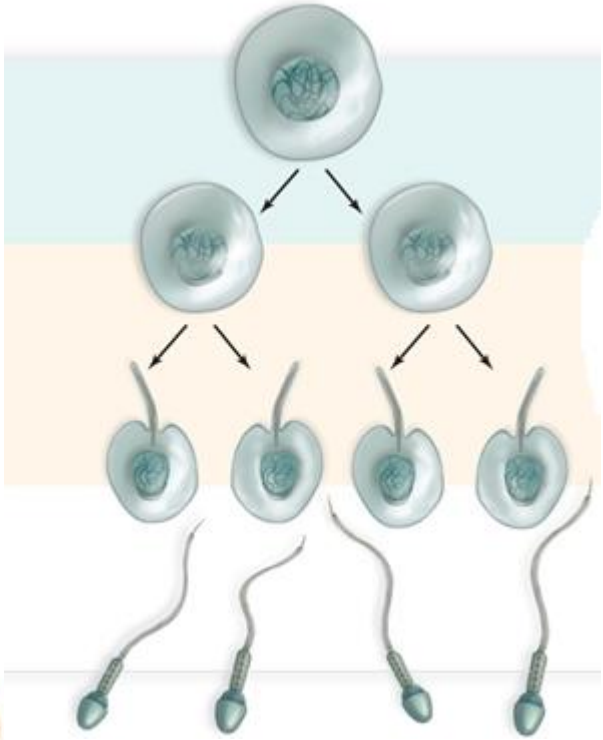


CONHECIMENTO DA CÉLULA

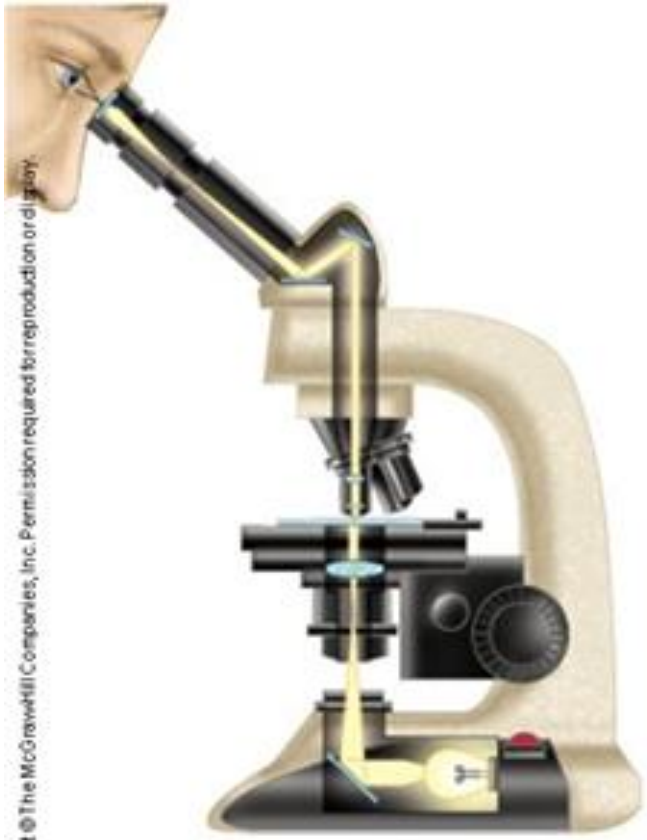
Teoria Celular - Schleiden e Schwann (1918)

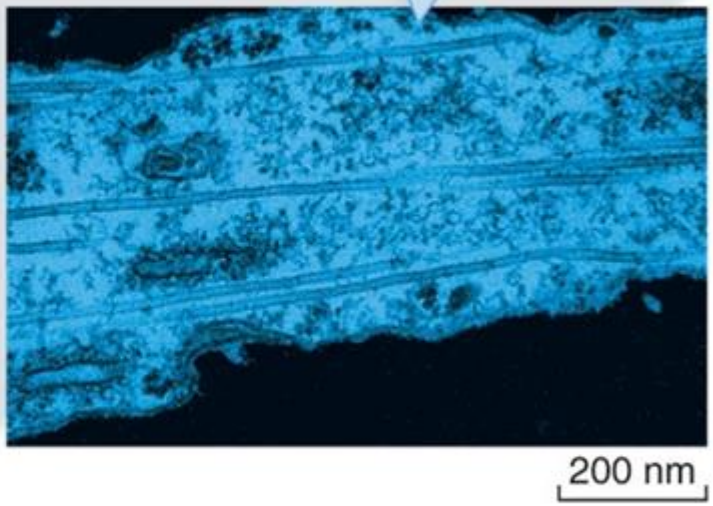






CONHECIMENTO DA CÉLULA

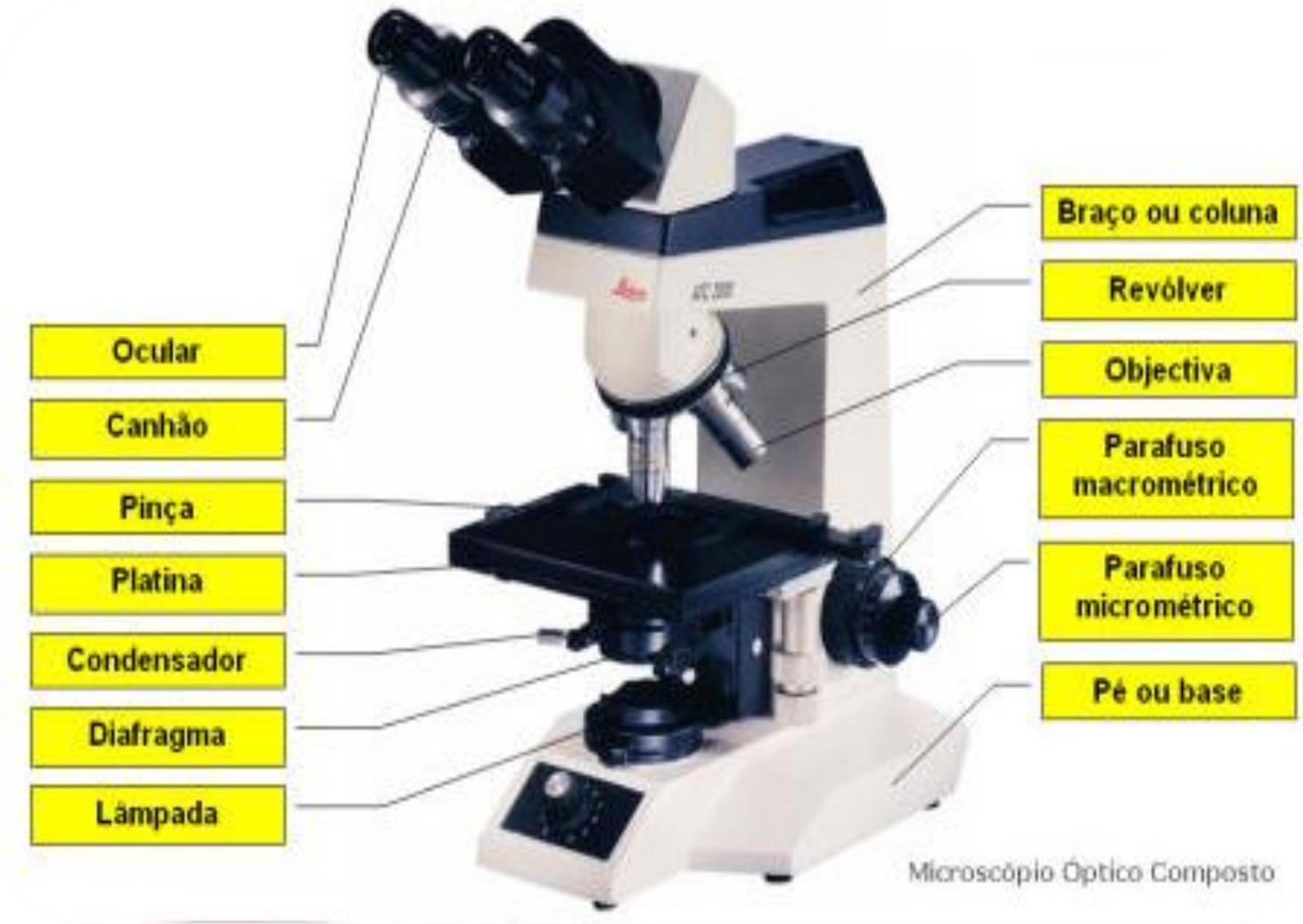




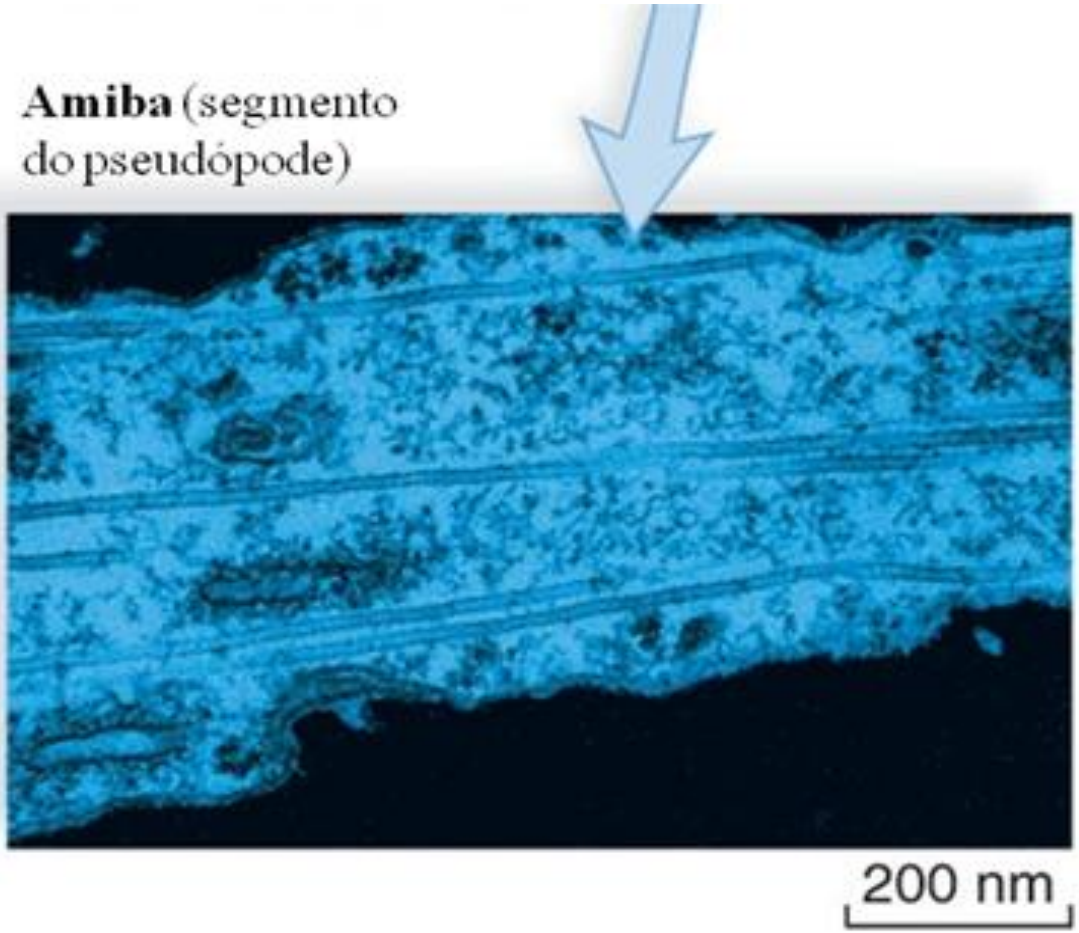
Microscópio Eletrónico de Transmissão

O Microscópio Óptico Composto

CONHECIMENTO DA CÉLULA

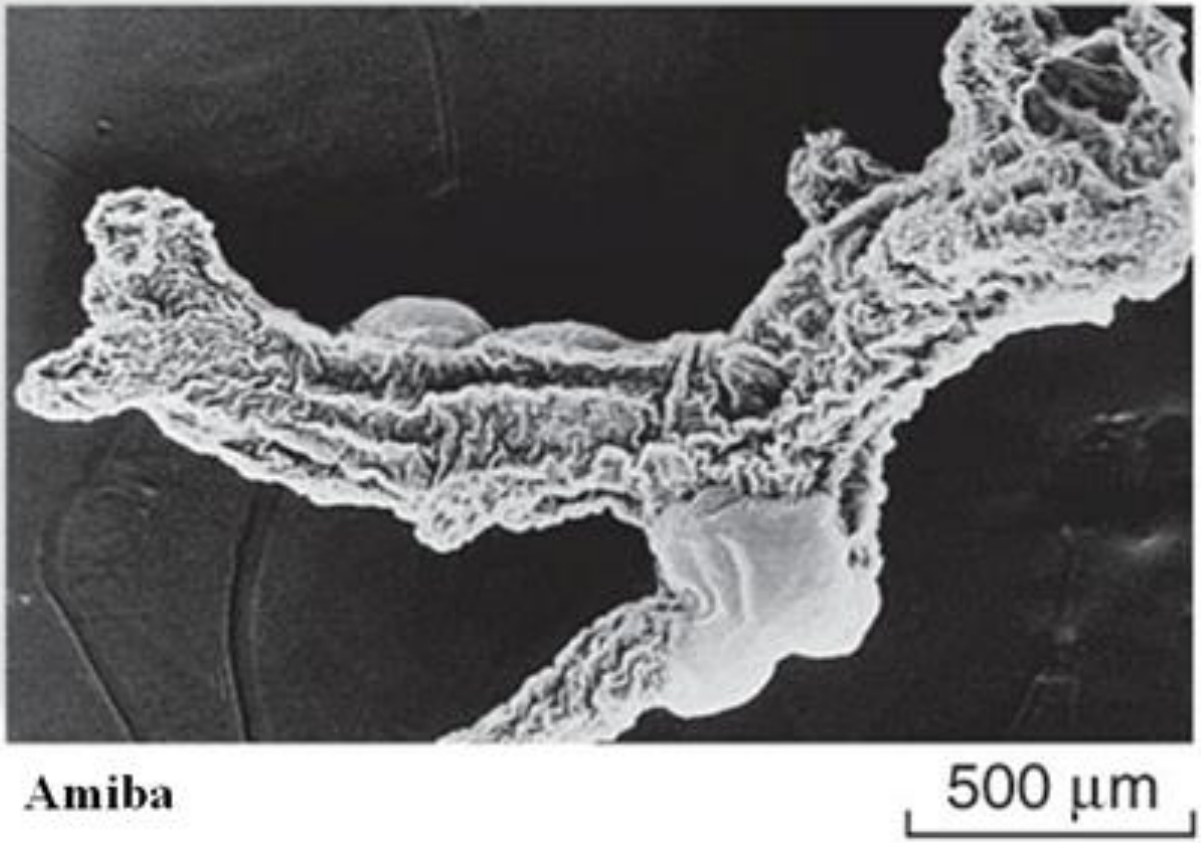


CONHECIMENTO DA CÉLULA



Microscópio Eletrónico de Transmissão

CONHECIMENTO DA CÉLULA



Microscópio Eletrónico de Varrimento

CONHECIMENTO DA CÉLULA

http://www.crie.min-edu.pt/files/@crie/1227874128_legendar_moc.swf

CONHECIMENTO DA CÉLULA

http://www.crie.min-edu.pt/files/@crie/1227874101_explorar_moc.swf

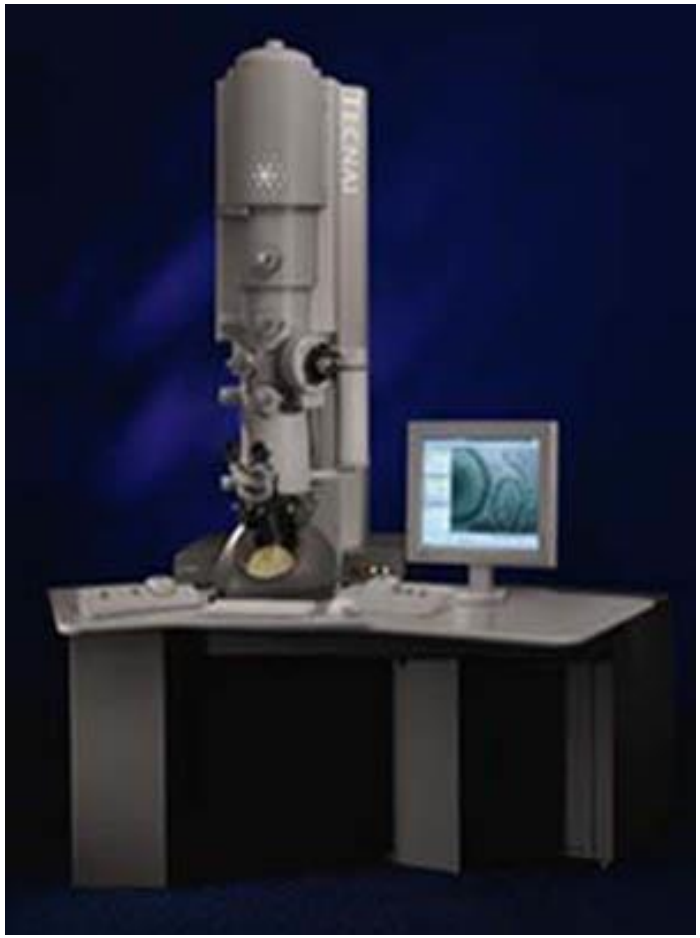
CONHECIMENTO DA CÉLULA

http://www.crie.min-edu.pt/files/@crie/1227874033_associar_moc.swf

CONHECIMENTO DA CÉLULA

http://www.crie.min-edu.pt/files/@crie/1227874072_escolher_moc.swf

CONHECIMENTO DA CÉLULA

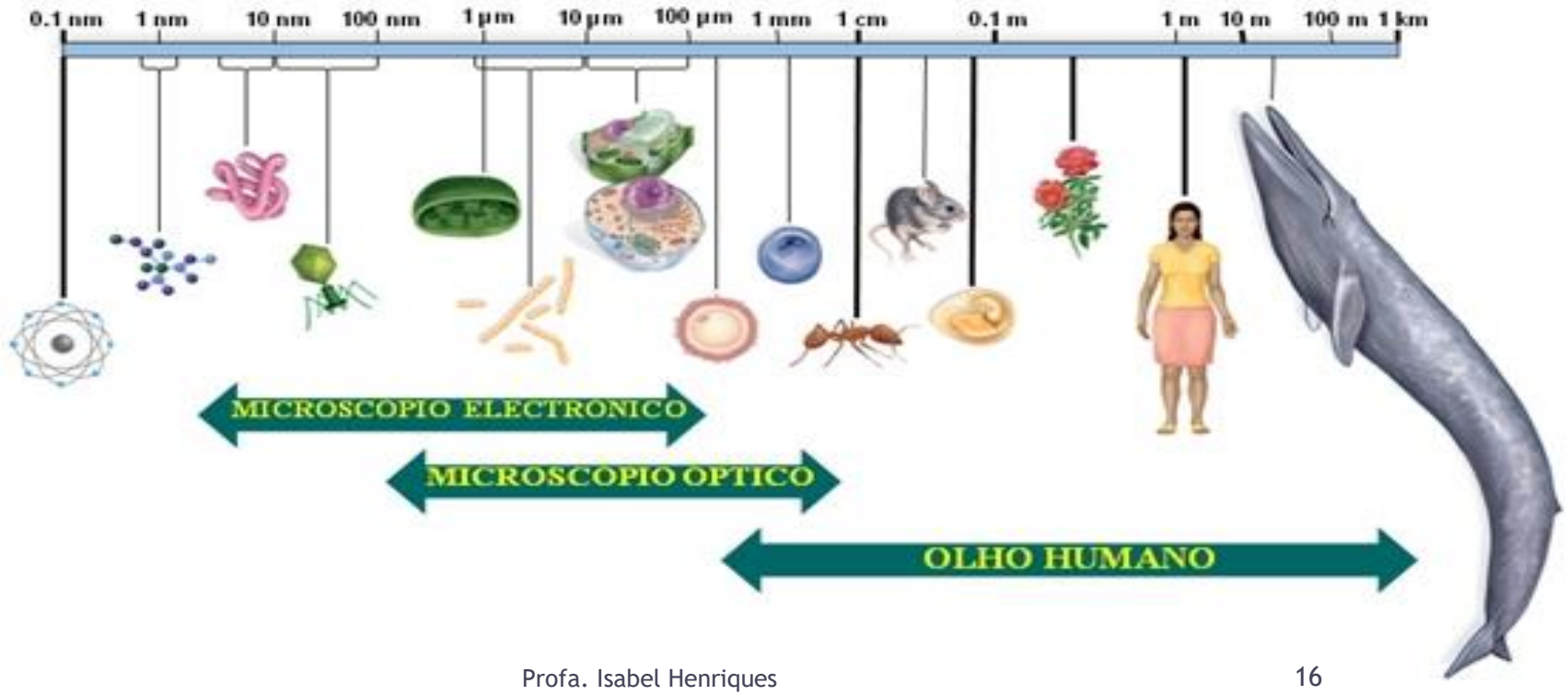


Conhecimento da célula

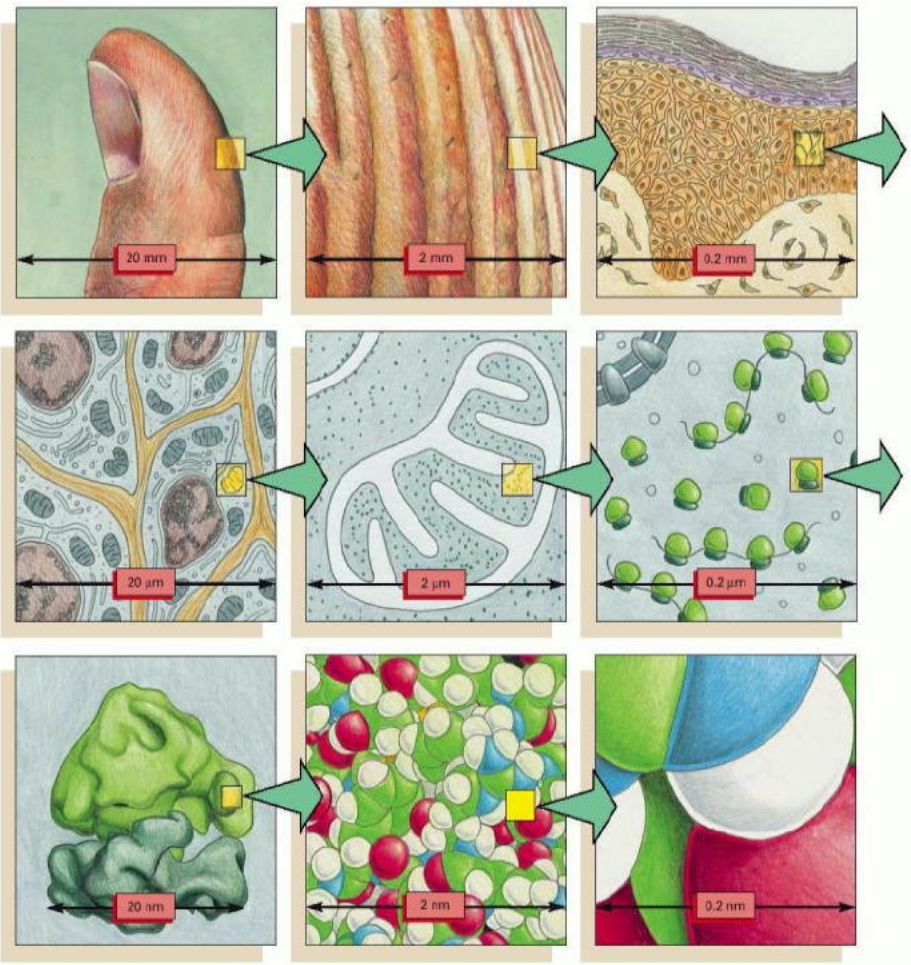
A obtenção de imagens muito ampliadas e detalhadas da ultraestrutura celular tornou-se possível com a invenção do microscópio electrónico, na década de 1930.

CONHECIMENTO DA CÉLULA

A invenção do **microscópio eletrónico**, no início da década de 30 do século XX, permitiu **novos progressos no conhecimento da célula**, por permitir a obtenção de imagens muito mais ampliadas.



CONHECIMENTO DA CÉLULA



Metro (m) = 1

Milímetro (mm) = 10^{-3}m

Micrómetro (µm) = 10^{-6}m

Nanómetro (nm) = 10^{-9}m

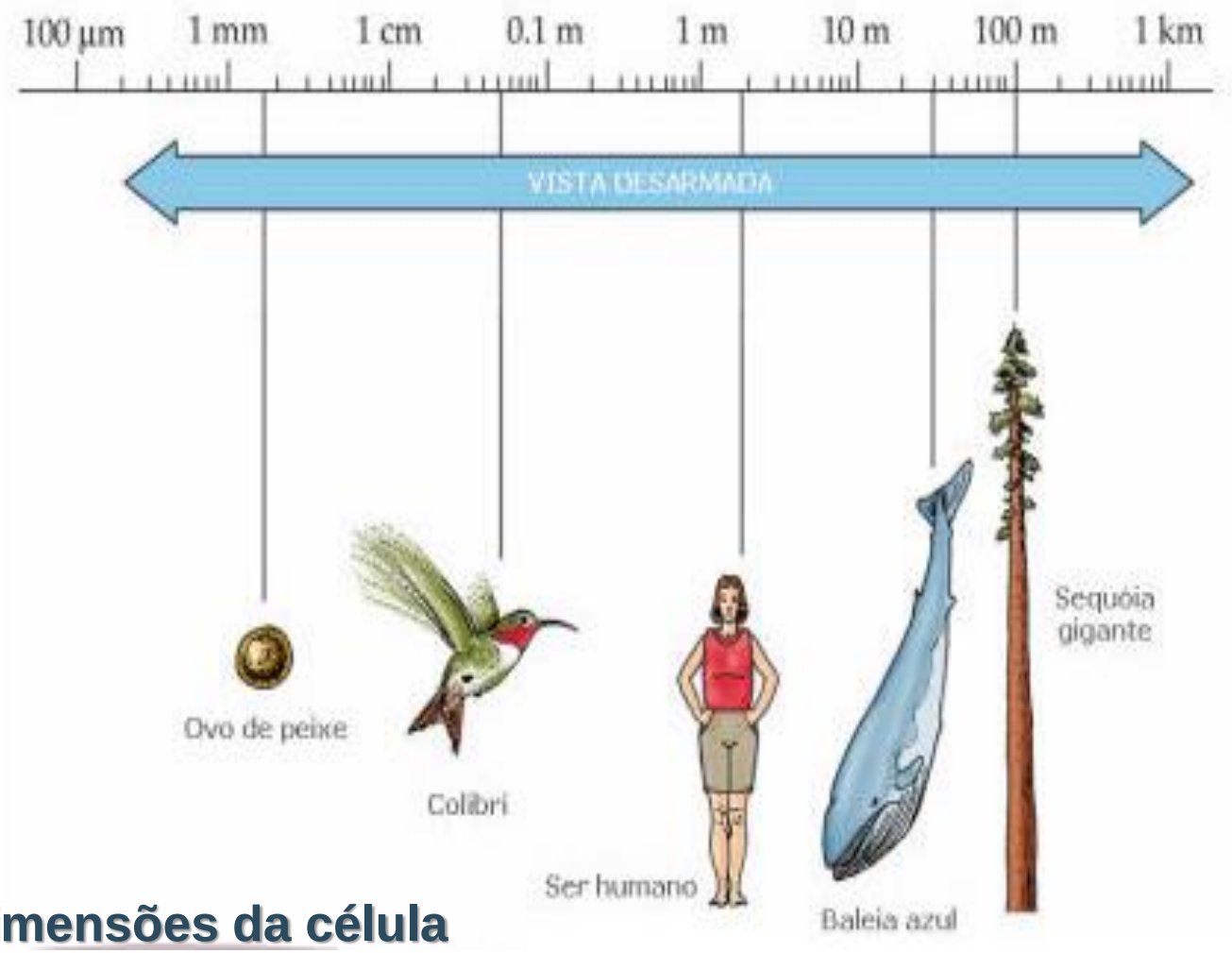
Angtrom (A) = 10^{-10}m

Picómetro (pm) = 10^{-12}m

Unidades de medida

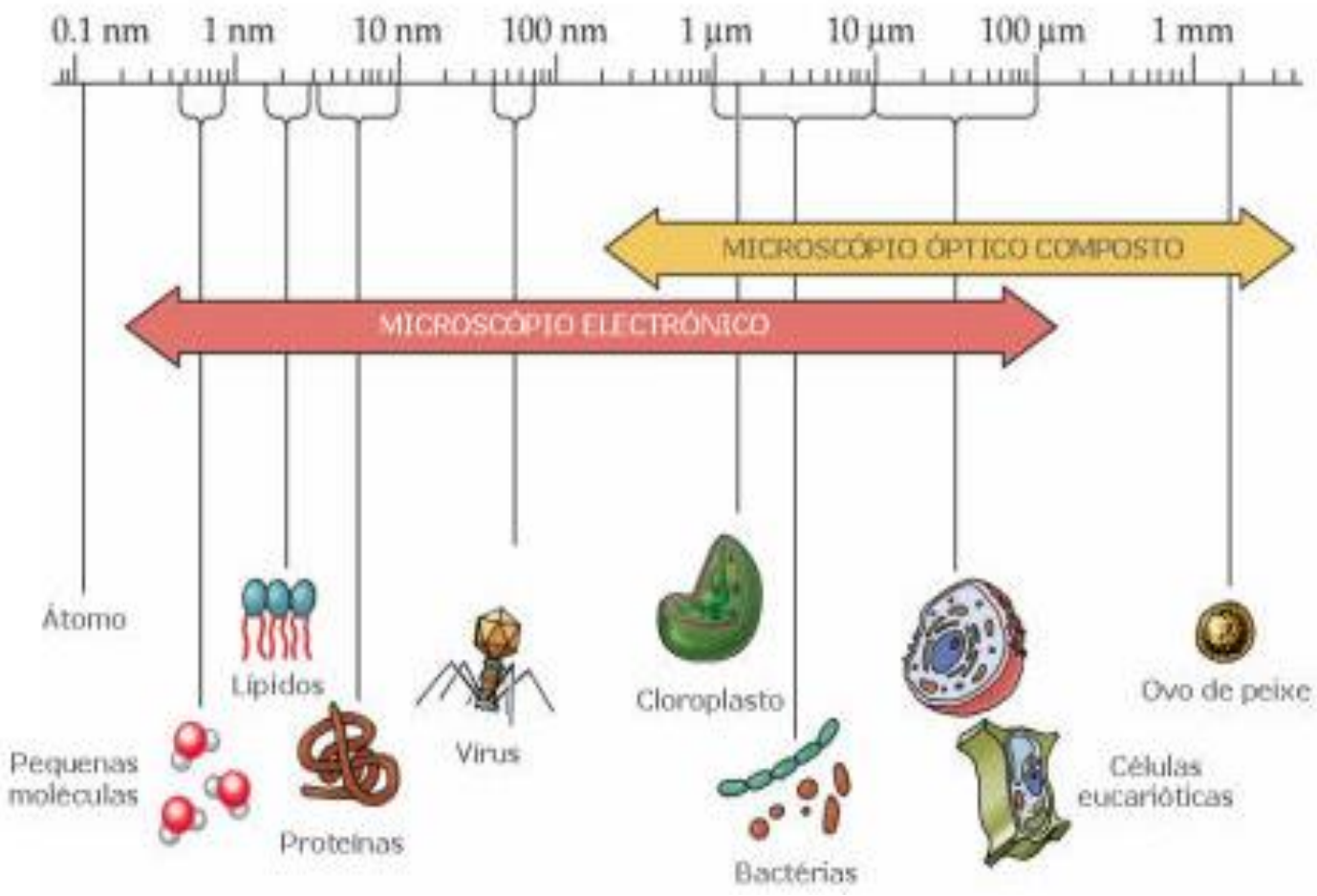
Dimensões da célula

CONHECIMENTO DA CÉLULA



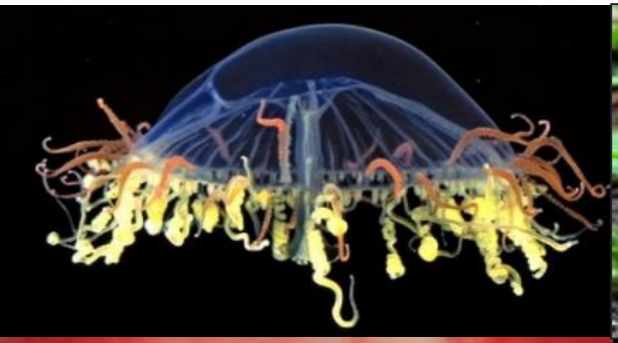
Dimensões da célula

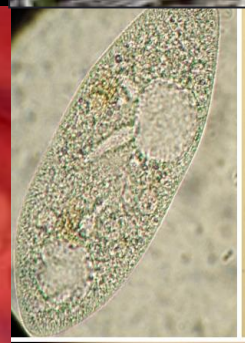
CONHECIMENTO DA CÉLULA



Dimensões da célula

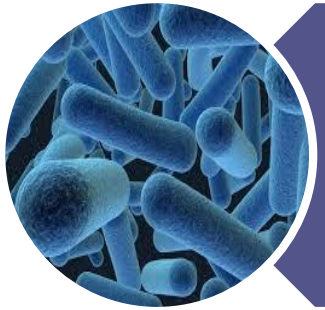
ORGANIZAÇÃO CELULAR



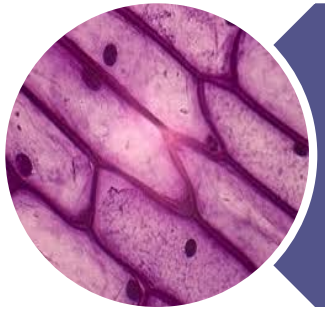


ORGANIZAÇÃO CELULAR

Organização celular



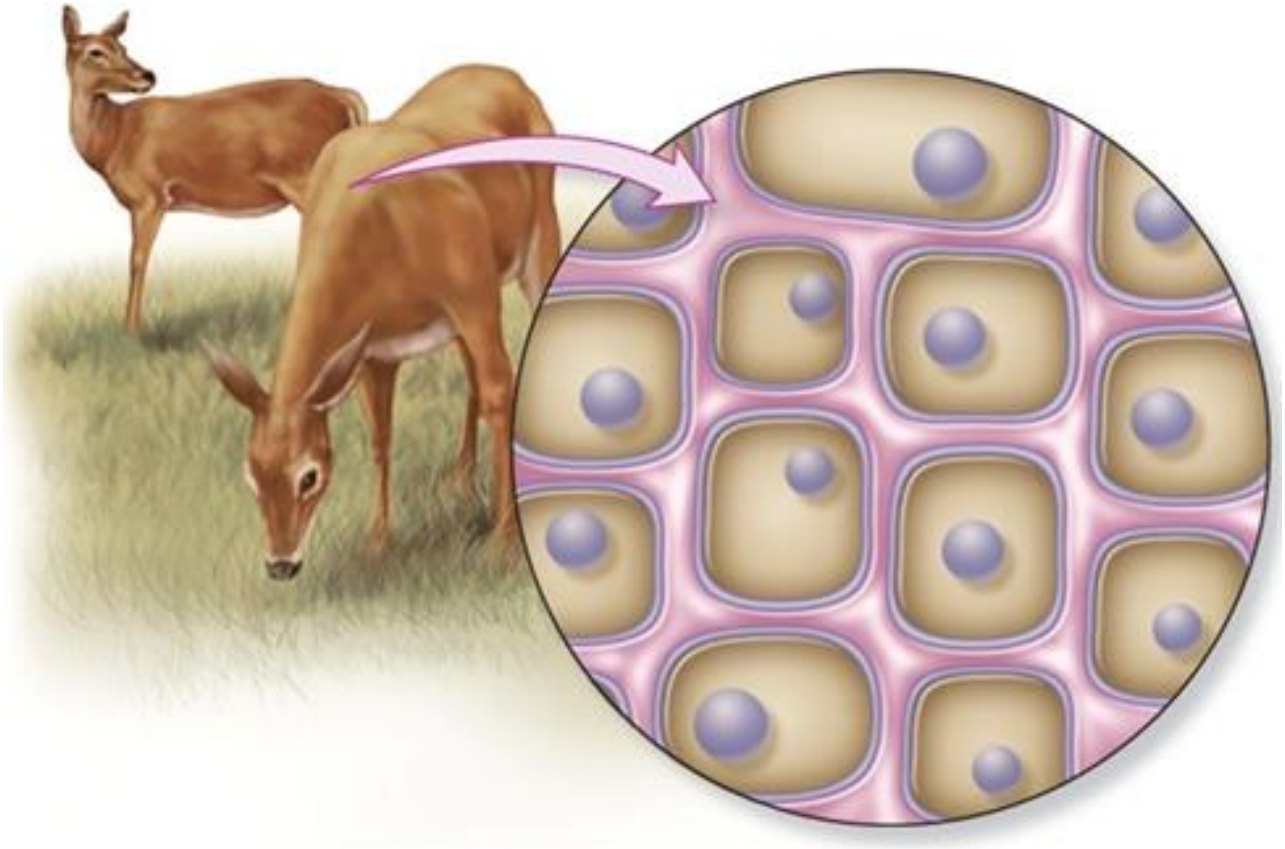
Unicelular



Pluricelular

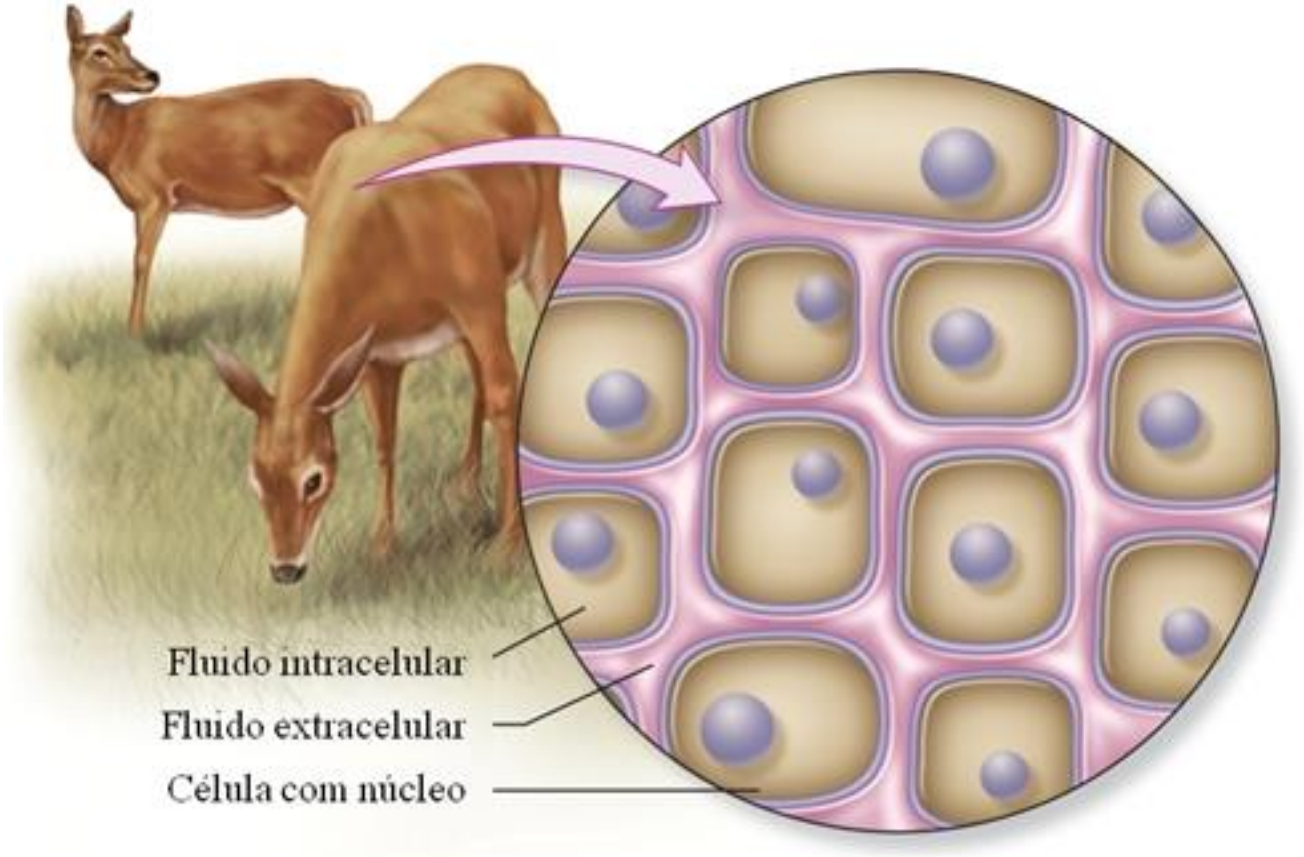
ORGANIZAÇÃO CELULAR

Todos os seres vivos são compostos por células (unidade básica da vida)



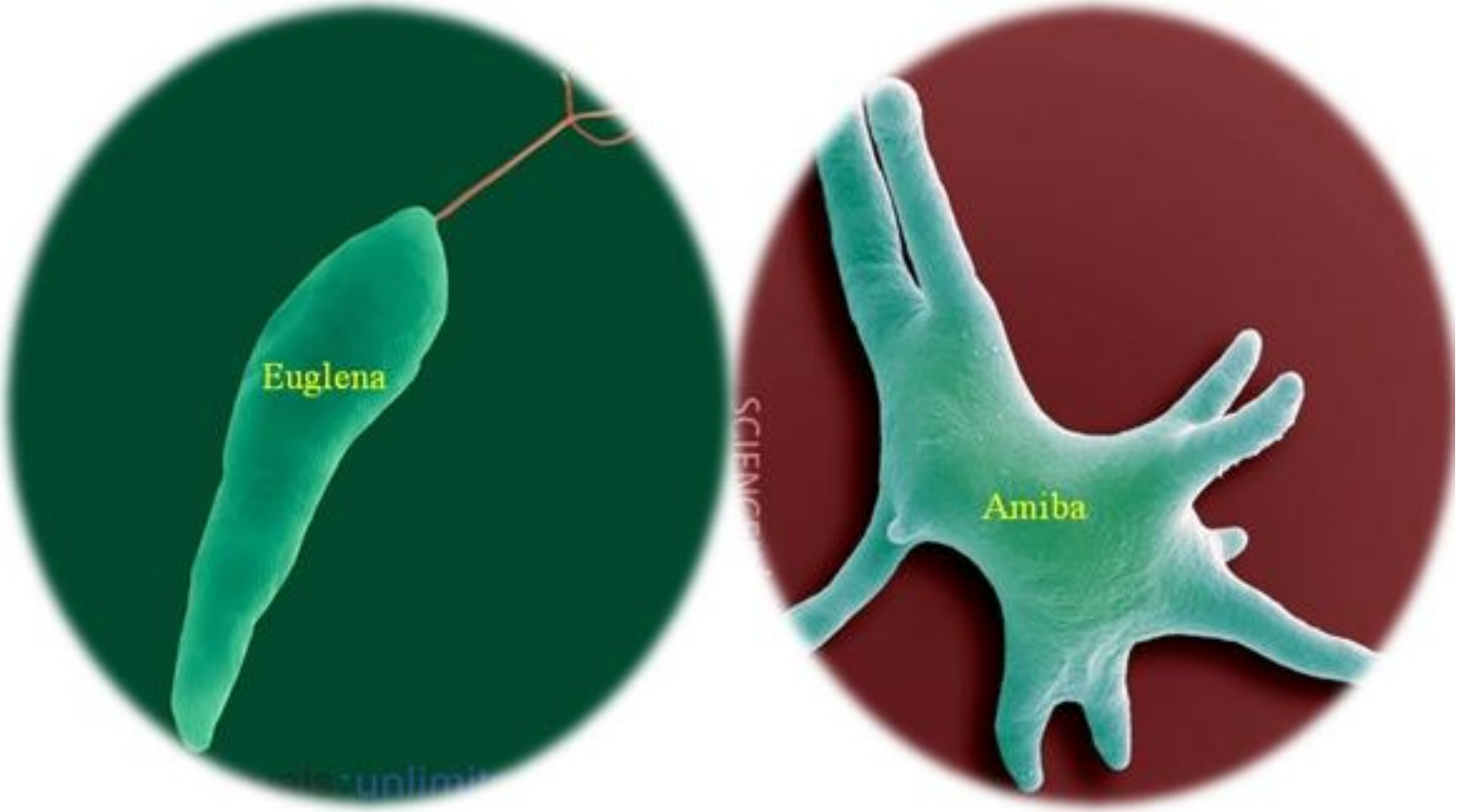
ORGANIZAÇÃO CELULAR

As células contêm a estão rodeadas por fluído.



ORGANIZAÇÃO CELULAR

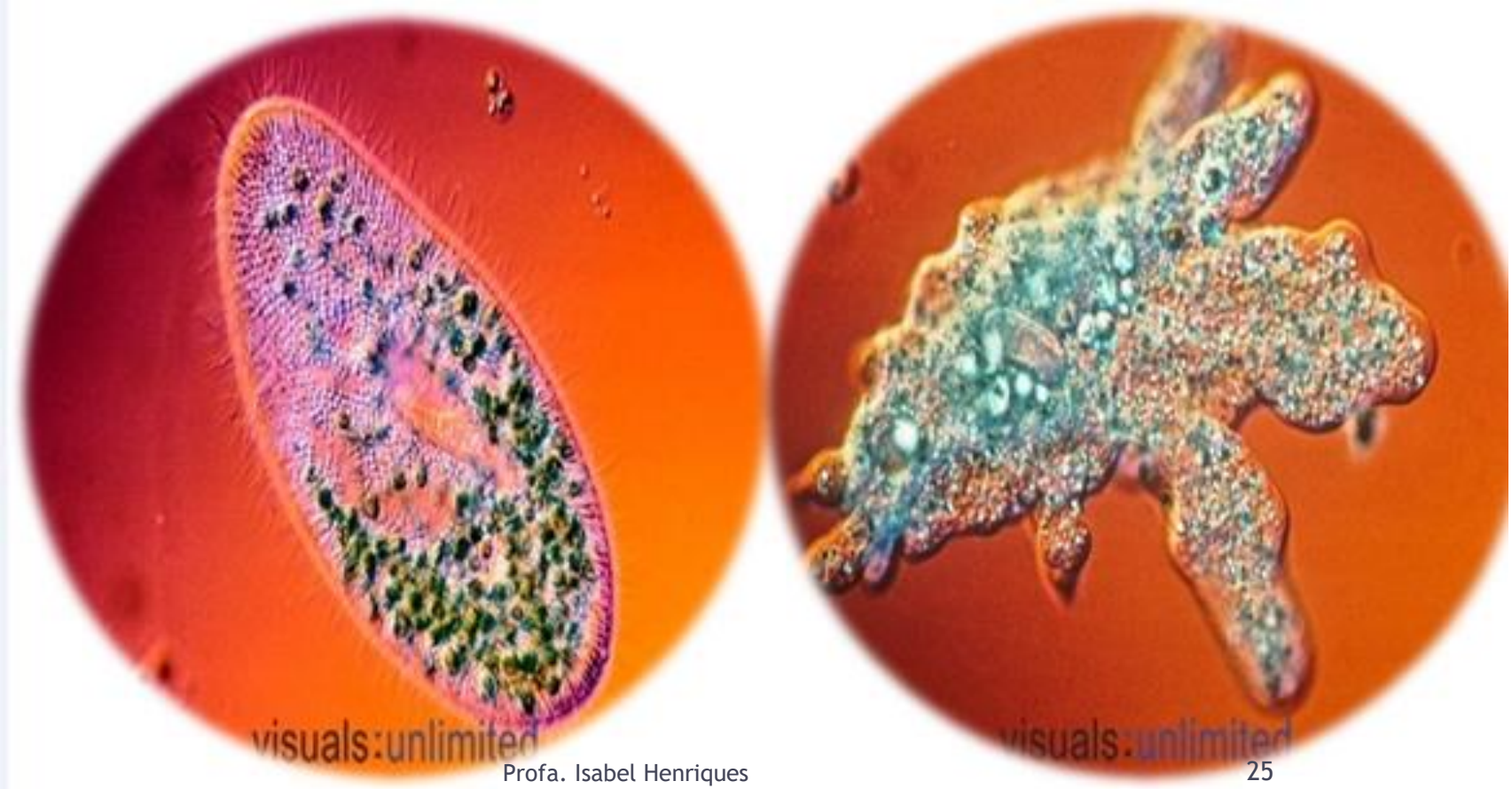
Seres Unicelulares



ORGANIZAÇÃO CELULAR

Seres Unicelulares

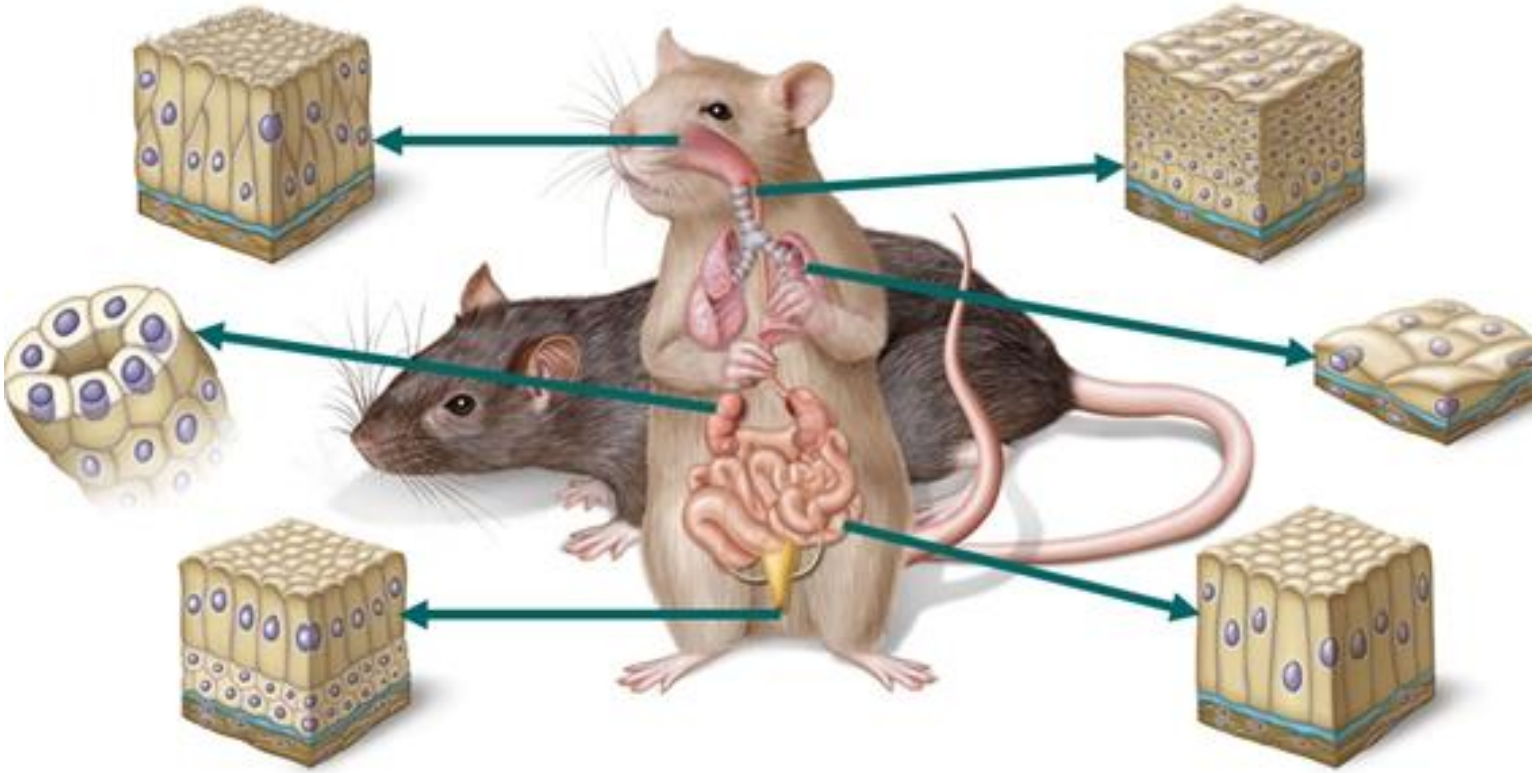
Paramécia e Amiba (protozoário)



ORGANIZAÇÃO CELULAR

Seres Multicelulares

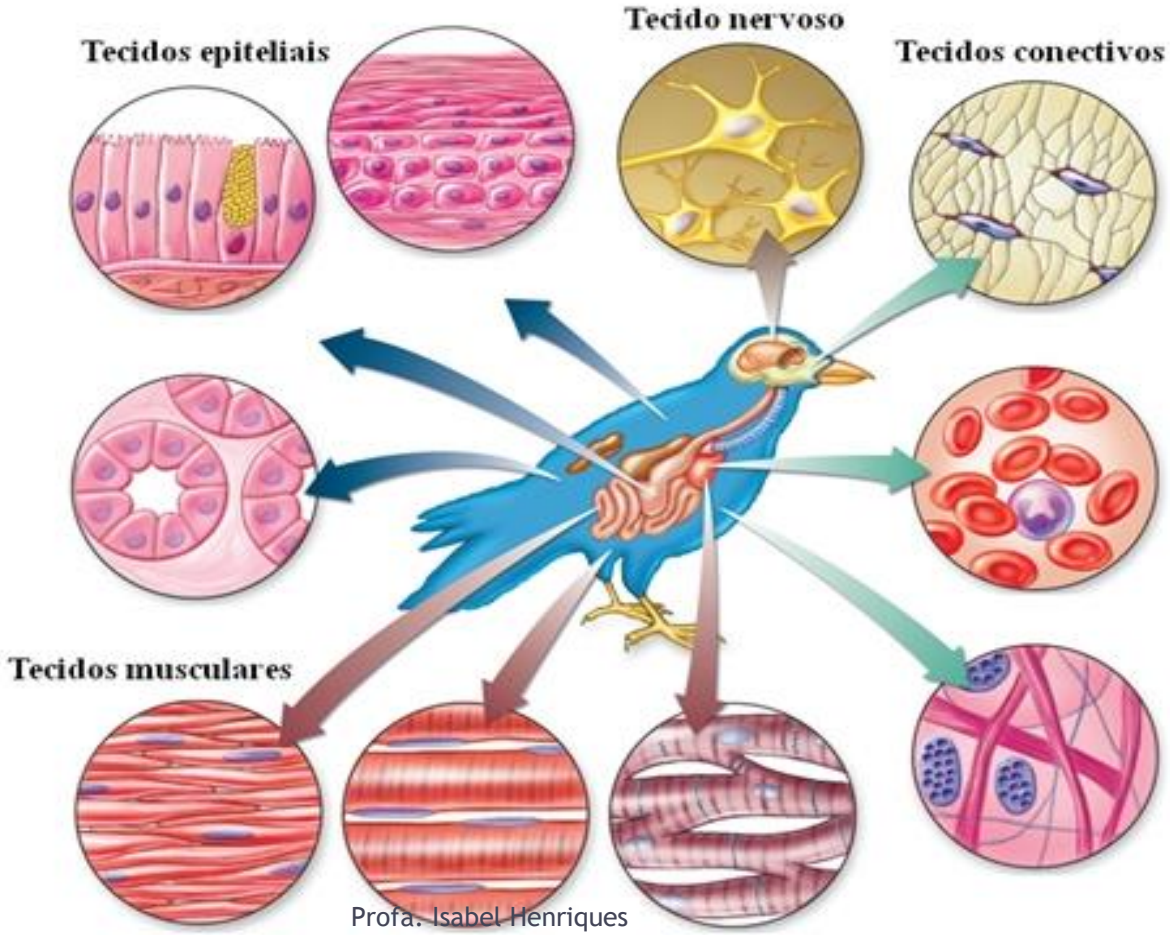
Várias **células organizadas em tecidos diferenciados** e **especializados** em diversas funções



ORGANIZAÇÃO CELULAR

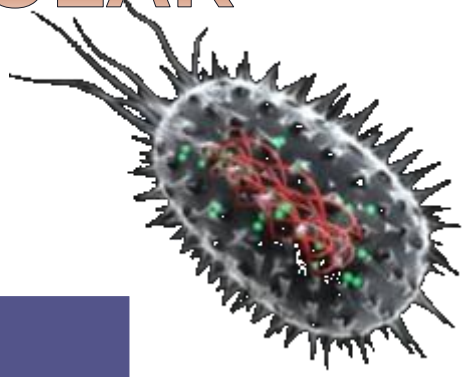
Seres Multicelulares

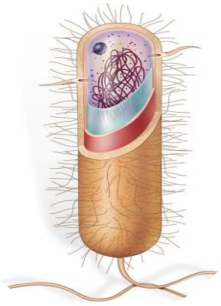
Células apresentam uma grande diversidade morfológica e funcional.



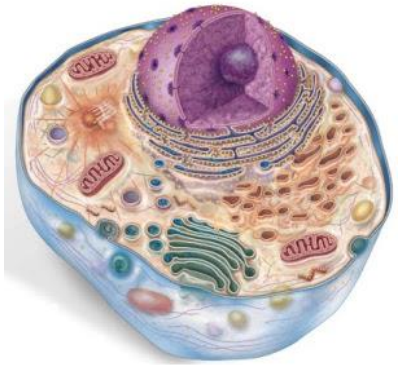
ORGANIZAÇÃO CELULAR

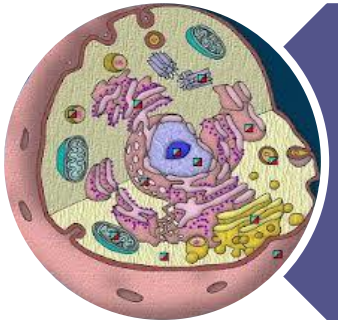
Organização celular



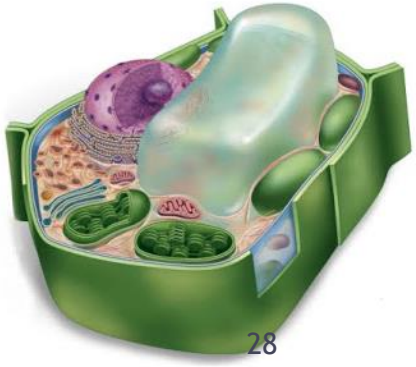


Células Procariotas



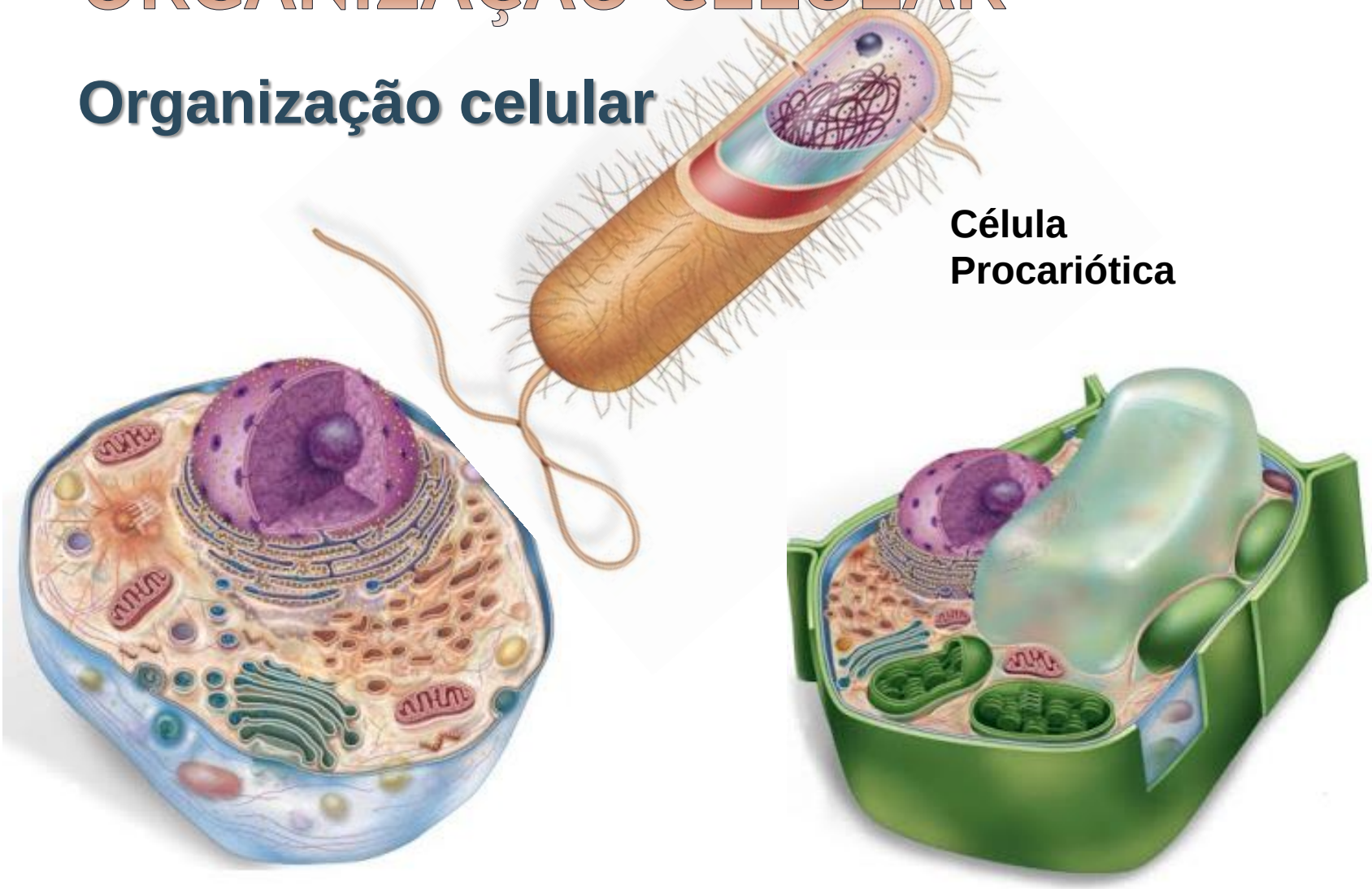


Células Eucariotas

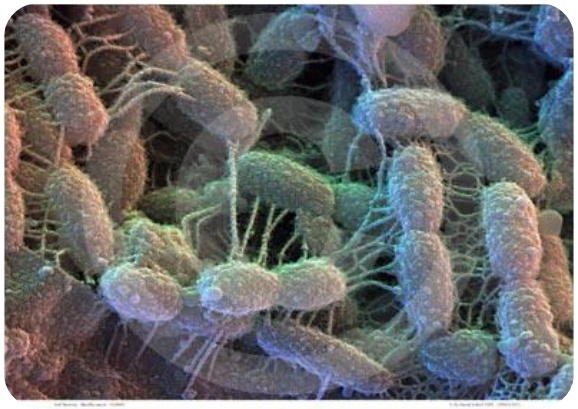


ORGANIZAÇÃO CELULAR

Organização celular



ORGANIZAÇÃO CELULAR



Bactérias

Cianobactérias

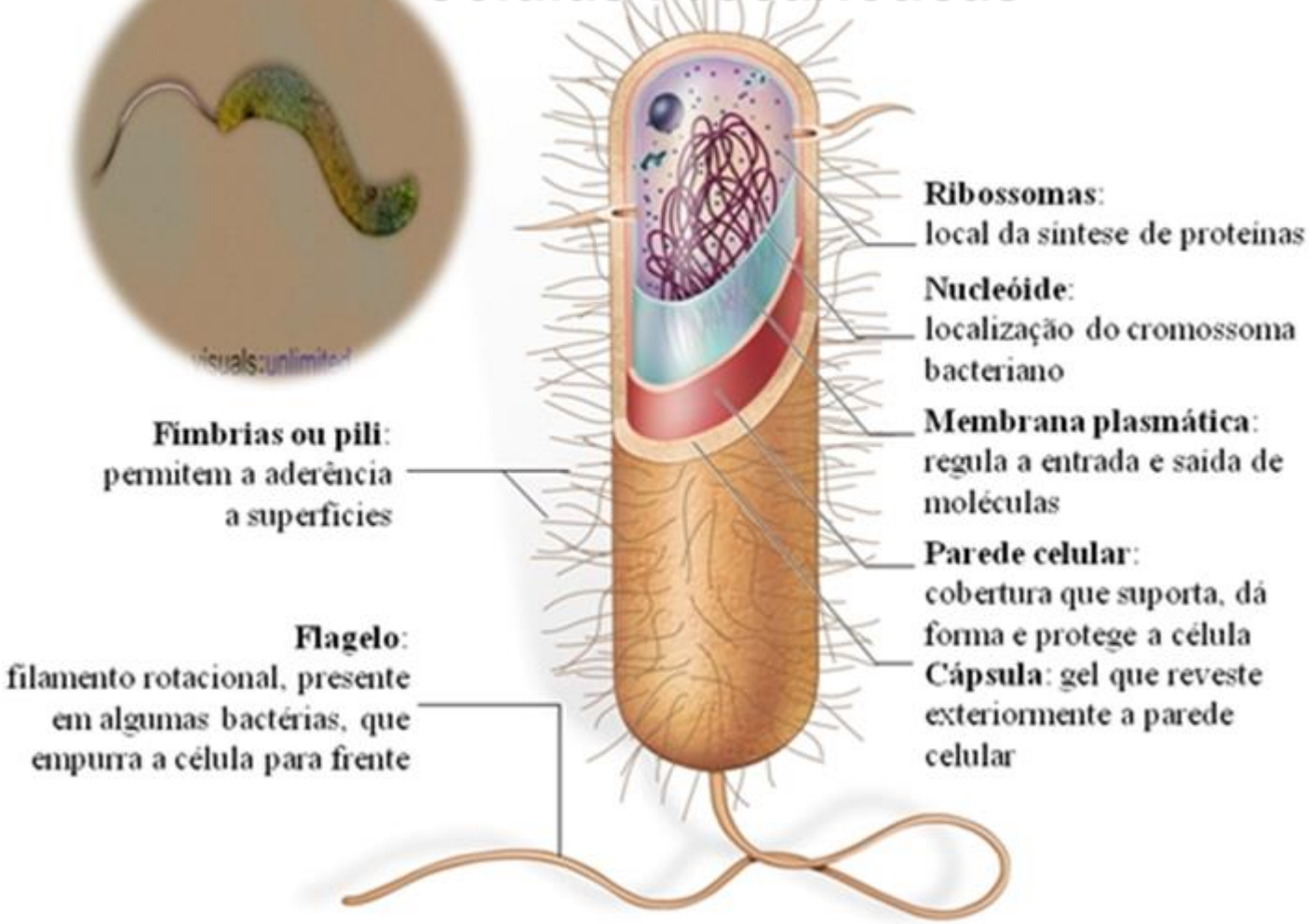
Organização Estrutural

Célula **procarióticas**:

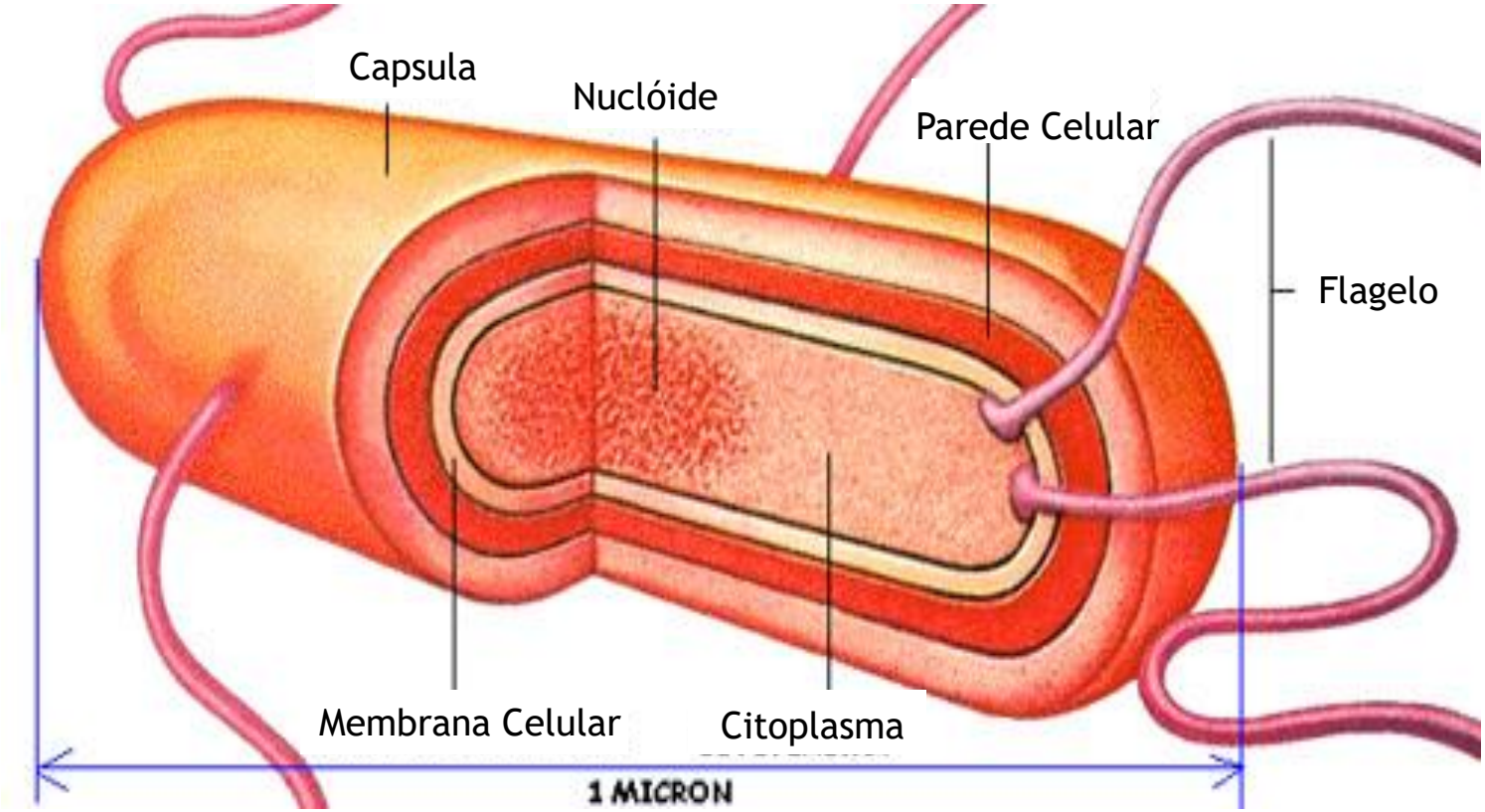
- células simples,
- sem núcleo,
- Sem a maioria das estruturas celulares conhecidas,
- Representadas pelas bactérias e cianobactérias.

ORGANIZAÇÃO CELULAR

Células Procarióticas



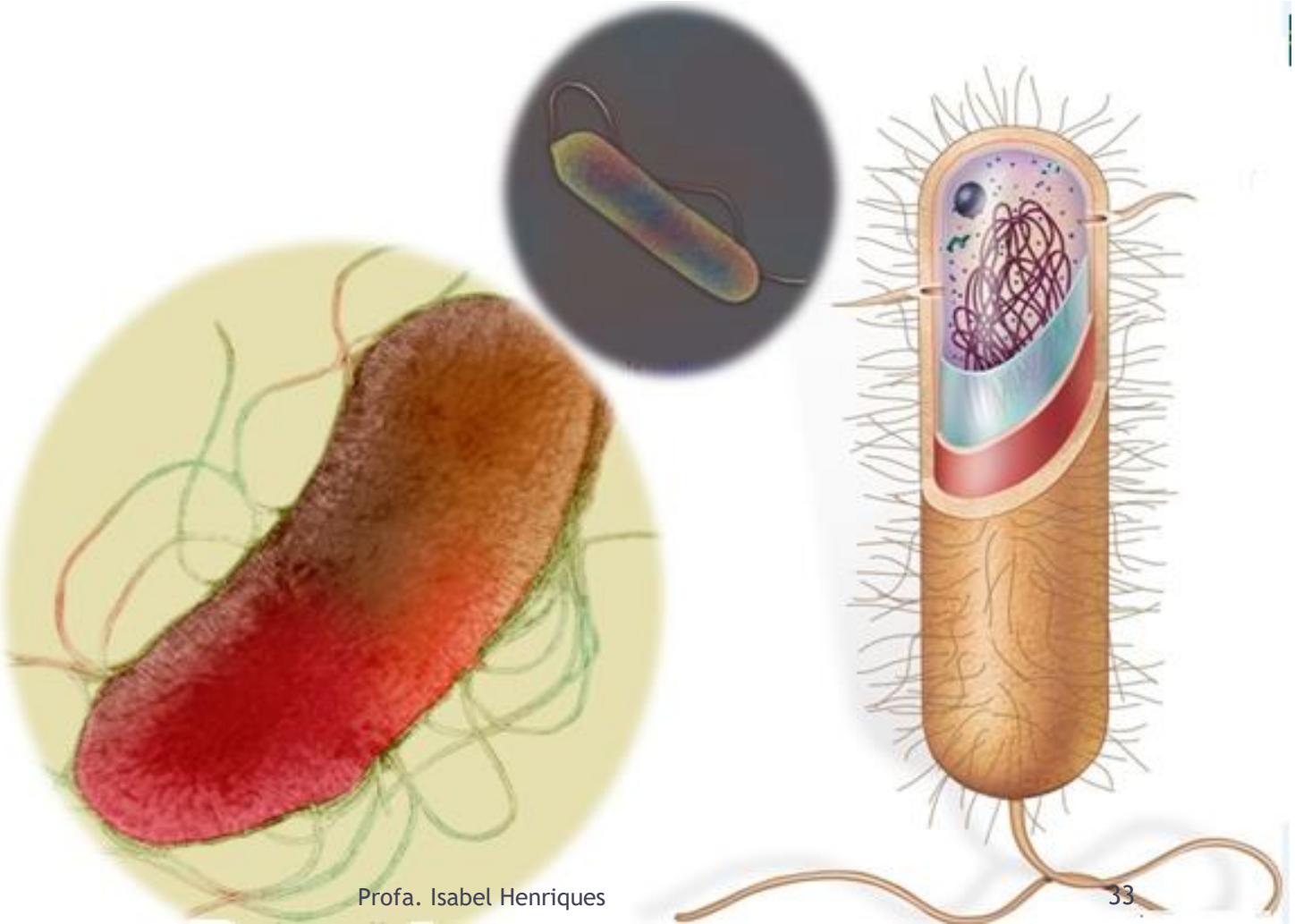
ORGANIZAÇÃO CELULAR



Célula Procariota

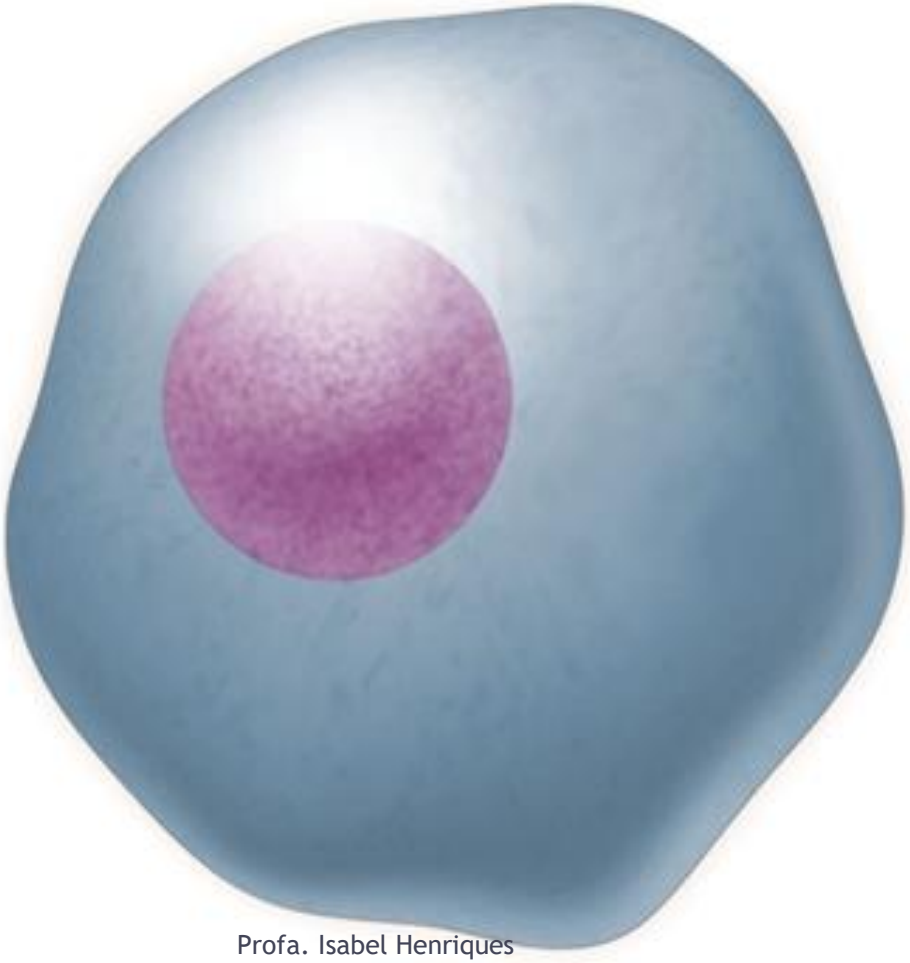
ORGANIZAÇÃO CELULAR

Células Procarióticas



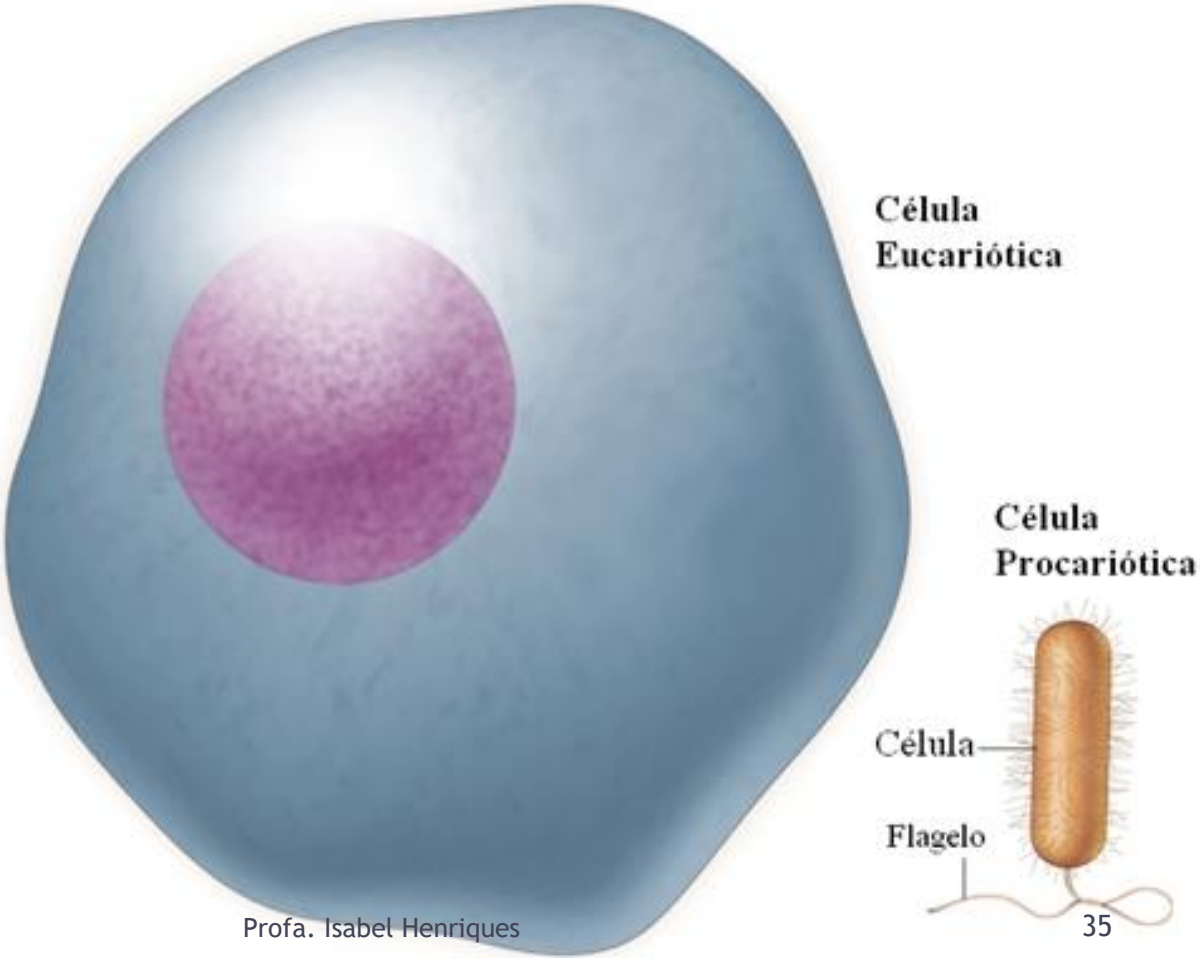
ORGANIZAÇÃO CELULAR

Células Eucarióticas

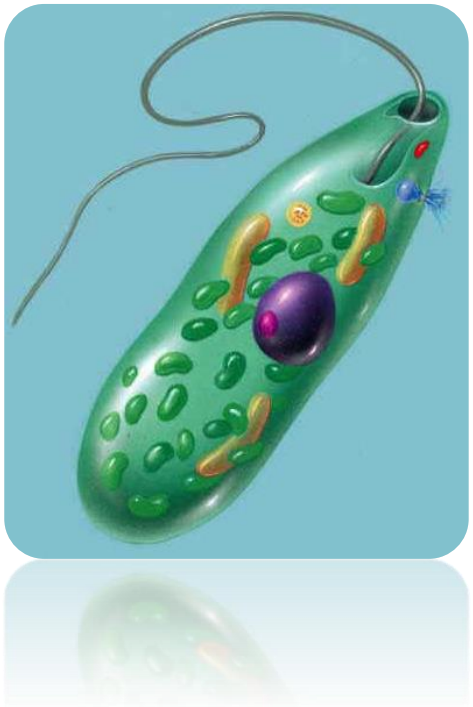


ORGANIZAÇÃO CELULAR

Células Eucarióticas



ORGANIZAÇÃO CELULAR



Organização Estrutural

Célula **Eucarióticas**:

- Células com uma estrutura mais complexa,
- Apresentam núcleo,
- Com organitos membranares,
- Presentes em todos os restantes grupos de seres vivos.

Dividem-se em:

- Celula Eucariota Animal
- Célula Eucariota Vegetal

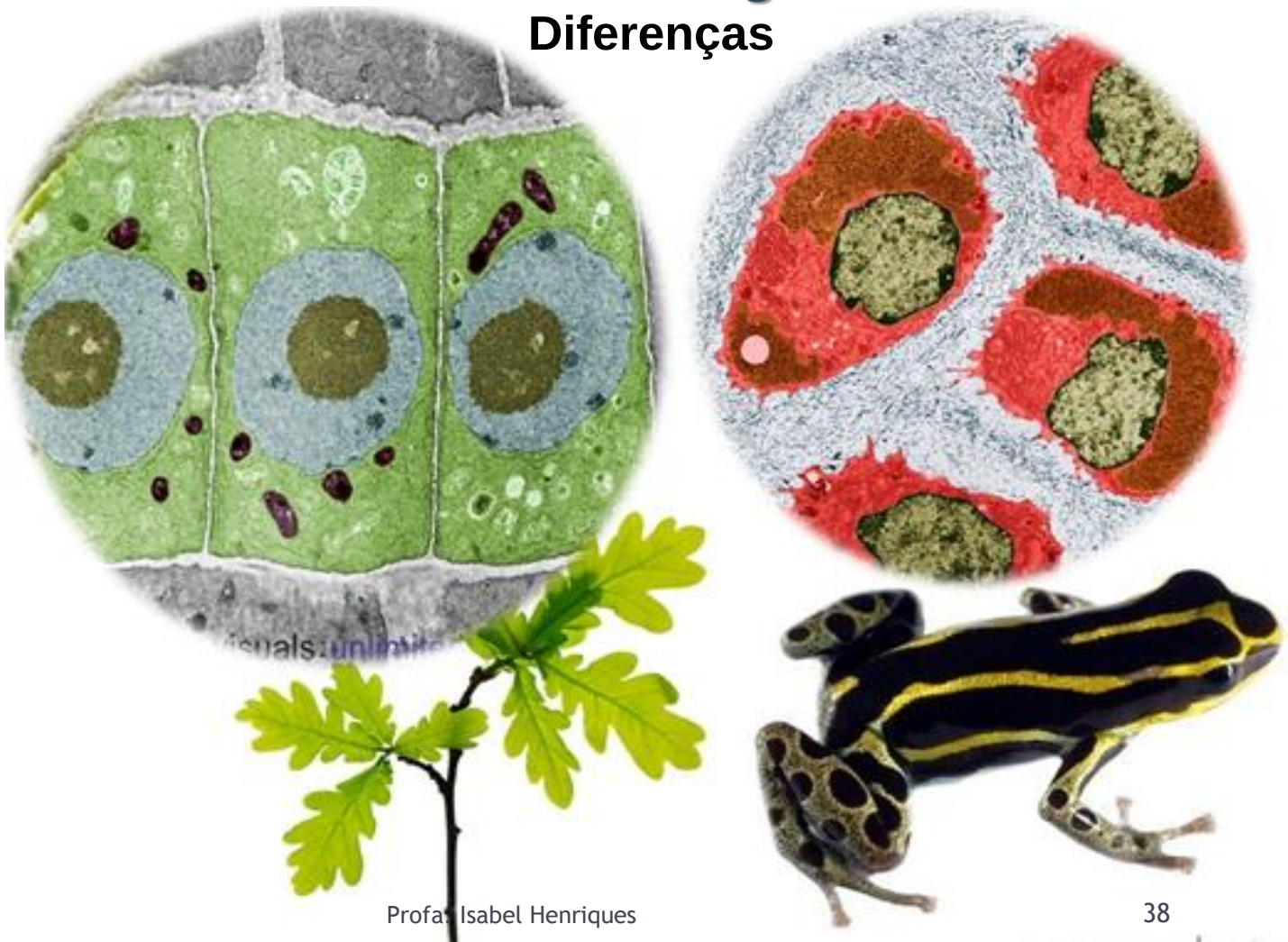
ORGANIZAÇÃO CELULAR

Estrutura celular	Células Procariotas	Células Eucariotas
Envoltório nuclear	Ausente	Presente
DNA	Desnudo	Combinado com proteínas
Cromossomas	Únicos	Múltiplos
Nucléolos	Ausentes	Presentes
Divisão	Fusão binária	Mitose e meiose
Ribossomas	70S* (50S + 30S)	80S (60S + 40S)
Endomembranas	Ausentes	Presentes
Mitocôndrias	Ausentes	Presentes
Cloroplastos	Ausentes	Presentes em células vegetais
Parede celular	Não celulósica (peptidoglicana)	Celulósica em células vegetais
Exocitose e endocitose	Ausentes	Presentes
Citoesqueleto	Ausente	Presente

ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal e Animal

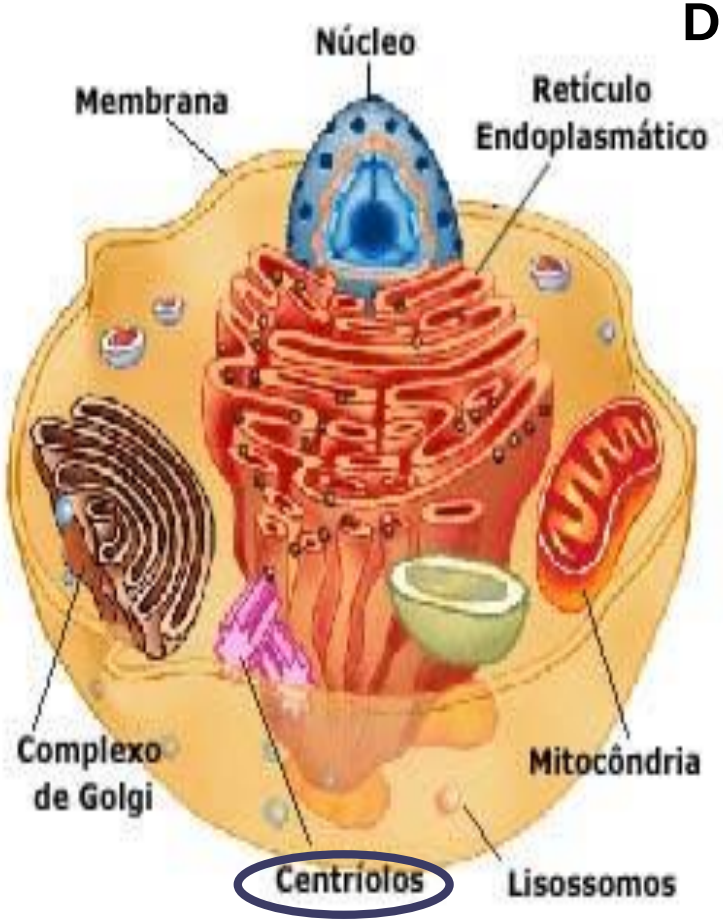
Diferenças



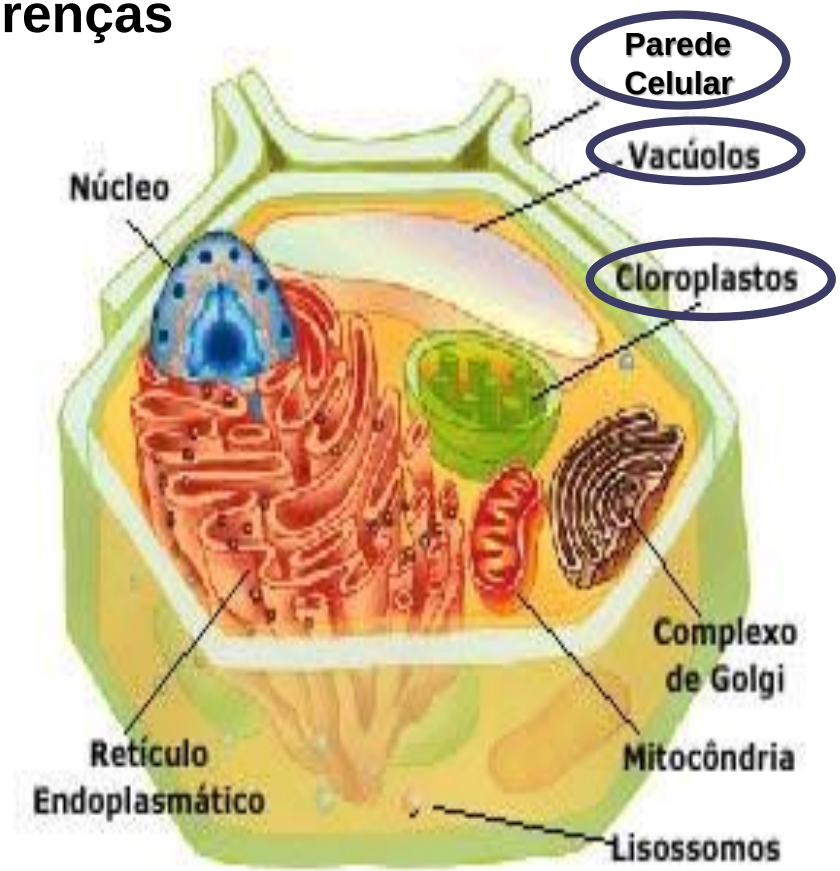
ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal e Animal

Diferenças



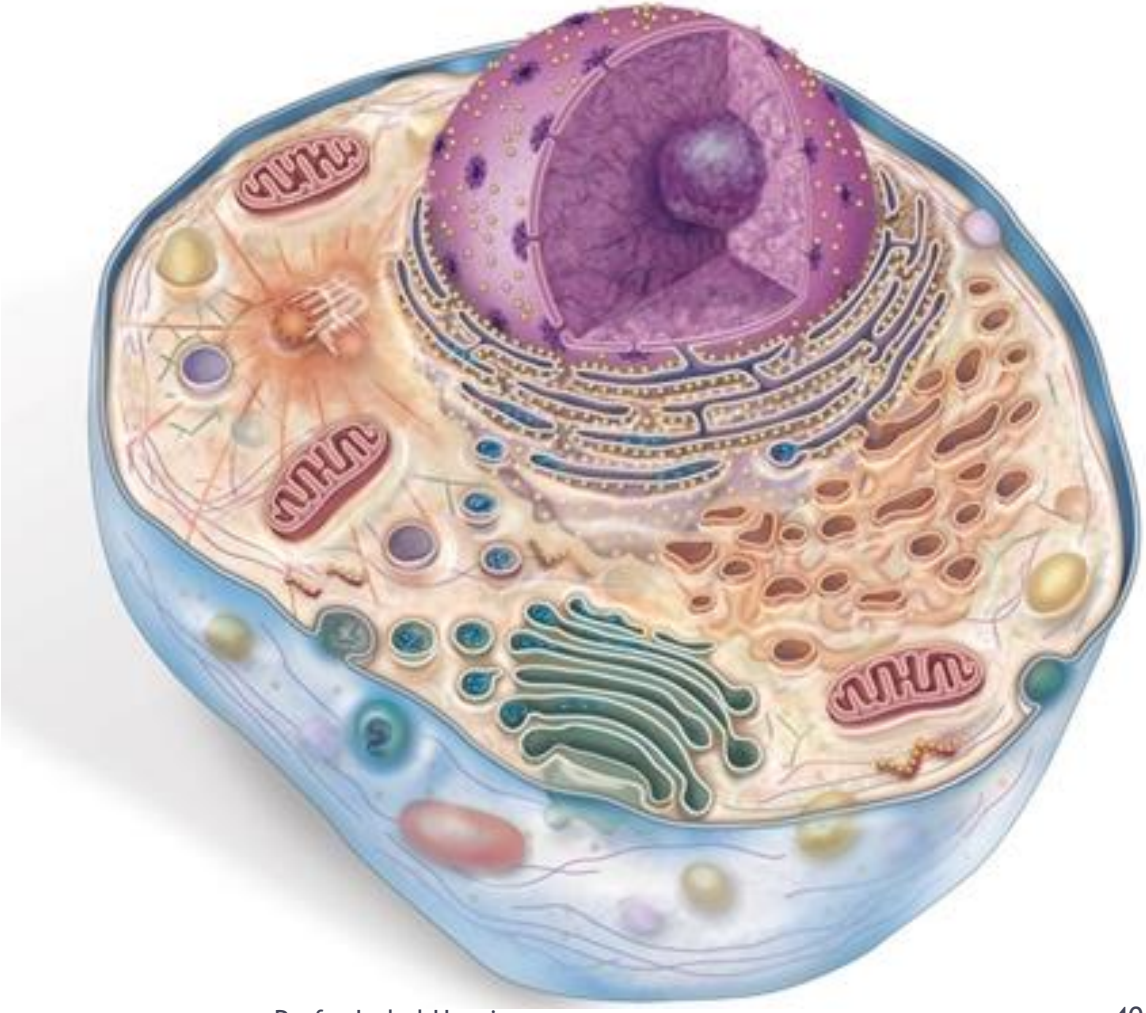
Célula Animal



Célula Vegetal

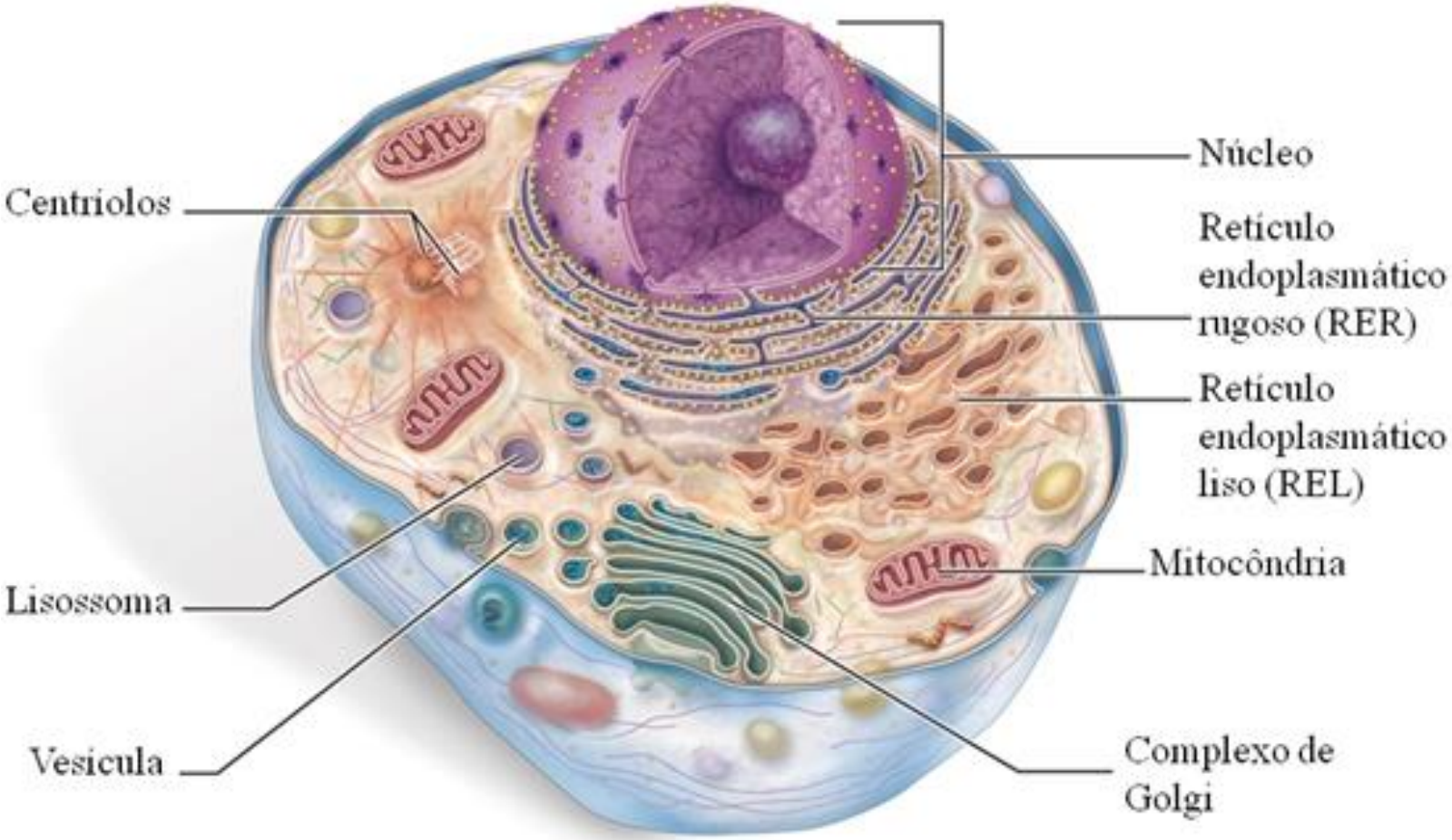
ORGANIZAÇÃO CELULAR

Células Eucariota Animal



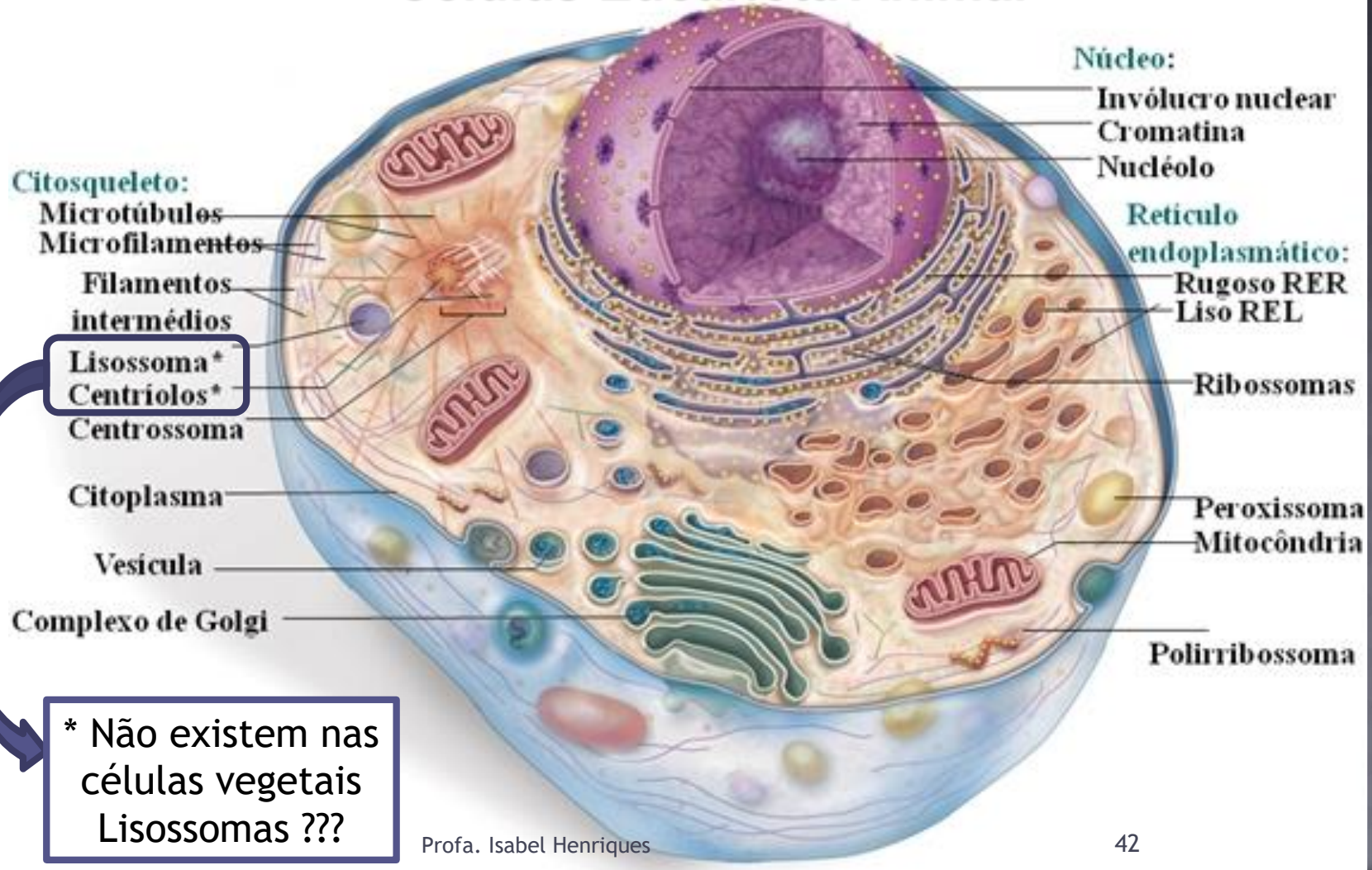
ORGANIZAÇÃO CELULAR

Células Eucariota animal



ORGANIZAÇÃO CELULAR

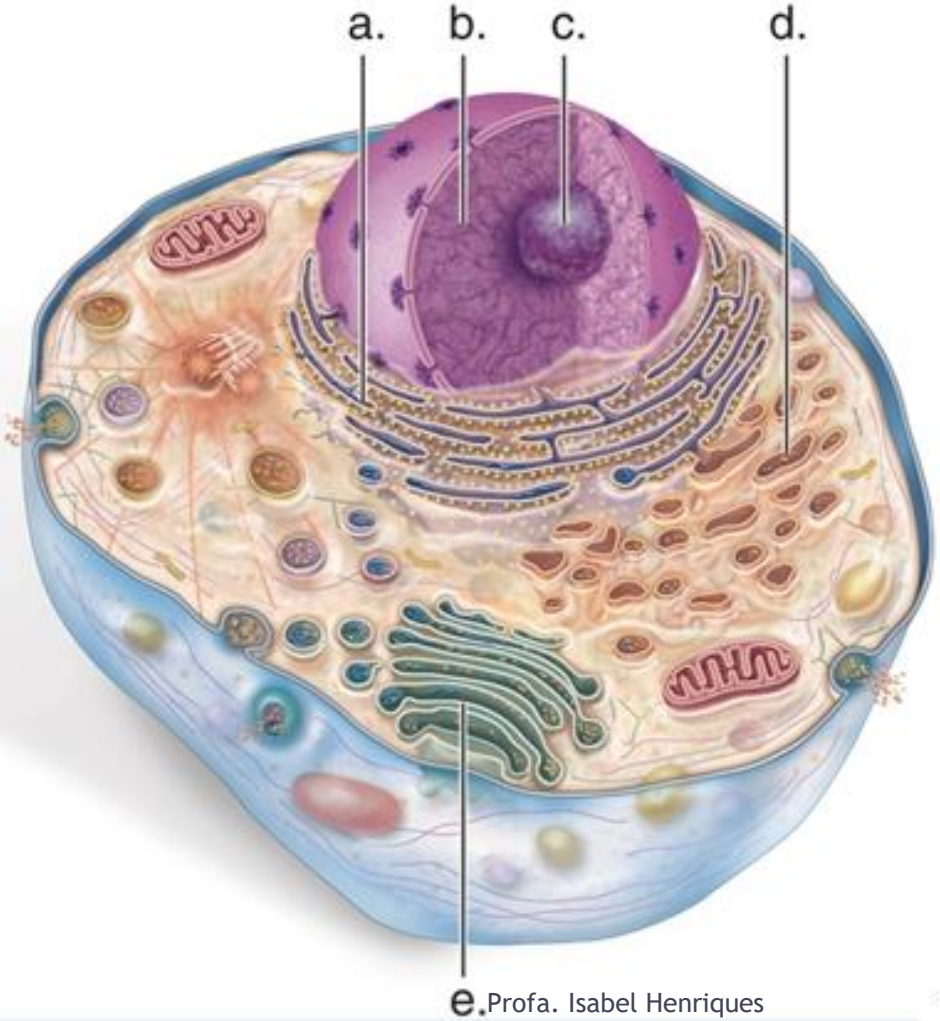
Células Eucariota Animal



* Não existem nas células vegetais Lisossomas ???

ORGANIZAÇÃO CELULAR

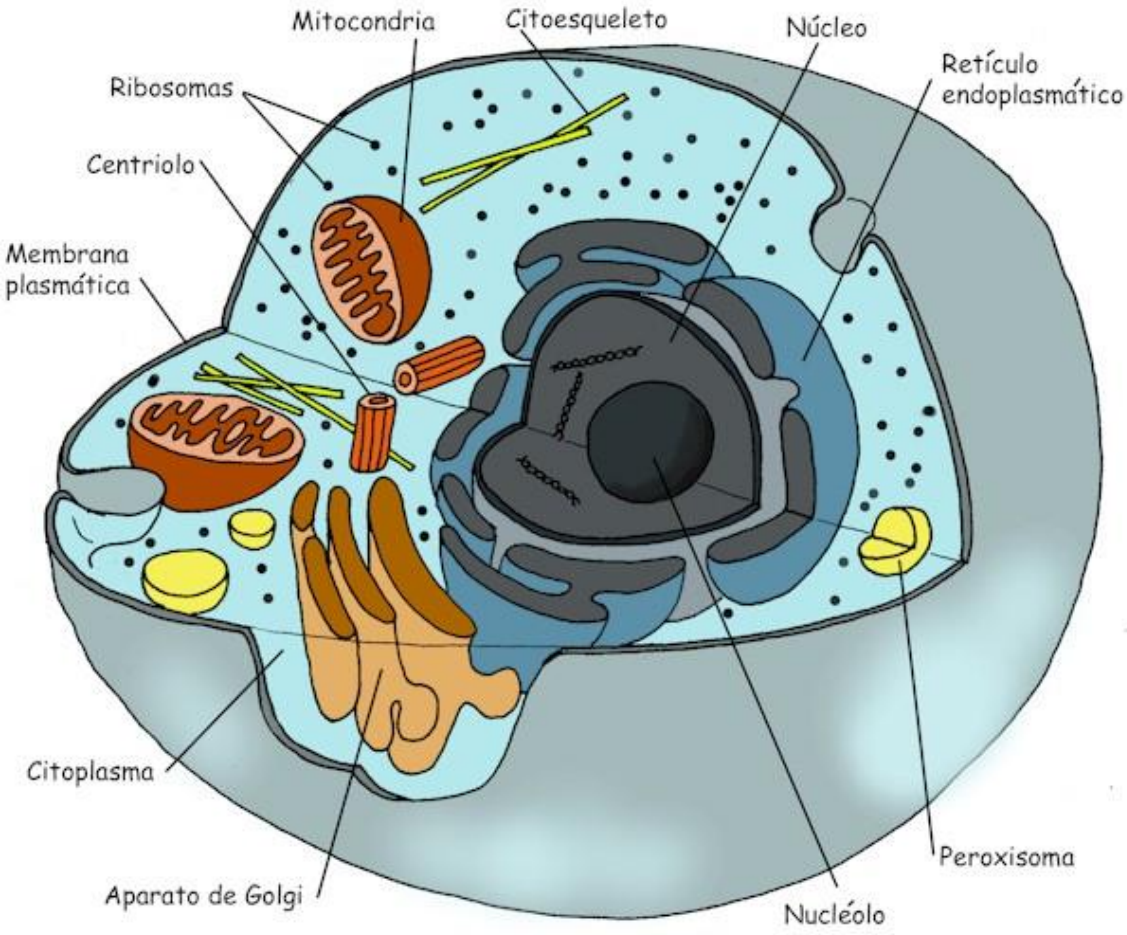
Células Eucariota Animal



Legenda

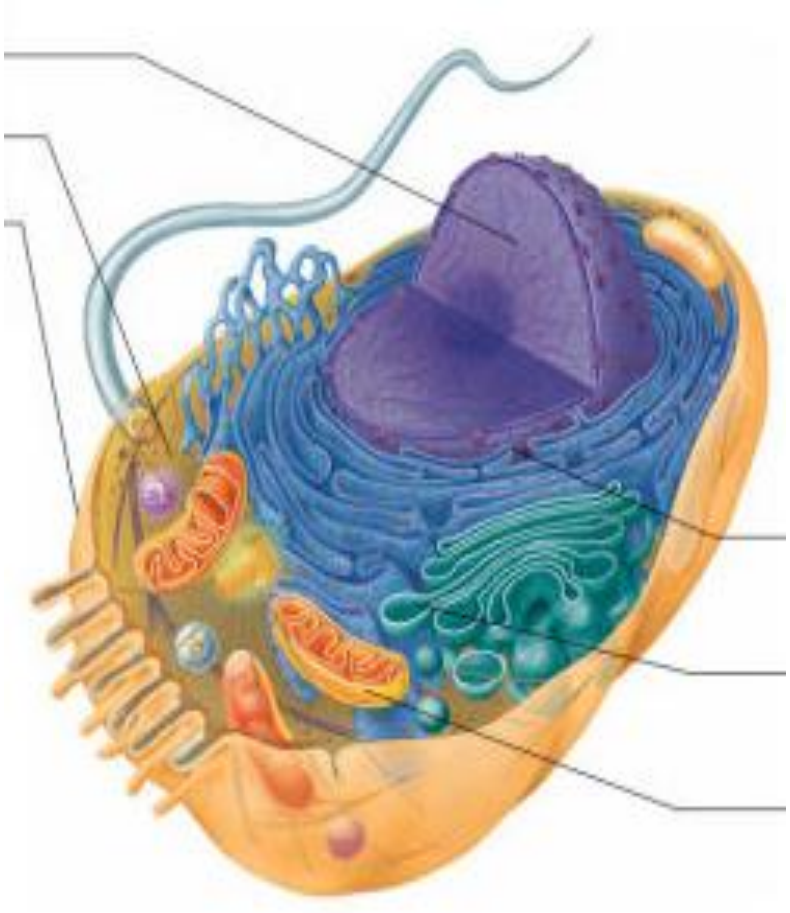
a) Retículo endoplasmático rugoso
b) Núcleo
c) Nucléolo
d) Retículo endoplasmático liso
e) Complexo de Golgi

ORGANIZAÇÃO CELULAR



Célula Eucariota Animal

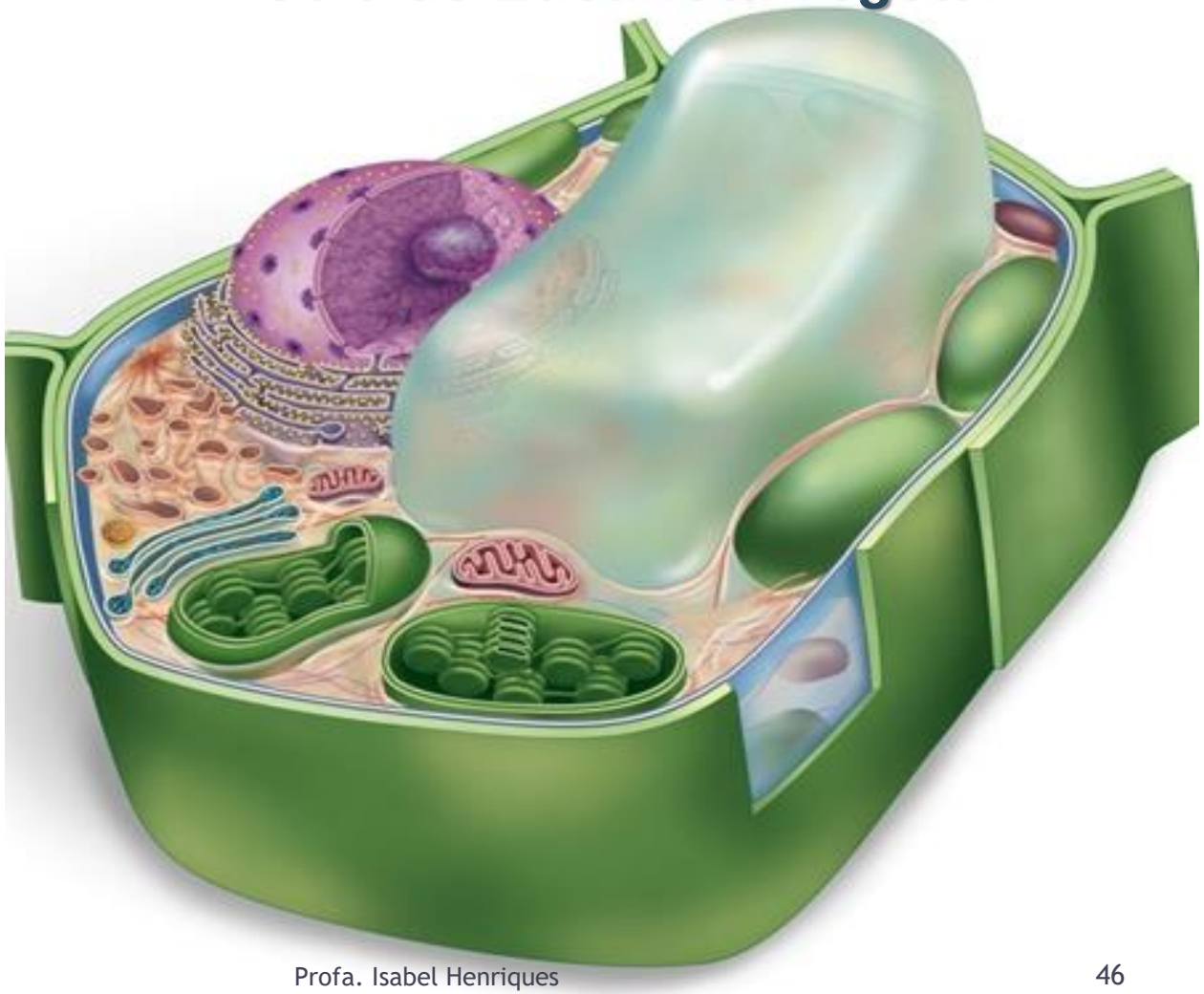
ORGANIZAÇÃO CELULAR



Célula Eucariota Animal

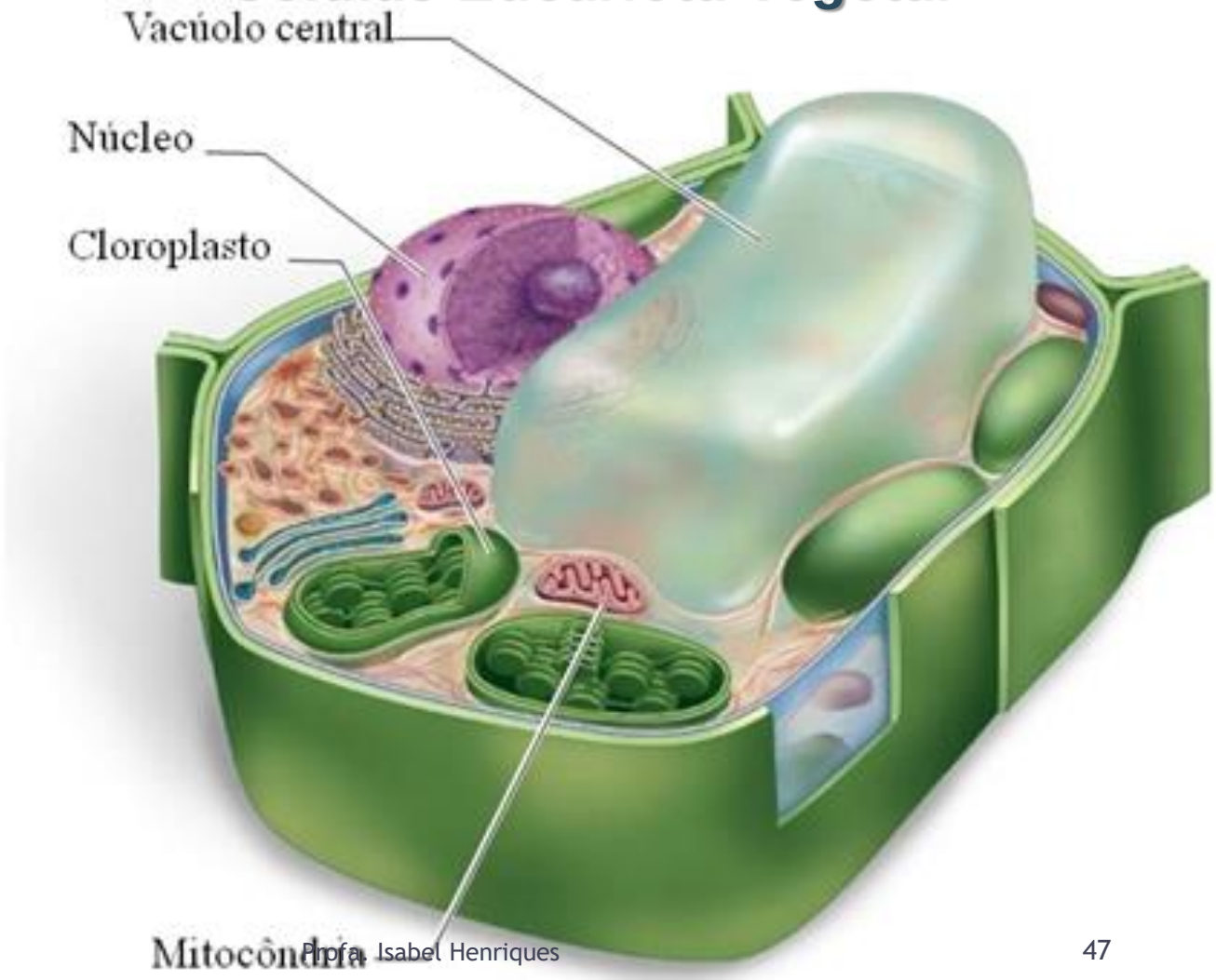
ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal



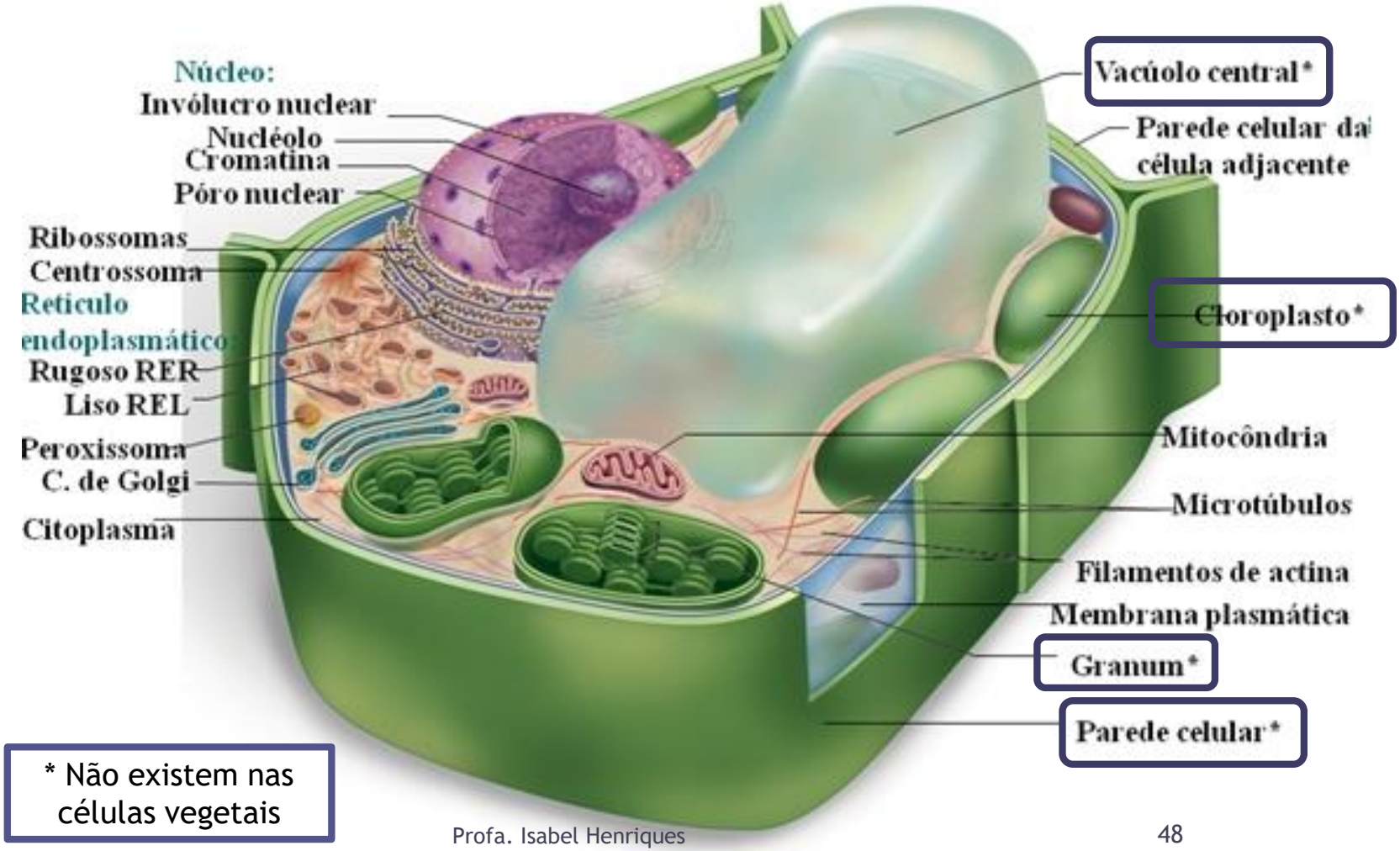
ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal



ORGANIZAÇÃO CELULAR

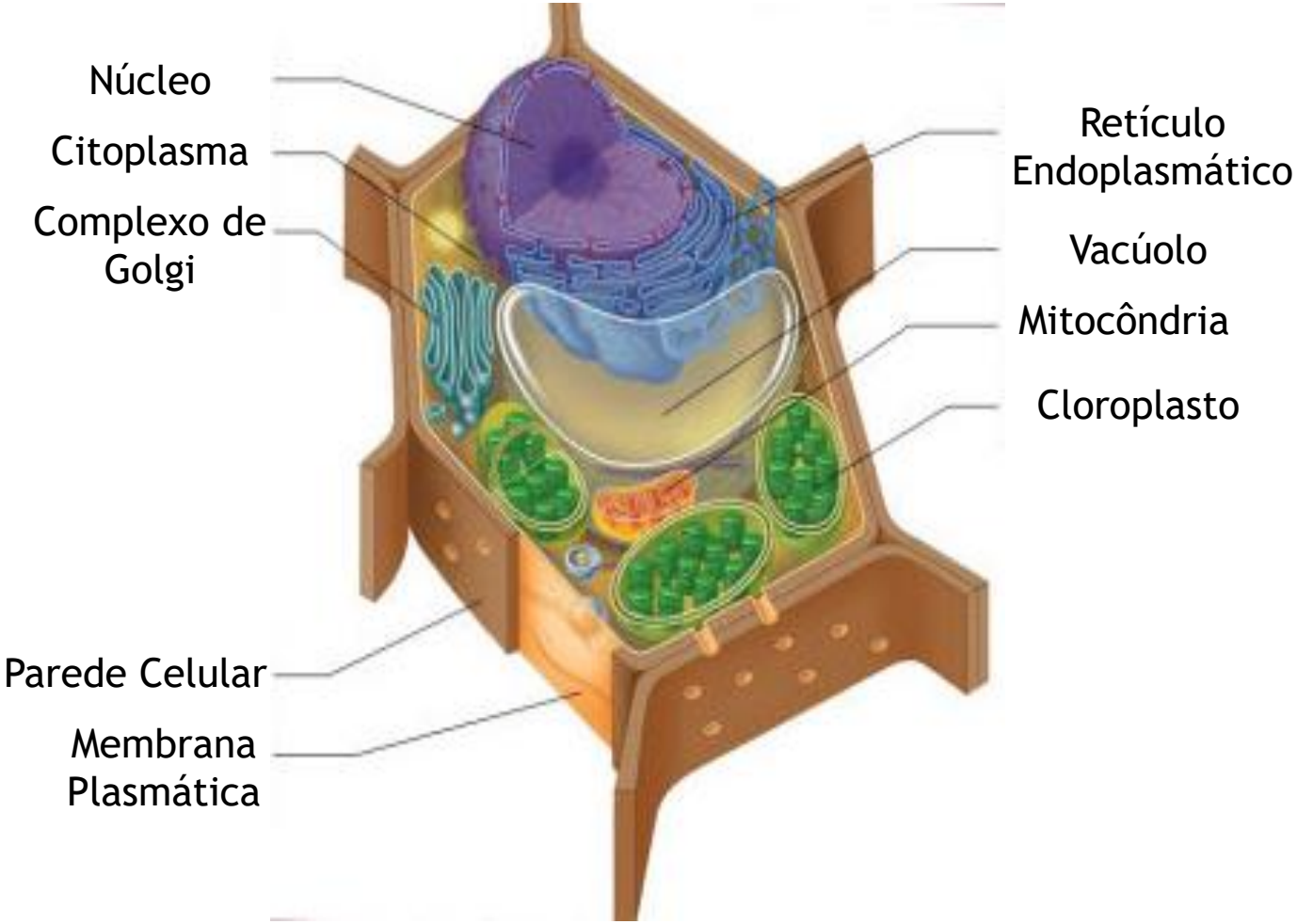
Células Eucariota Vegetal



* Não existem nas células vegetais

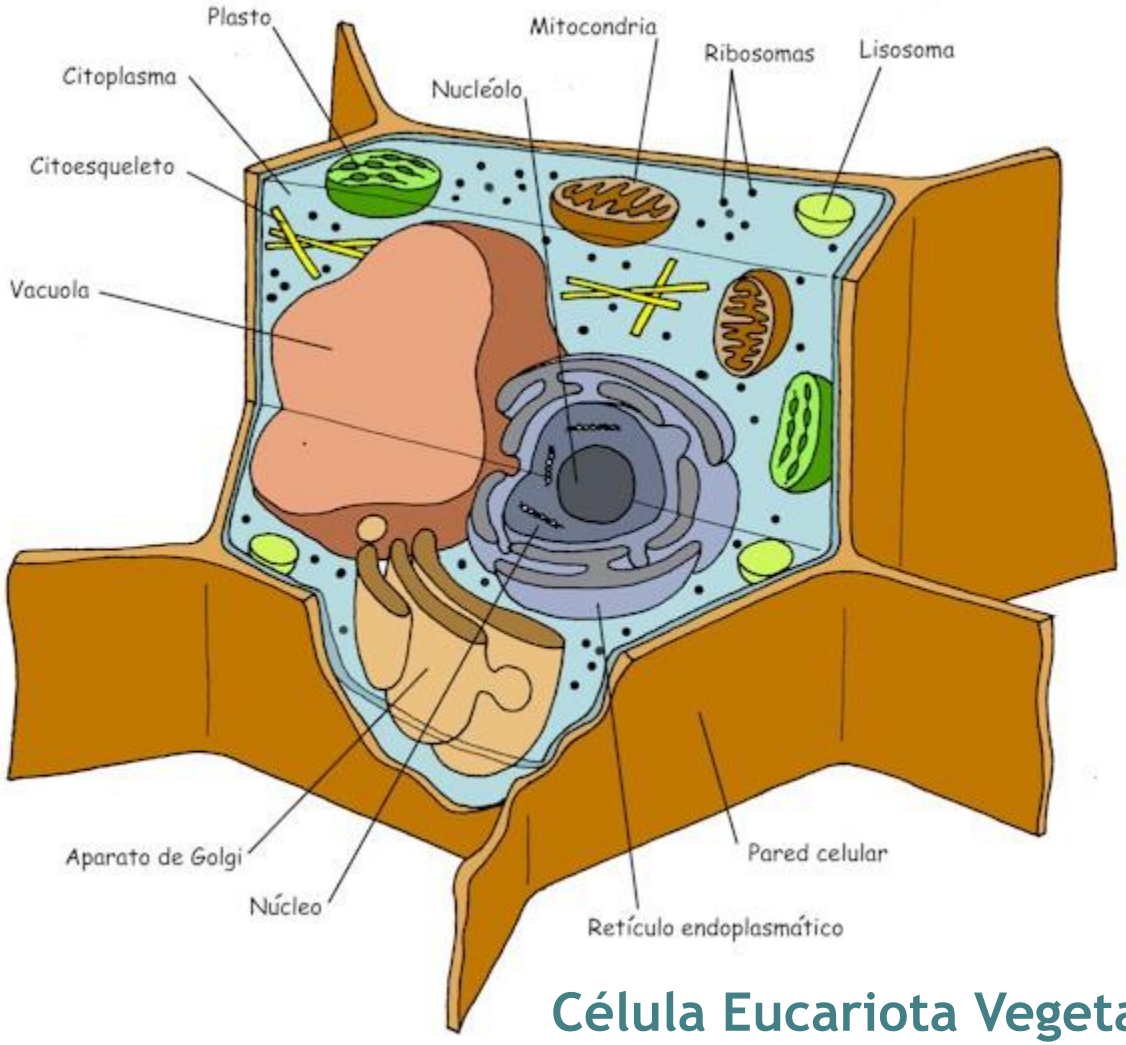
A CÉLULA – unidade estrutural e funcional dos seres vivos

ORGANIZAÇÃO CELULAR



Célula Eucariota Vegetal

ORGANIZAÇÃO CELULAR



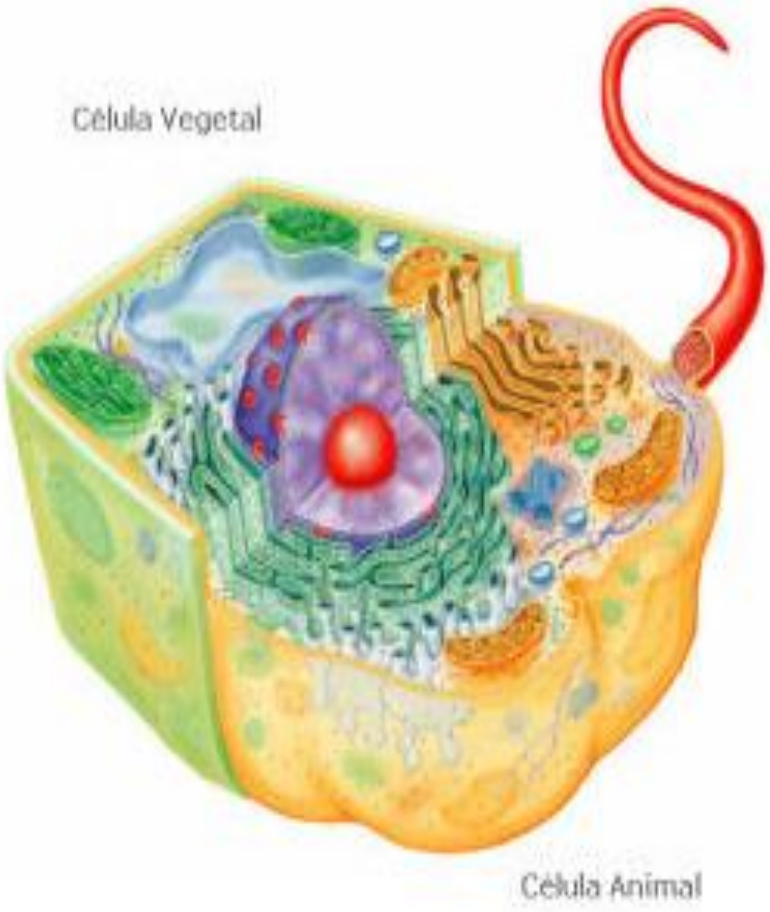
Célula Eucariota Vegetal

ORGANIZAÇÃO CELULAR

Organização Estrutural

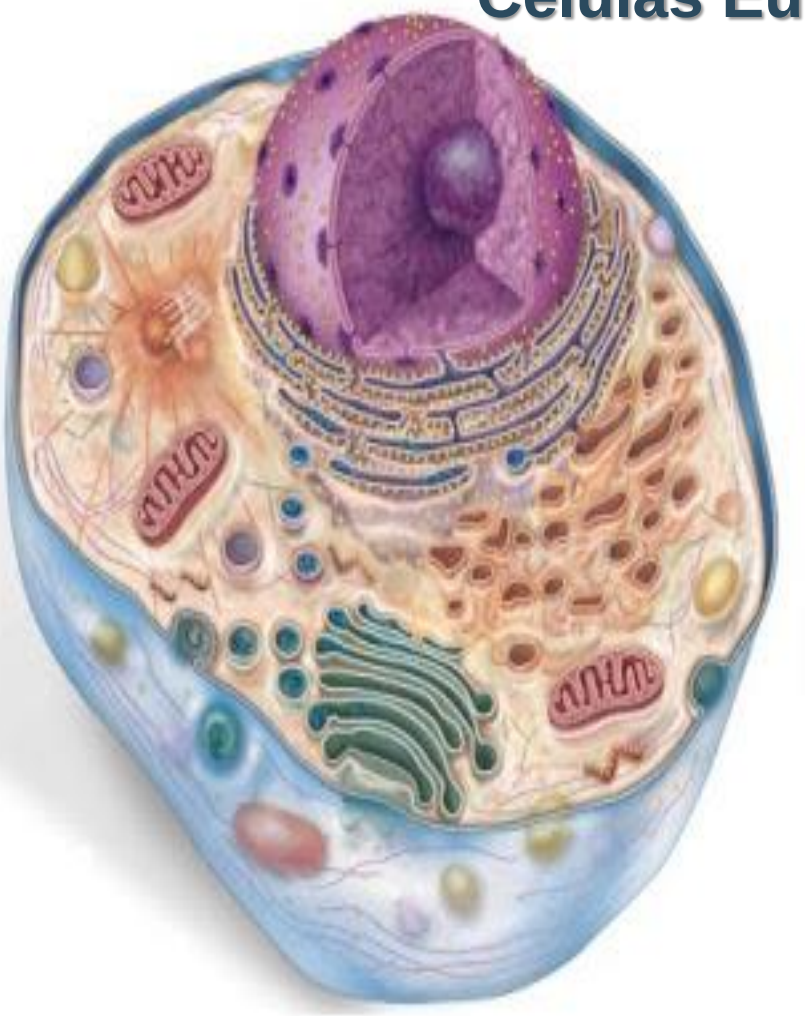
Apesar de haver algumas diferenças estruturais entre as **células animais e células vegetais**, ambas possuem três constituintes fundamentais:

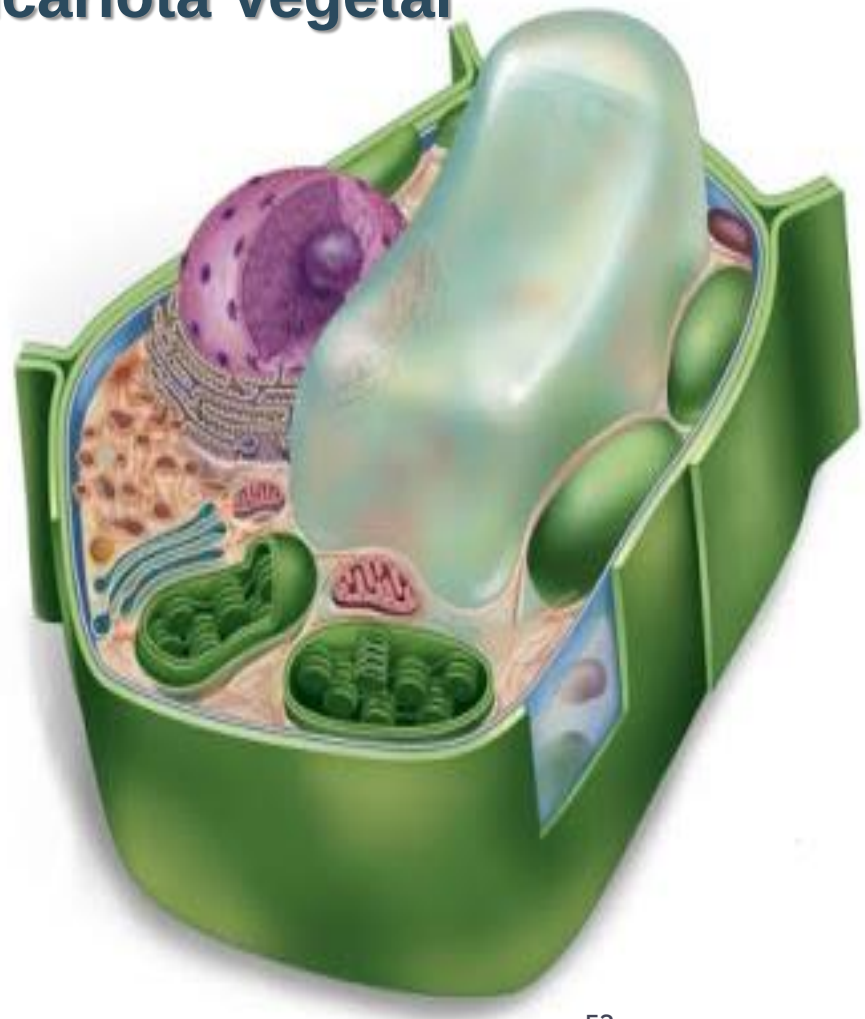
- a membrana celular,
- o citoplasma,
- o núcleo



ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal



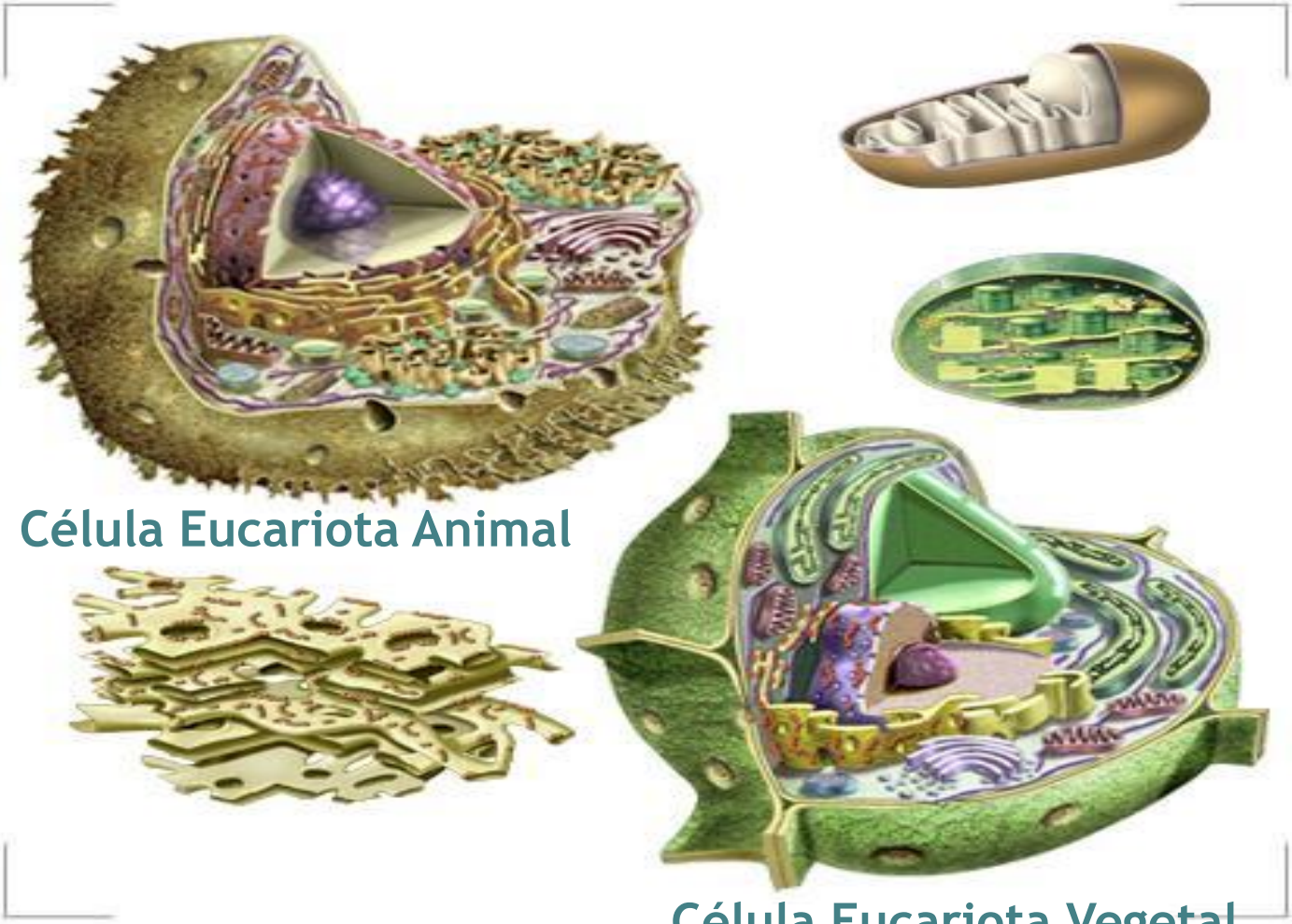


ORGANIZAÇÃO CELULAR

Células Eucariota Vegetal

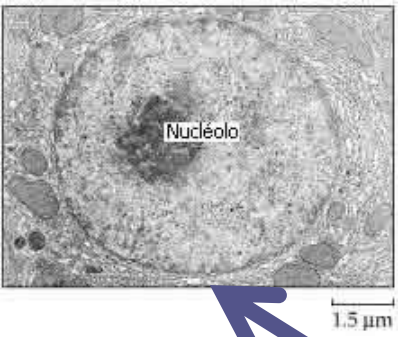
Estrutura celular	Célula Animal	Célula Vegetal
Membrana	+	+
Citoplasma	+	+
Núcleo	+	+
Parede celular	-	+
Cloroplasto	-	+
Centríolos	+	-
Lisossomas	+	+ ou - ?
Grande vacúolo central	-	+
Forma	Redonda	Retangular

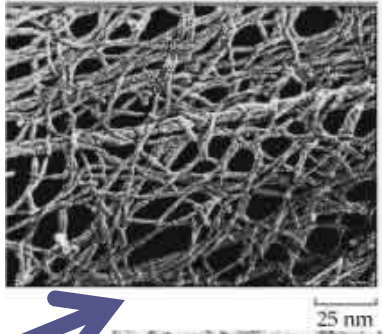
ORGANIZAÇÃO CELULAR

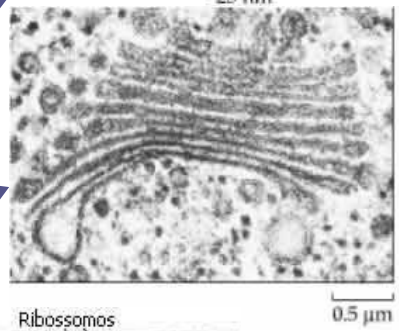


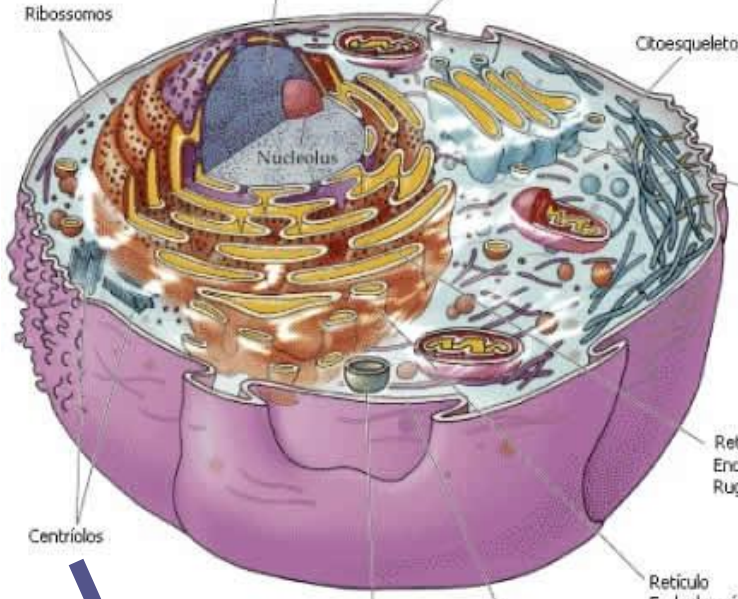
ORGANIZAÇÃO CELULAR

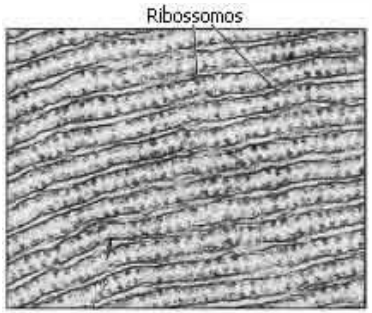
Célula vegetal - Cebola

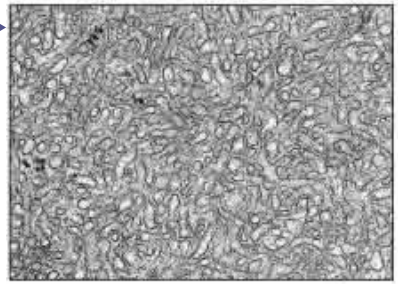


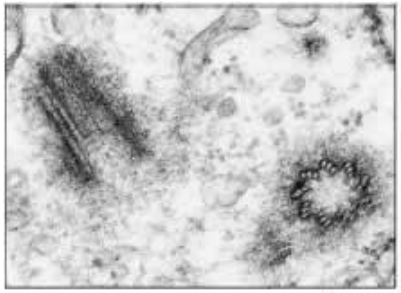






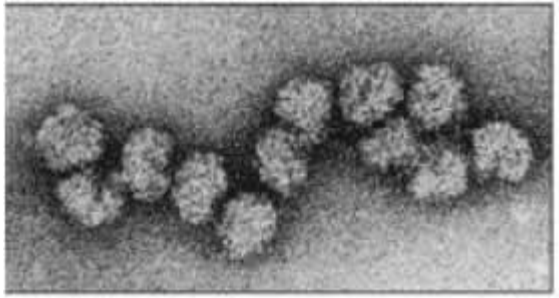


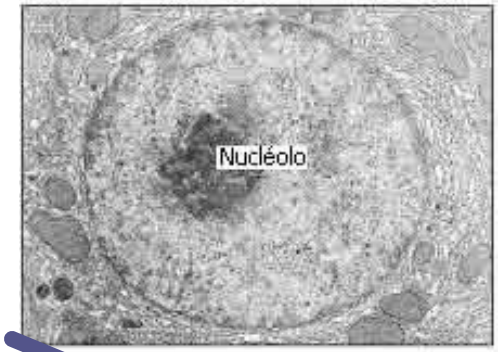


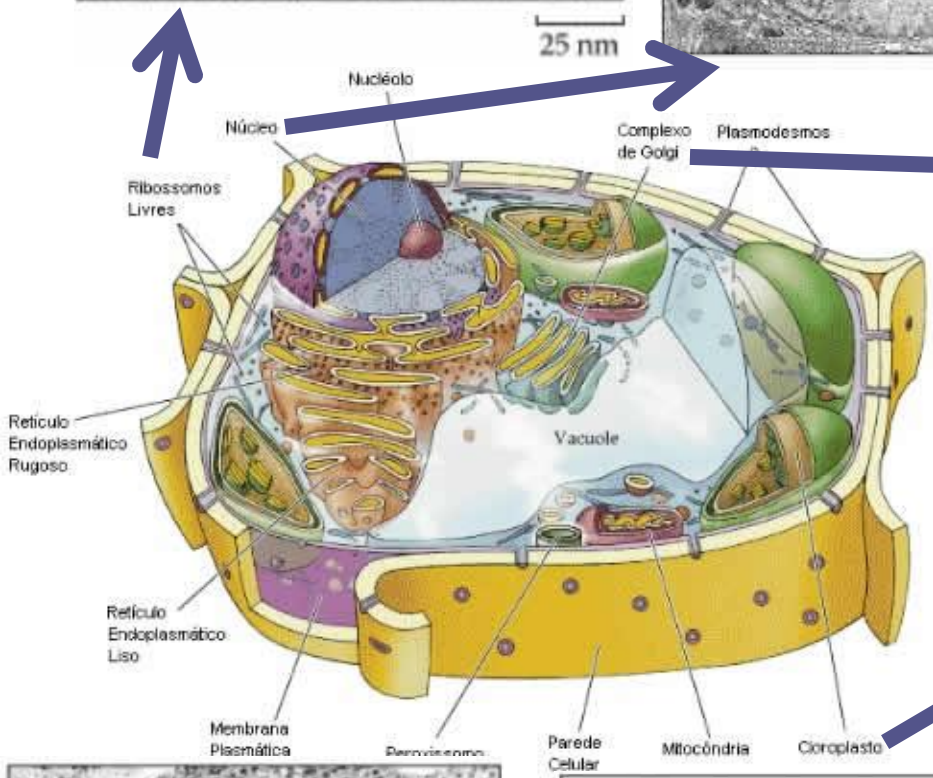


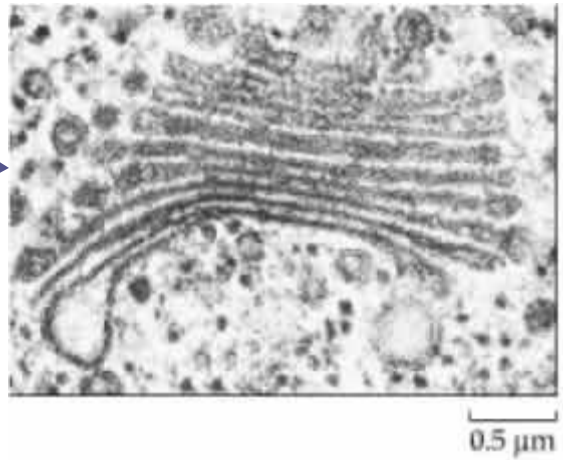
CÉLULA ANIMAL

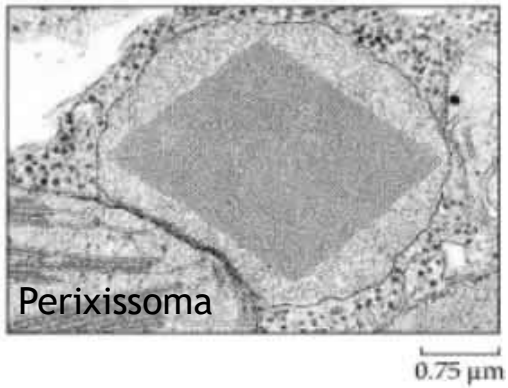
Profa. Isabel Henriques











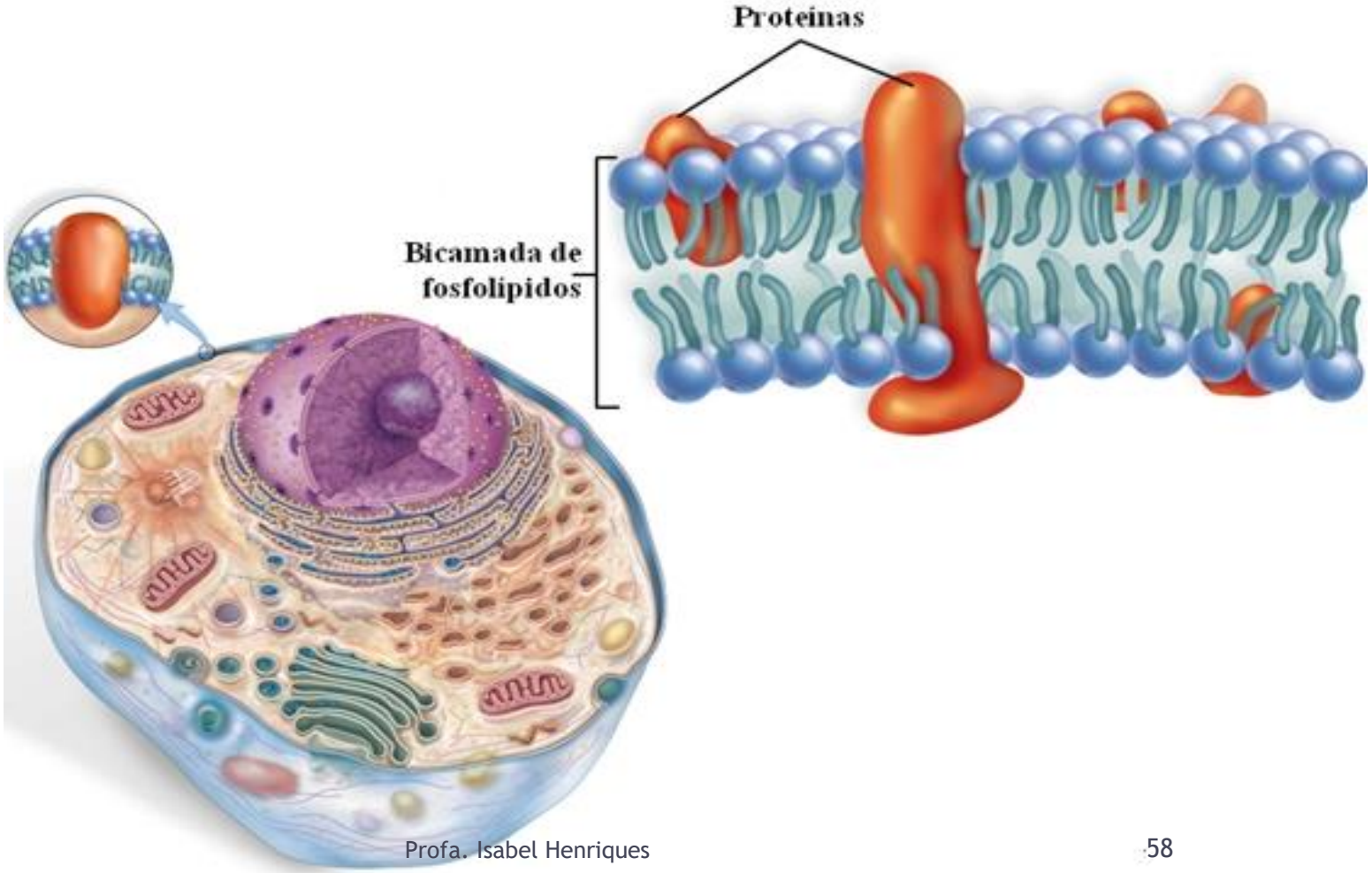
CÉLULA VEGETAL

Profa. Isabel Henriques

A CÉLULA – unidade estrutural e funcional dos seres vivos

MORFOLOGIA CELULAR

Membrana Plasmática

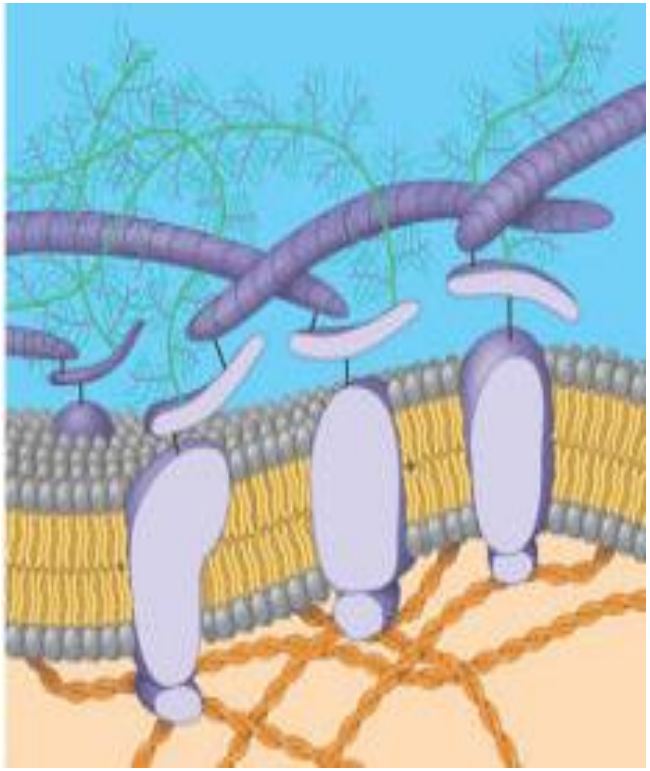


MORFOLOGIA CELULAR

Membrana Plasmática

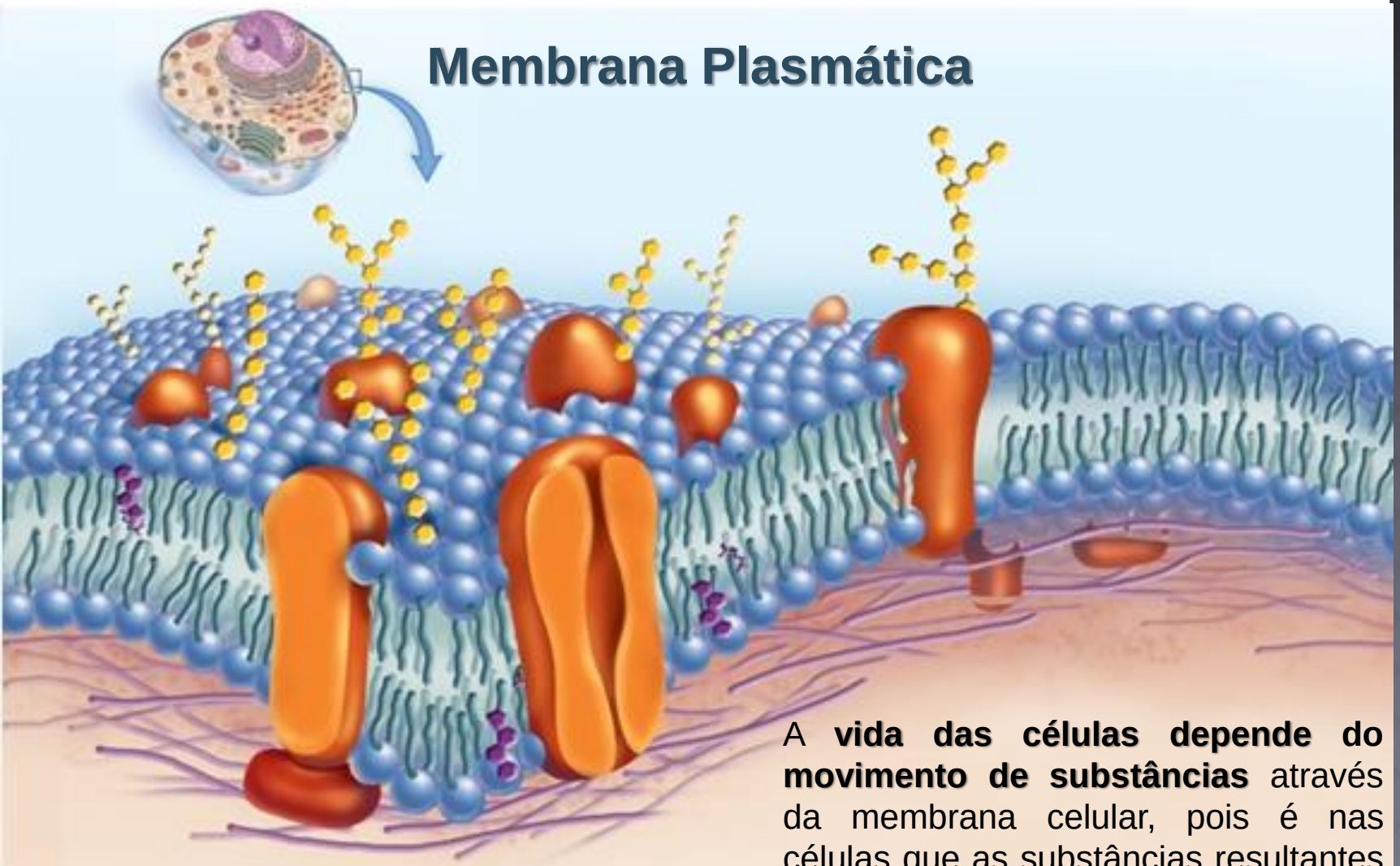
A membrana celular, também designada por membrana plasmática ou membrana citoplasmática, é invisível ao M.O.C. e limita exteriormente o citoplasma, separando o meio intracelular do meio extracelular.

A membrana permite a passagem de substâncias nos dois sentidos.



MORFOLOGIA CELULAR

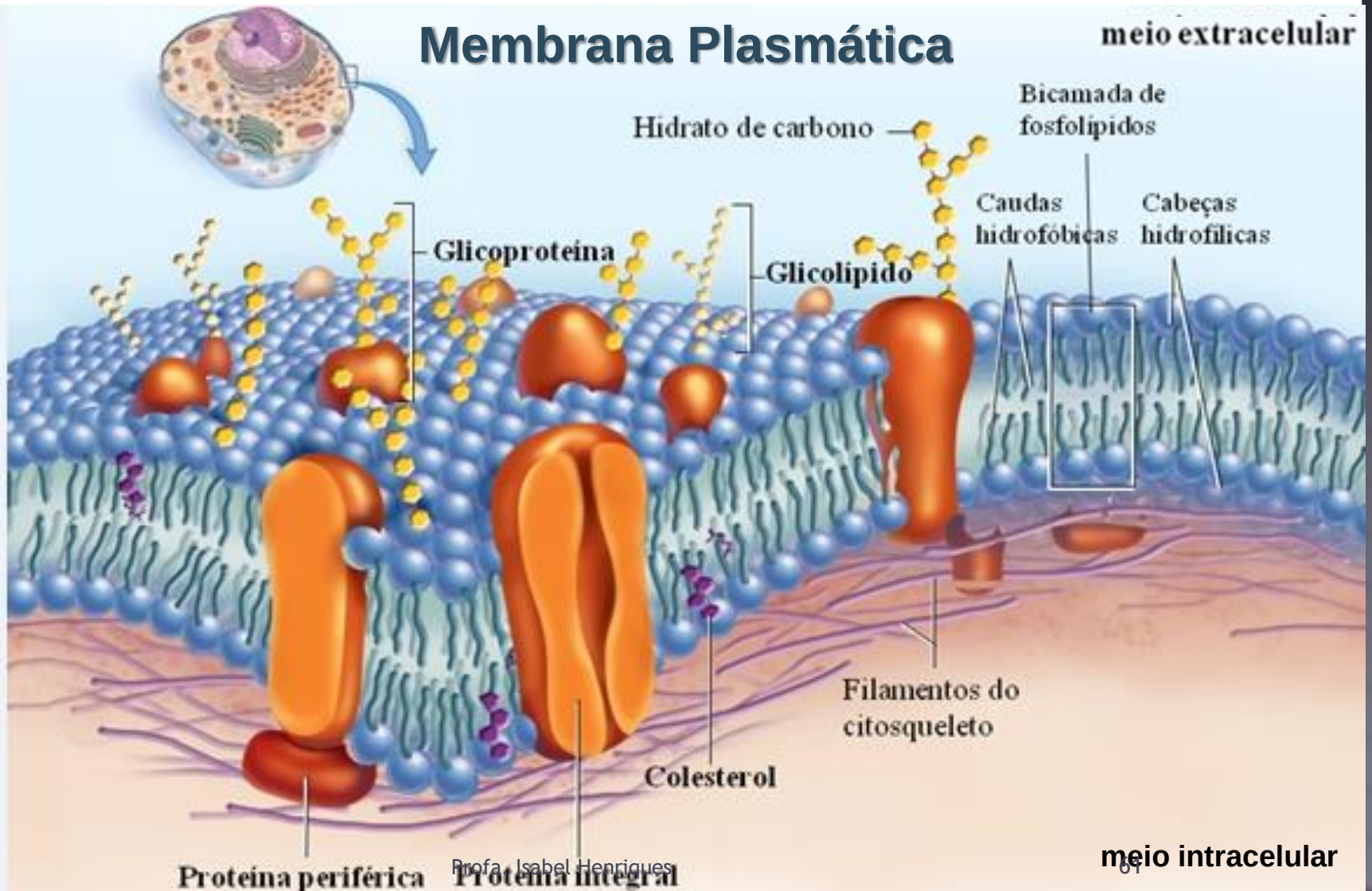
Membrana Plasmática



A **vida das células depende do movimento de substâncias** através da membrana celular, pois é nas células que as substâncias resultantes da **digestão** vão ser utilizadas.

Membrana celular

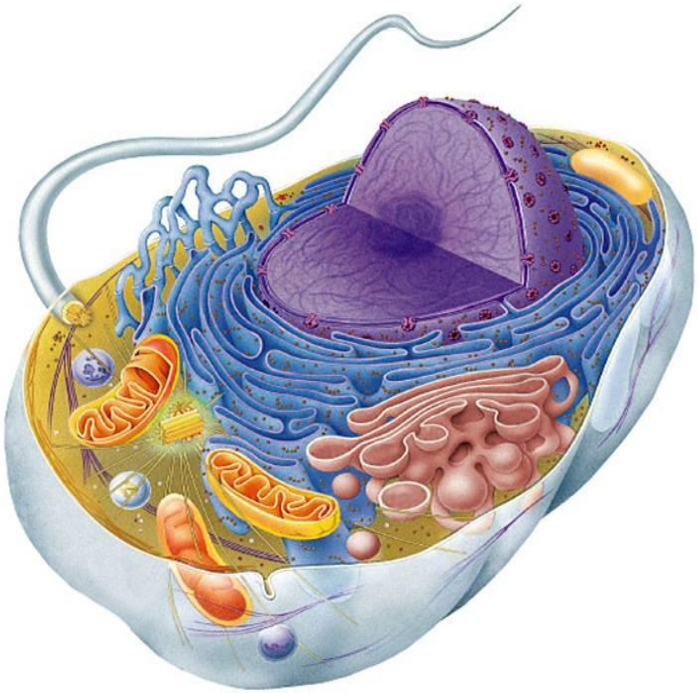
MORFOLOGIA CELULAR



MORFOLOGIA CELULAR

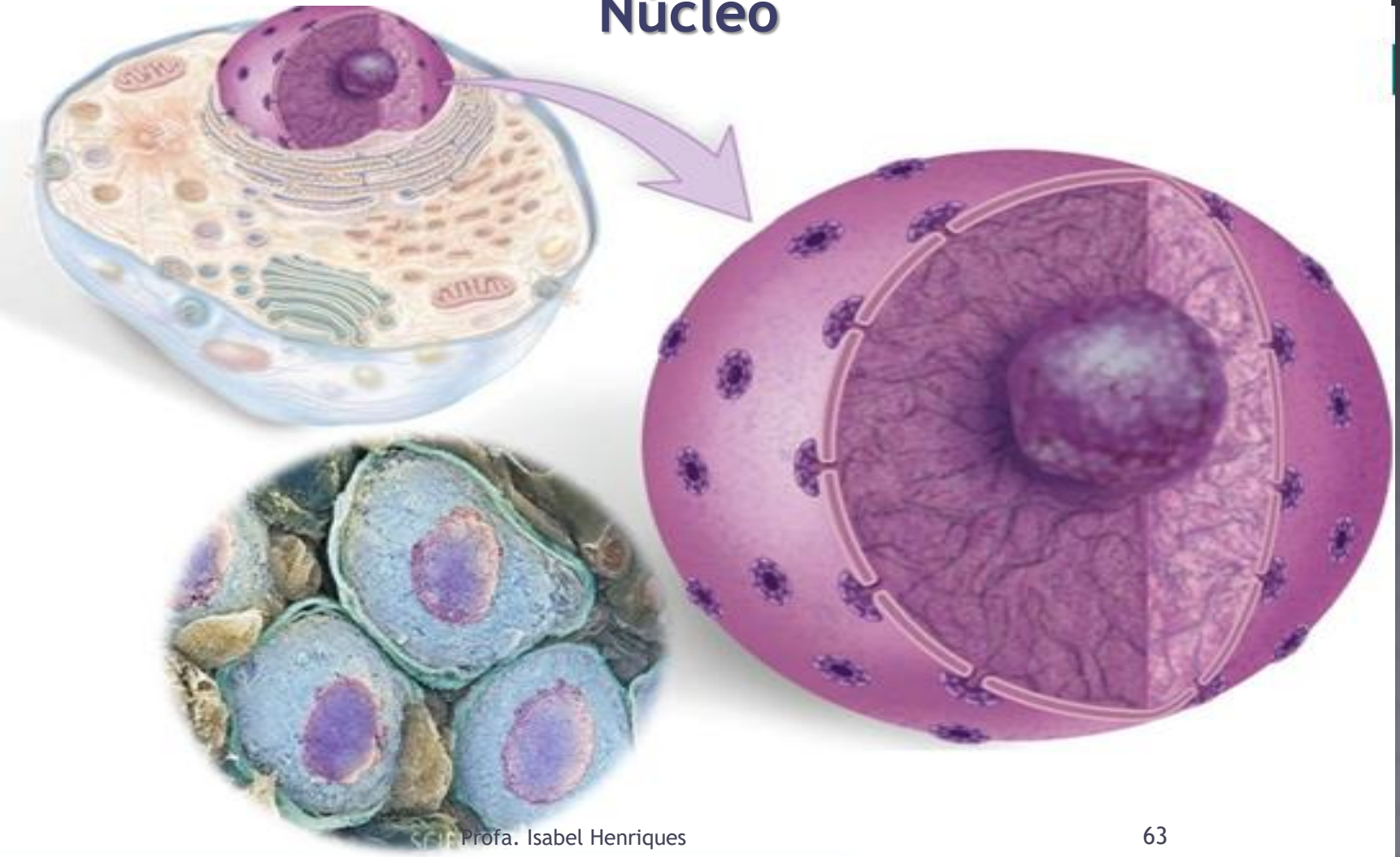
Citoplasma

O citoplasma é limitado pela membrana celular e tem o aspecto de uma **massa semifluida**, o **hialplasma**, na qual se encontram dispersos diversos organelos.



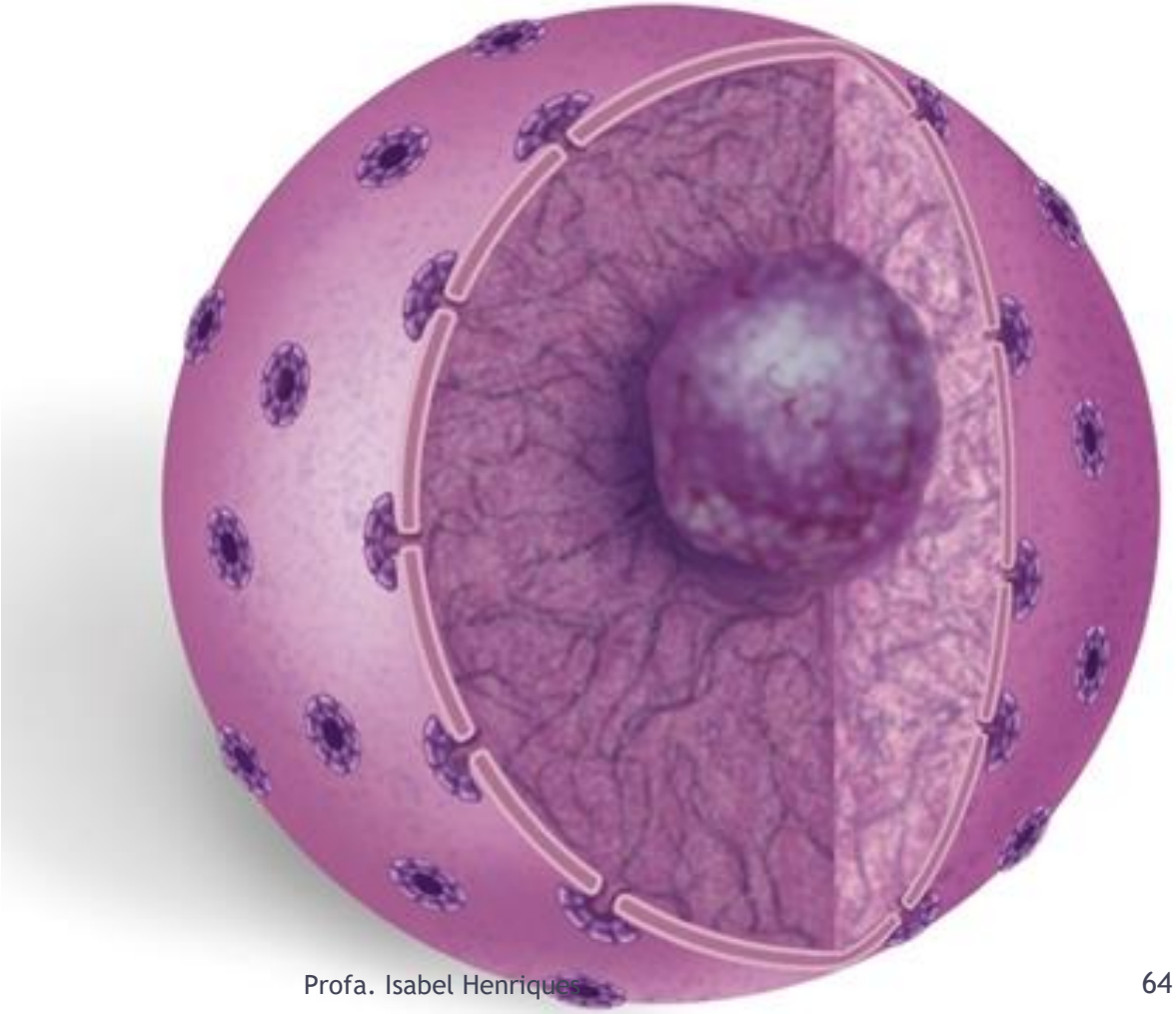
MORFOLOGIA CELULAR

Núcleo



MORFOLOGIA CELULAR

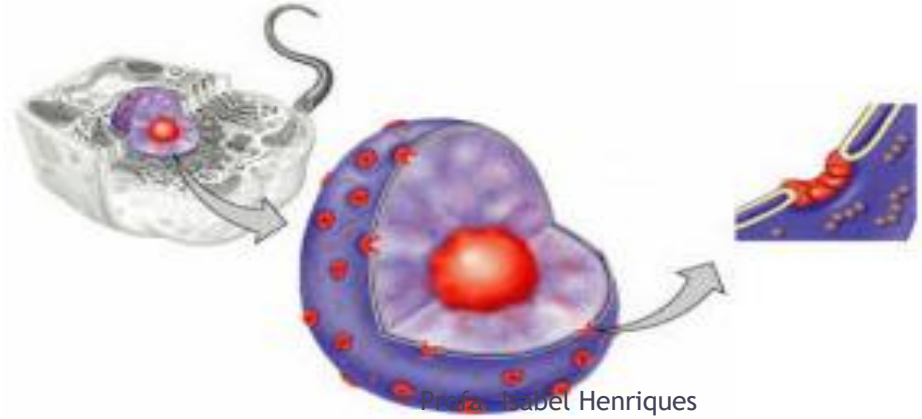
Núcleo

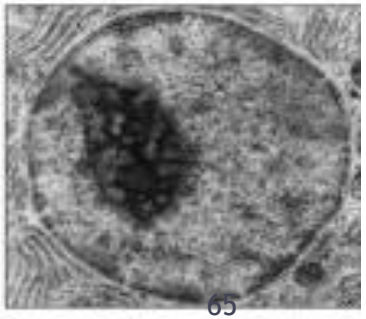


MORFOLOGIA CELULAR

Núcleo

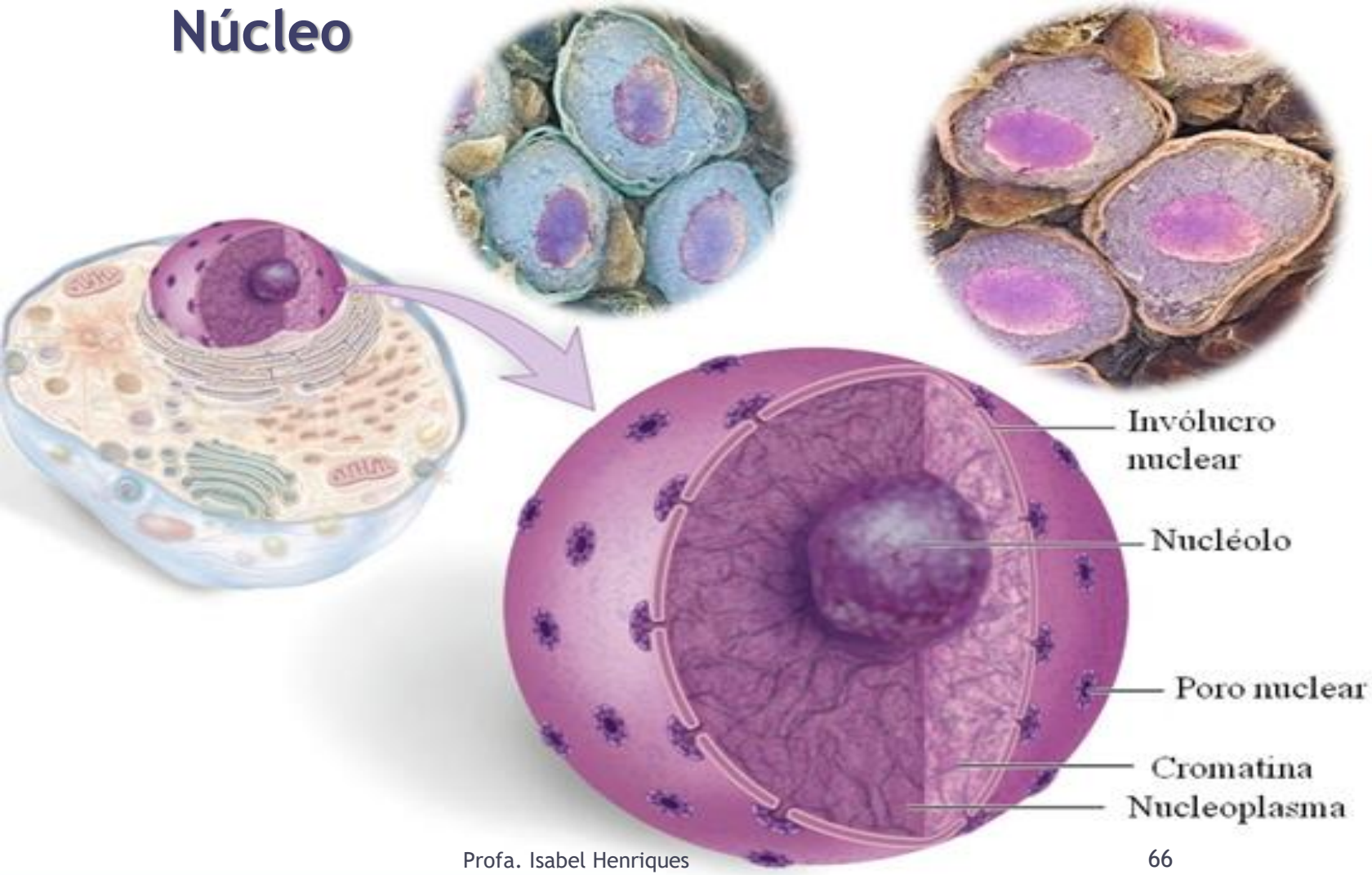
- Rodeado pelo citoplasma e delimitado pelo **invólucro nuclear**.
- Possui **poros**, que permitem a comunicação entre o núcleo e o citoplasma.
- No **interior** do núcleo há um líquido, o **nucleoplasma**, com **cromatina** – material genético e que contem informação essencial ao funcionamento celular.
- Por vezes, no interior do núcleo observa-se o **nucléolo**, constituído por **proteínas e ácidos nucléicos**.





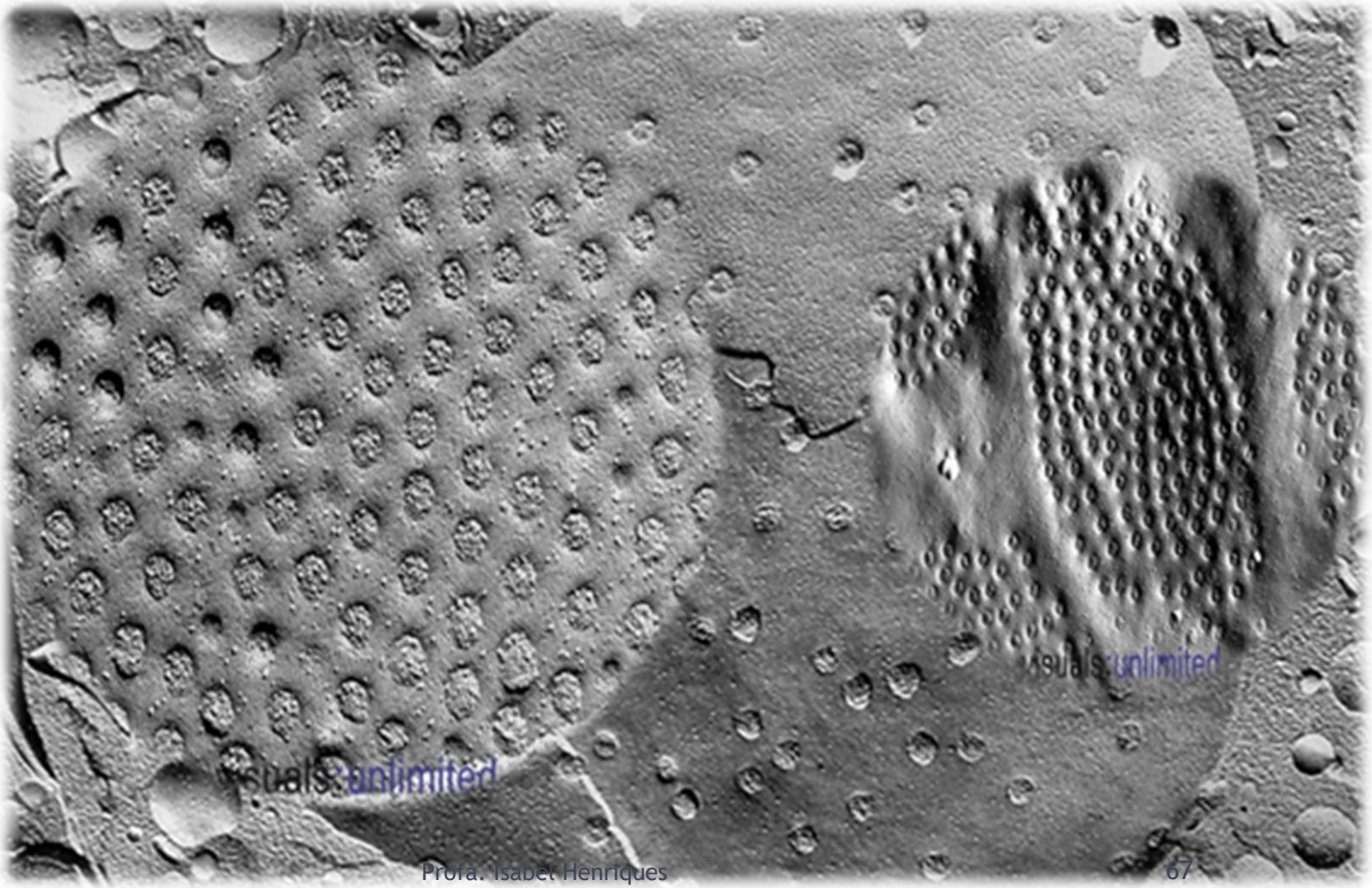
MORFOLOGIA CELULAR

Núcleo



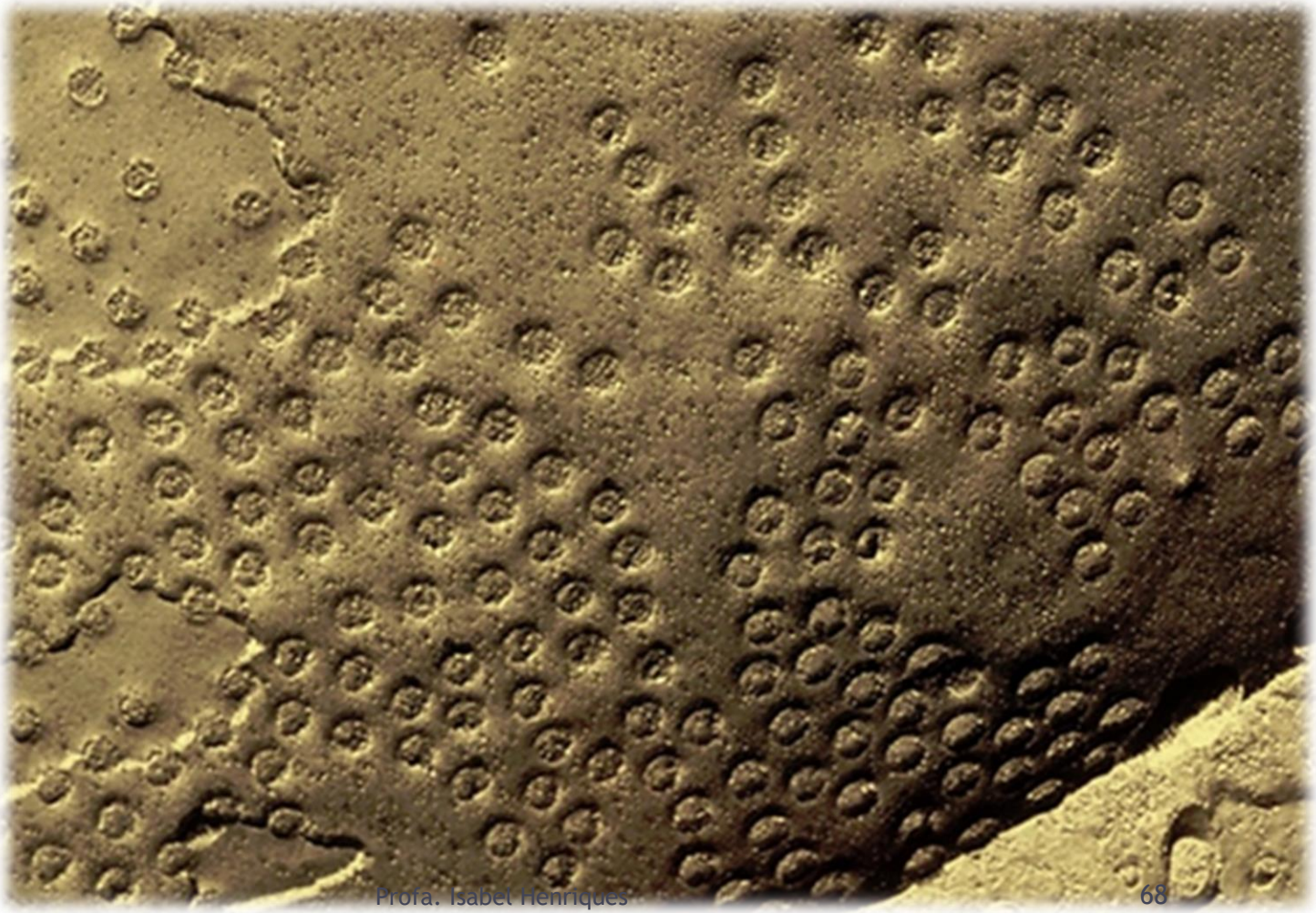
MORFOLOGIA CELULAR

Núcleo - Poros nucleares



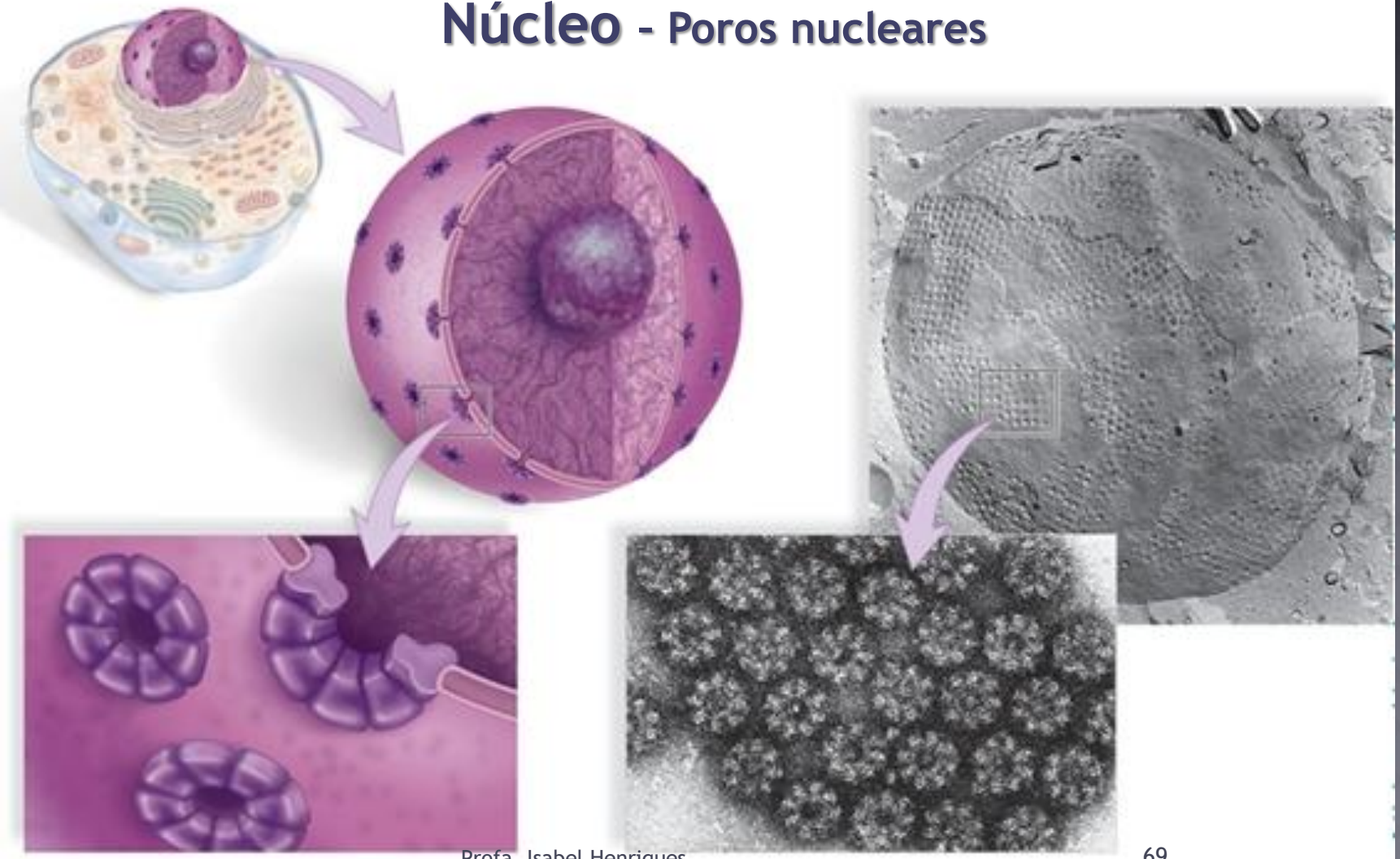
MORFOLOGIA CELULAR

Núcleo - Poros nucleares



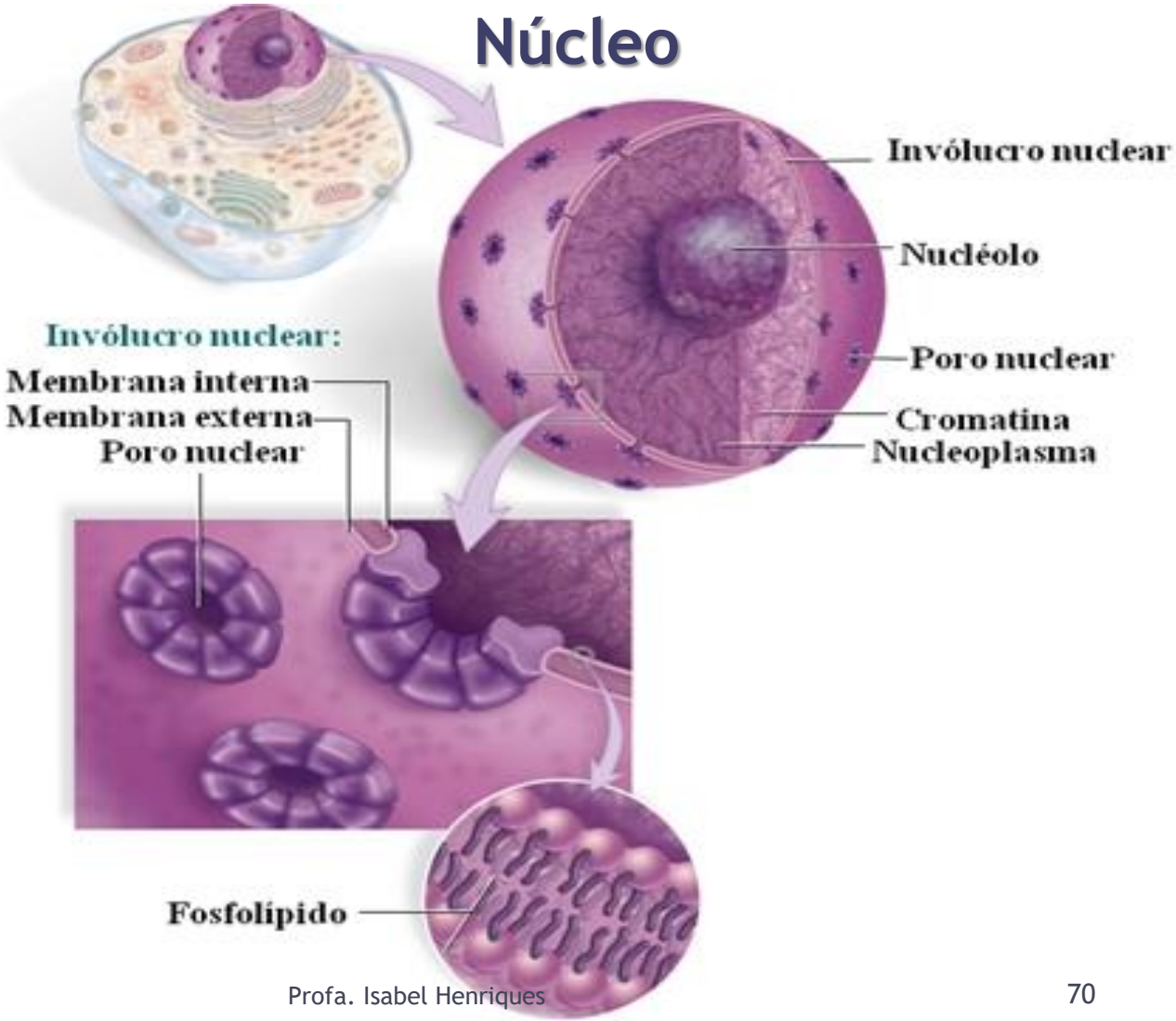
MORFOLOGIA CELULAR

Núcleo - Poros nucleares



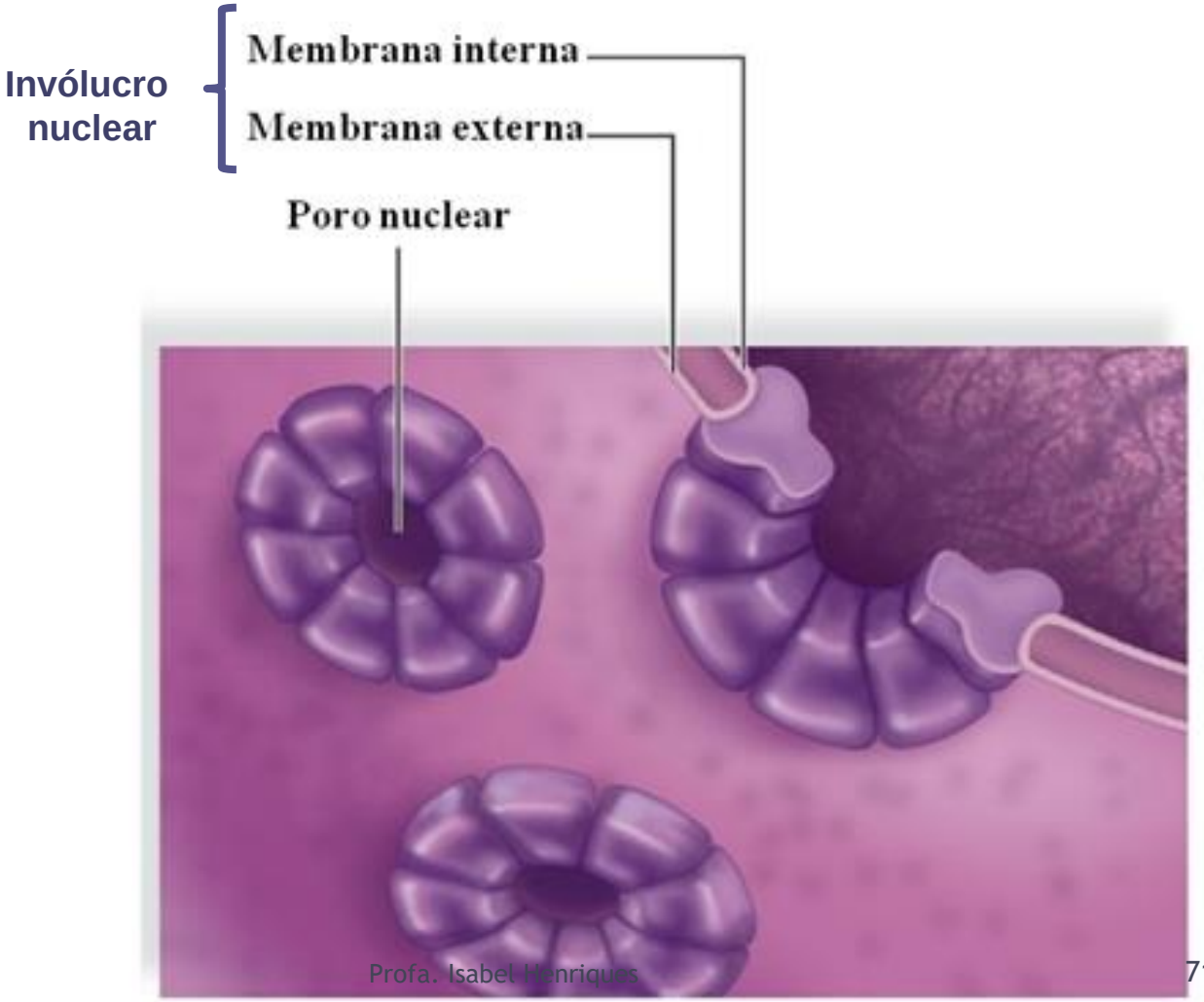
MORFOLOGIA CELULAR

Núcleo



MORFOLOGIA CELULAR

Núcleo - Poros nucleares



MORFOLOGIA CELULAR

Cloroplastos

- Organelos que possuem uma membrana duplas, onde se encontram pigmentos envolvidos na fotossíntese.
- A **fotossíntese** é um processo de síntese de matéria orgânica que ocorre nas células produtoras.

MORFOLOGIA CELULAR

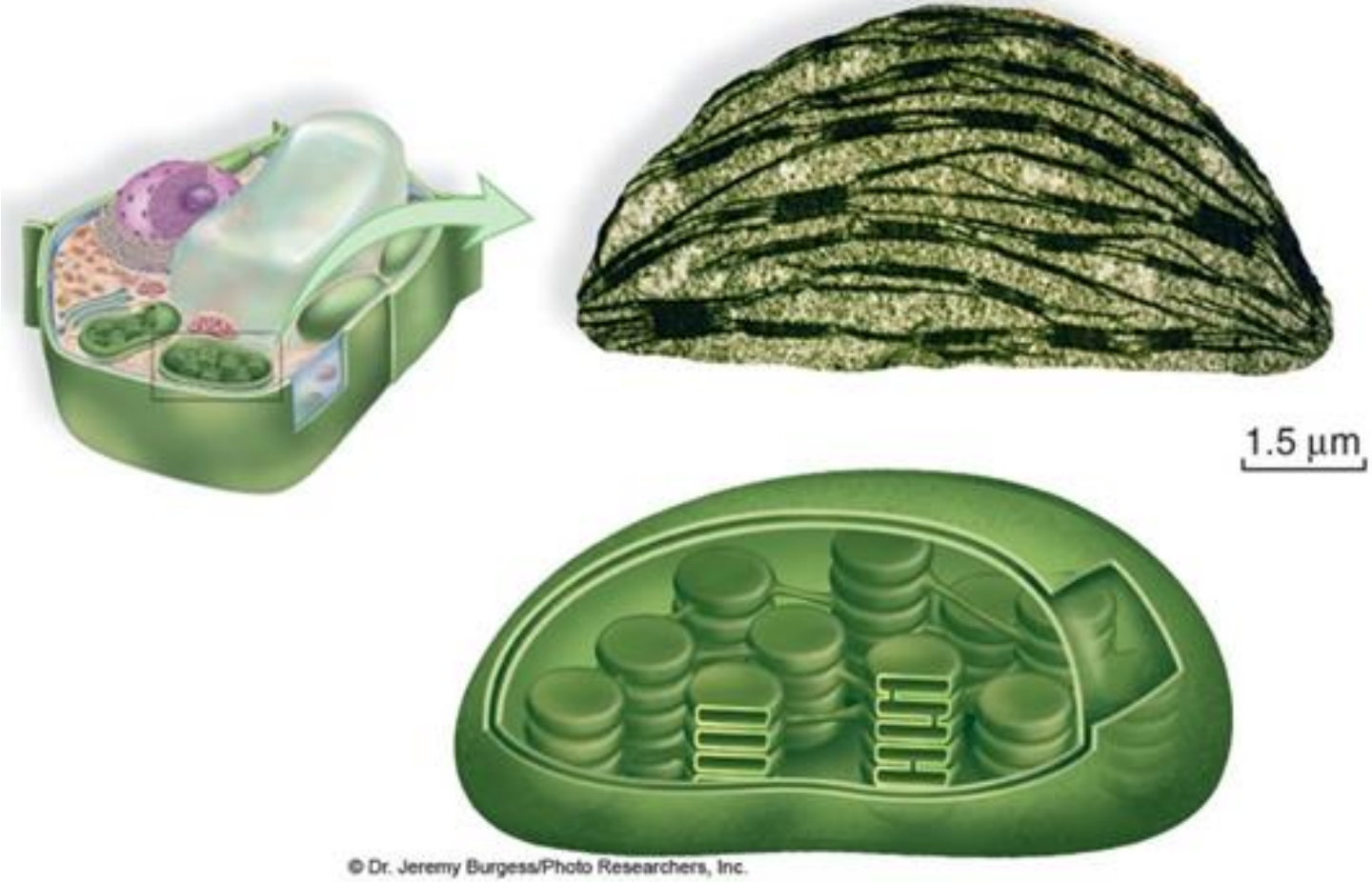
Cloroplastos

MORFOLOGIA CELULAR

Cloroplastos

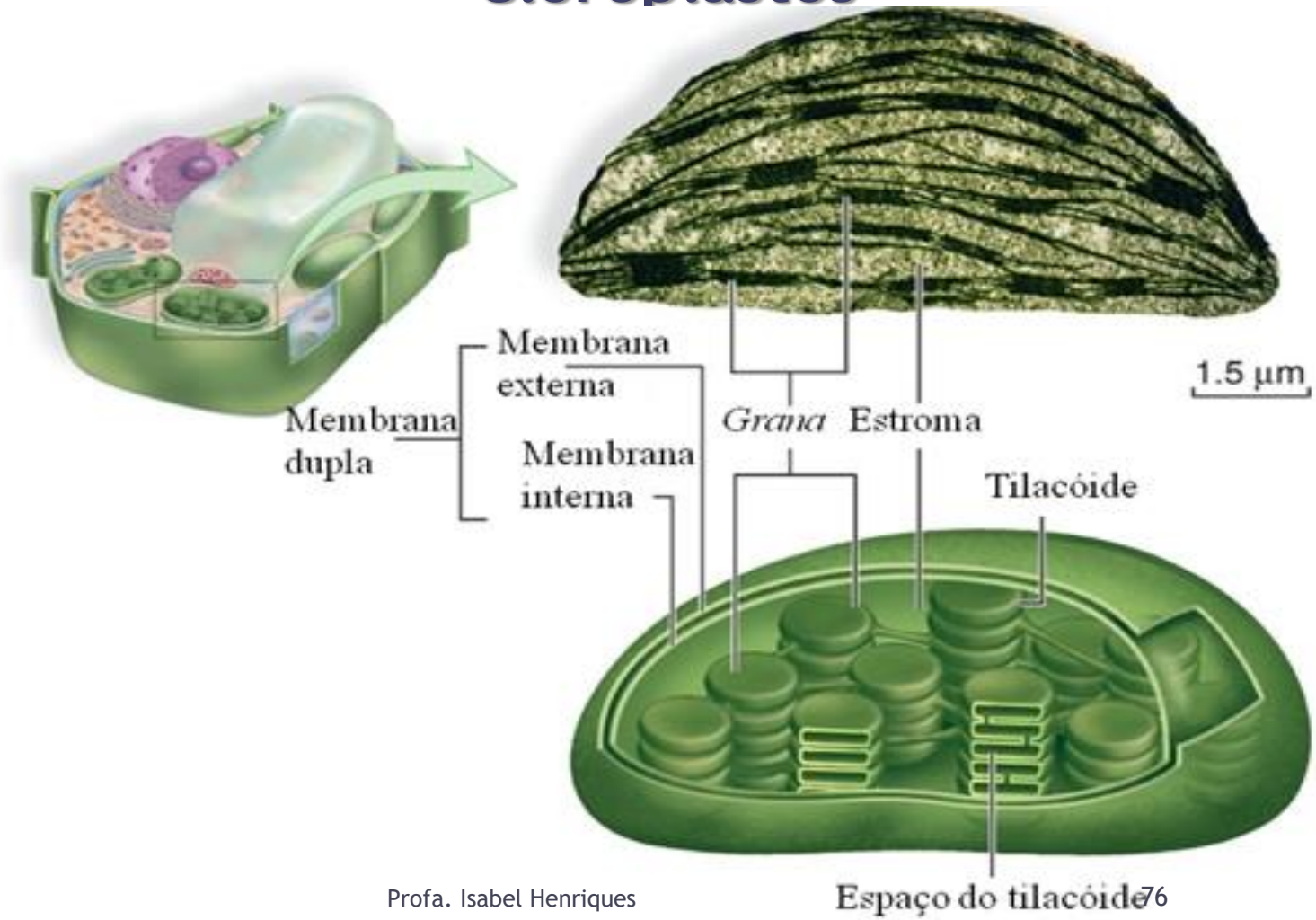
MORFOLOGIA CELULAR

Cloroplastos



MORFOLOGIA CELULAR

Cloroplastos



MORFOLOGIA CELULAR

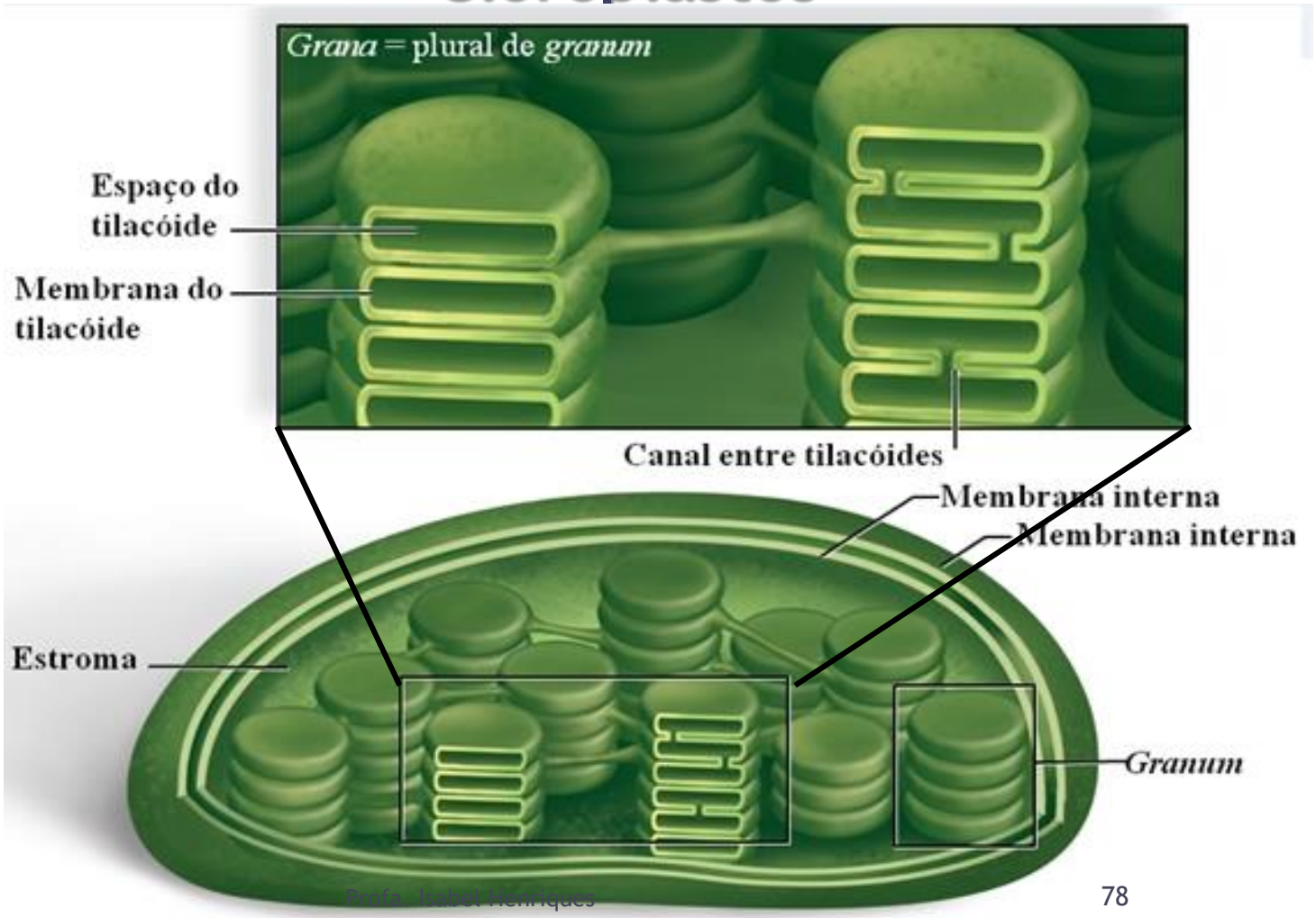
Cloroplastos

37,000×

© Dr. George Chapman/Visuals Unlimited

MORFOLOGIA CELULAR

Cloroplastos



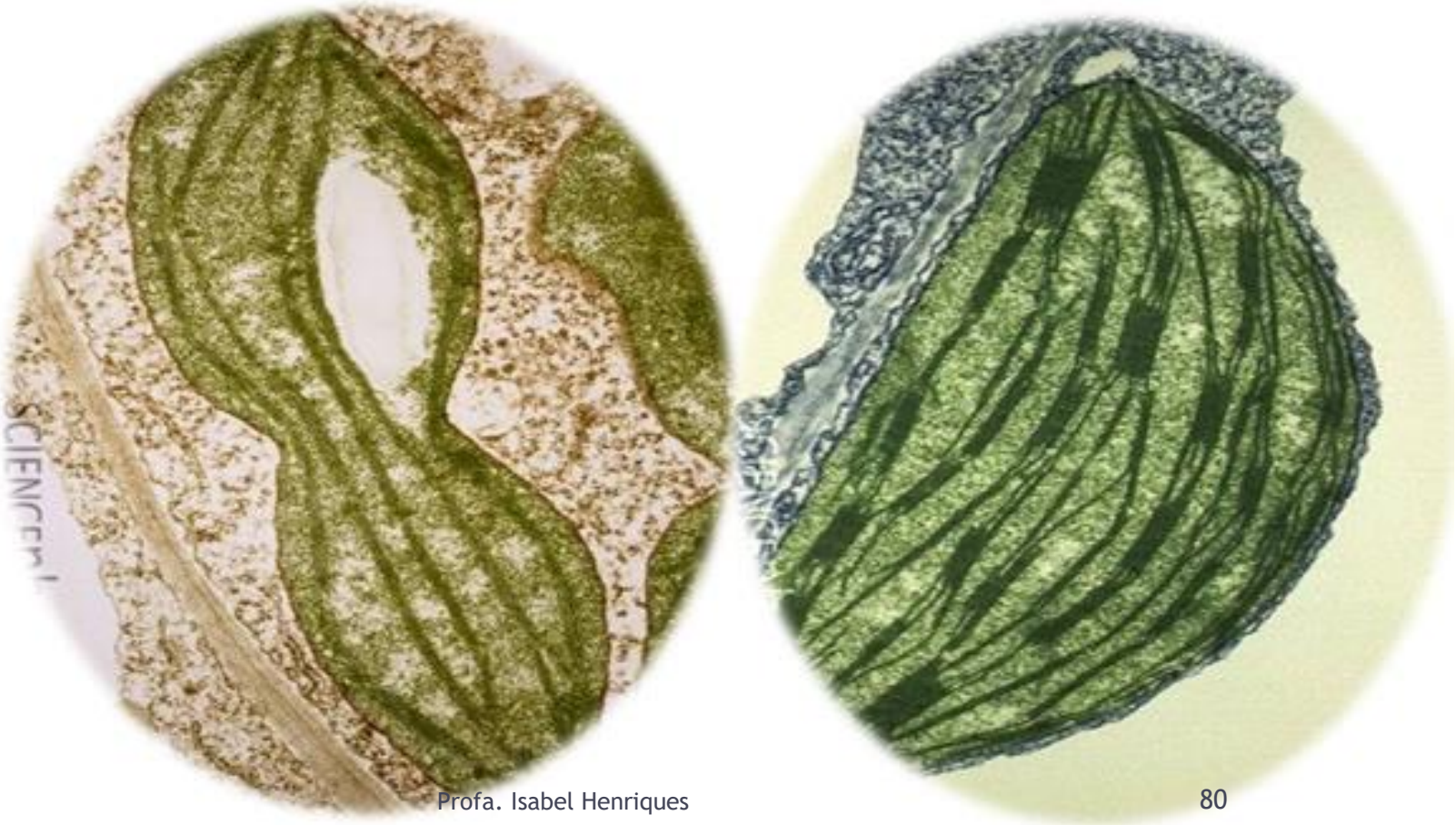
MORFOLOGIA CELULAR

Cloroplastos

MORFOLOGIA CELULAR

Cloroplastos

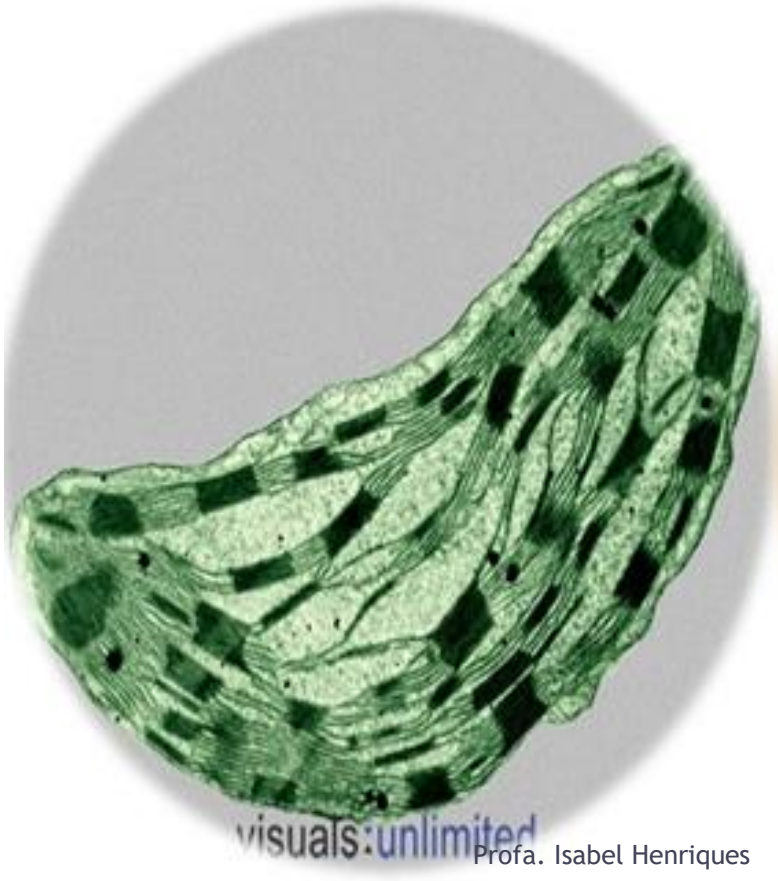
Plantas superiores em divisão (esquerda)



MORFOLOGIA CELULAR

Cloroplastos

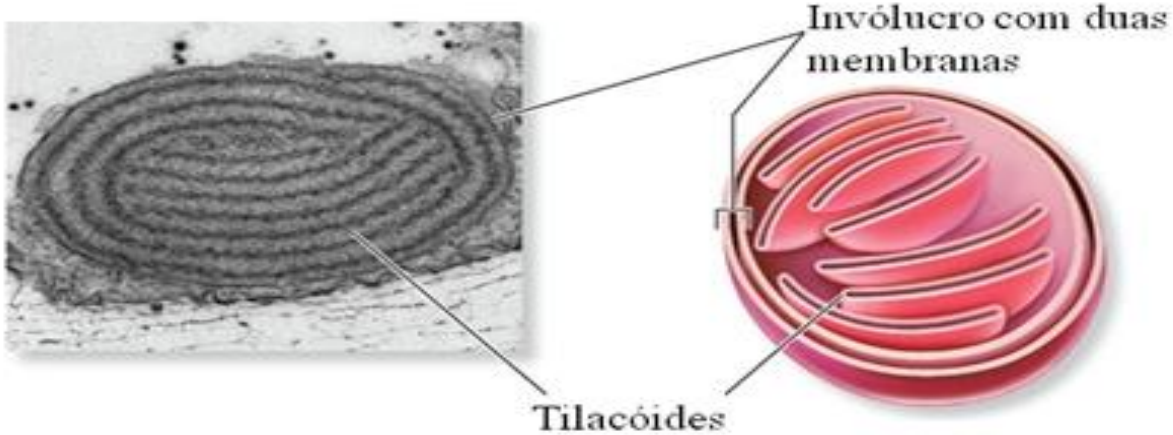
Cloroplasto de plantas superiores vs Cloroplasto de algas vermelhas

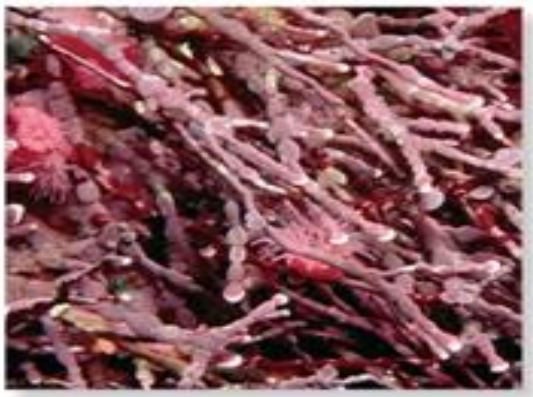


MORFOLOGIA CELULAR

Cloroplastos

Cloroplasto de algas vermelhas e Cloroplasto de algas castanhas



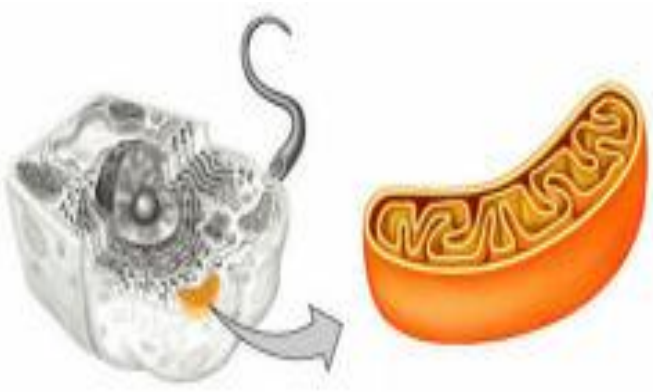


Calliarthron

Chondrus crispus

a: Joe Scott, D[illegible] of William and Mary, Williamsburg, VA 23187; b: © Dr. Brandon D. Cole/CORBIS; c: © Walter H. Hodge/Peter Arnold, Inc.

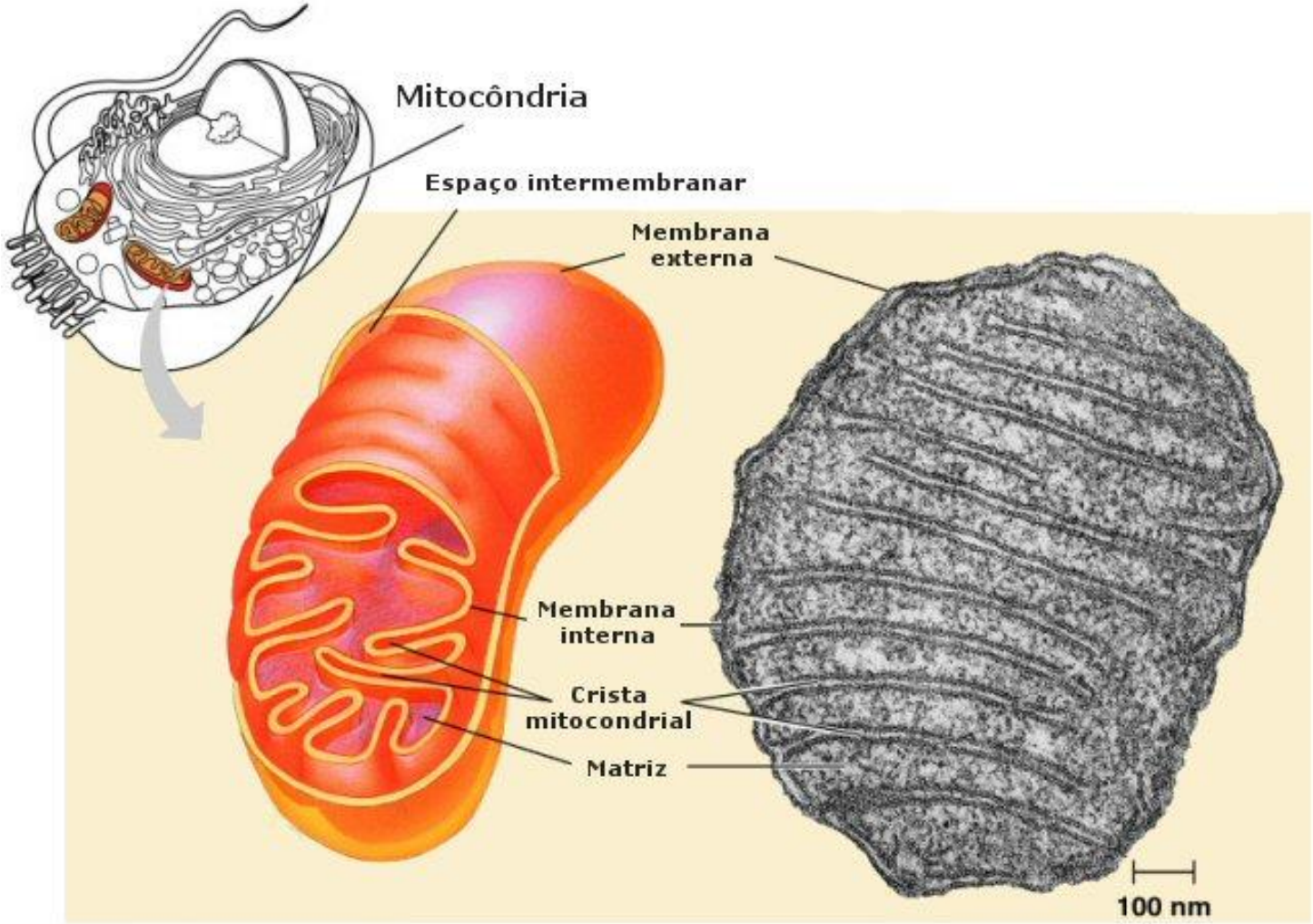
MORFOLOGIA CELULAR



Mitocôndrias

- Organelos que possuem **duas membranas**, uma externa e outra interna.
- A **membrana interna** pode apresentar **invaginações** para o interior.
- As mitocôndrias estão envolvidas em processos de **obtenção de energia**, por parte da célula.

MORFOLOGIA CELULAR

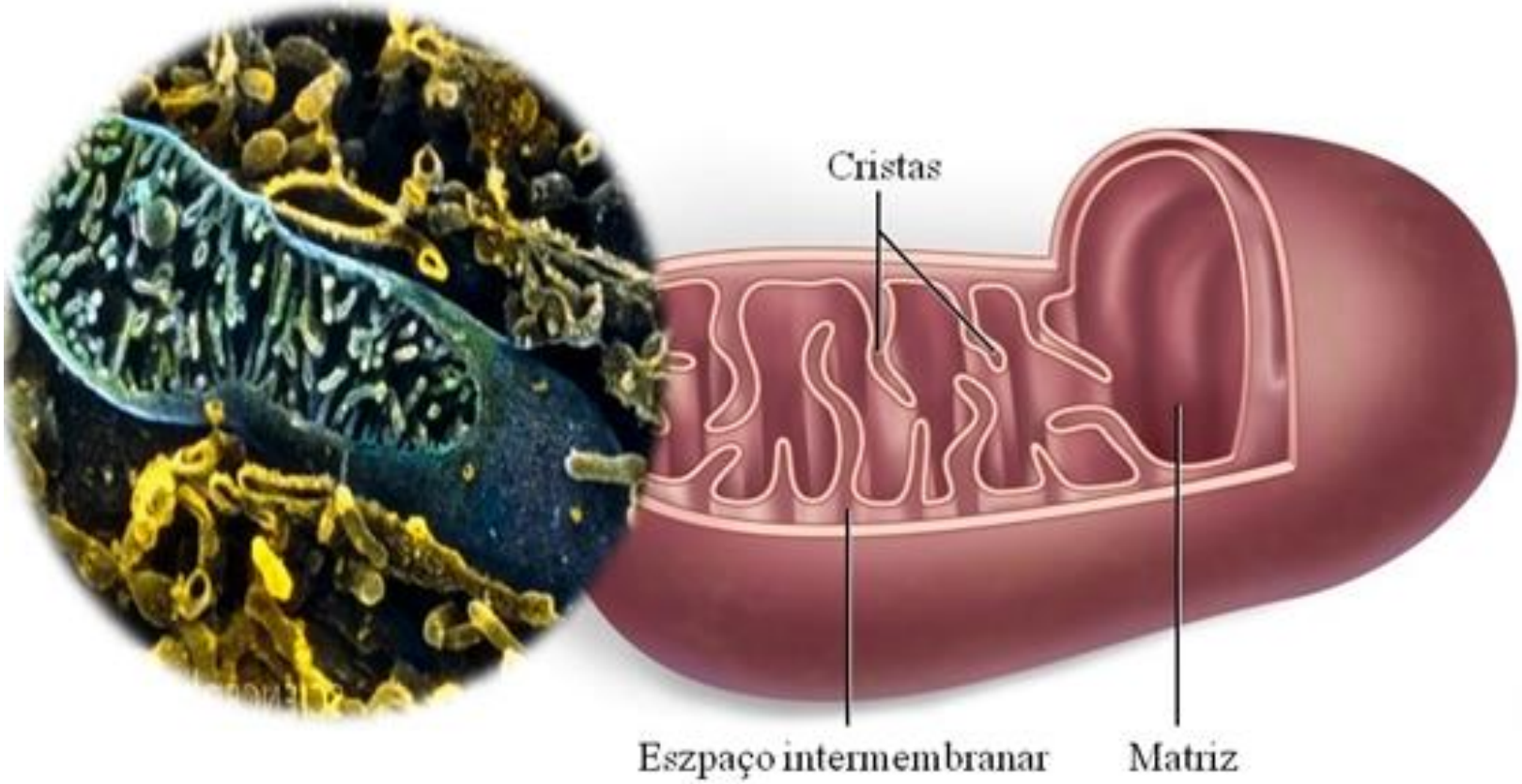


MORFOLOGIA CELULAR

Mitocôndrias

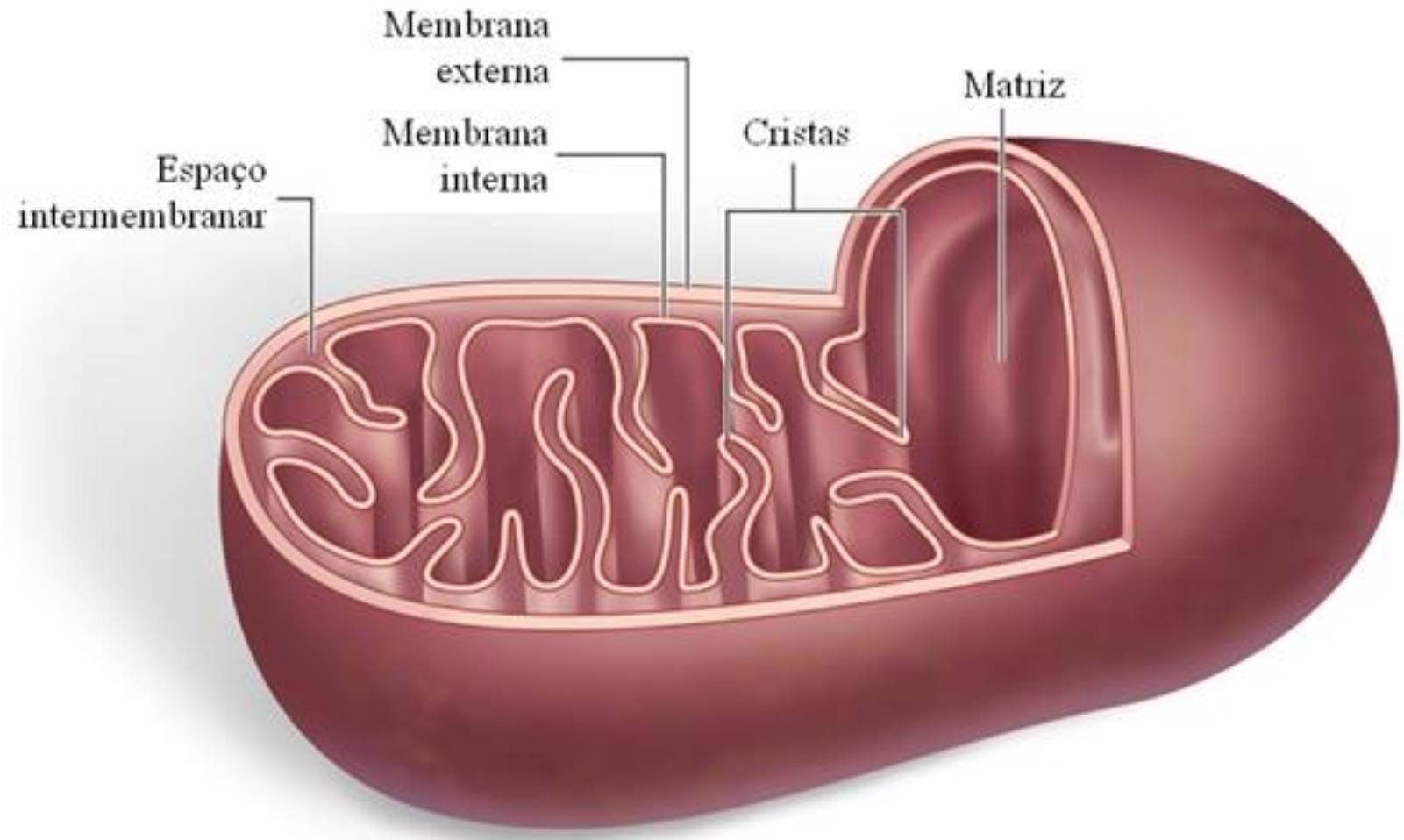
MORFOLOGIA CELULAR

Mitocôndrias



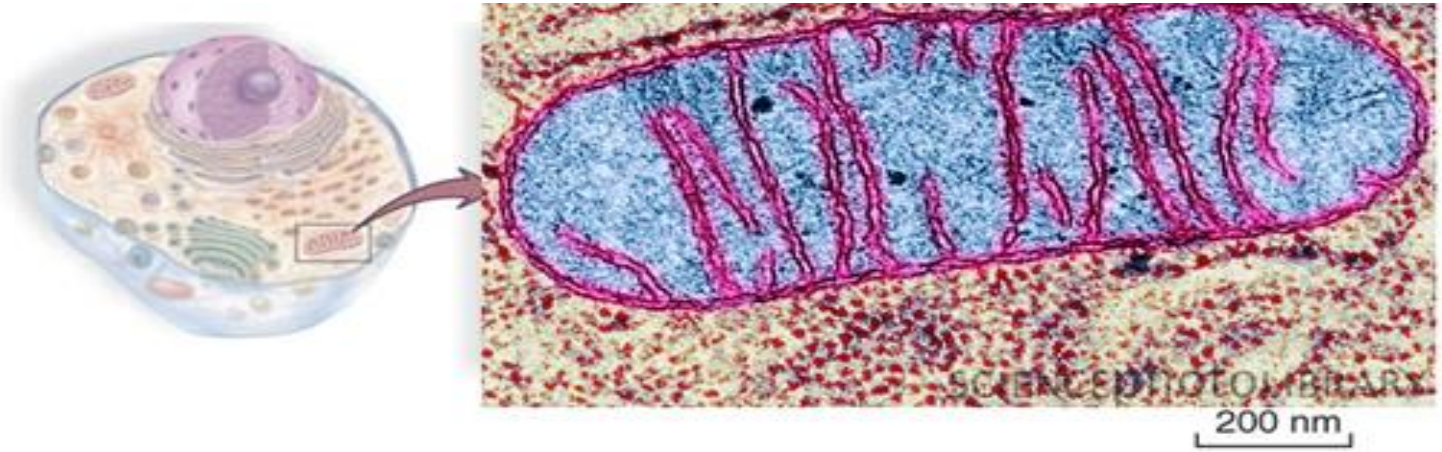
MORFOLOGIA CELULAR

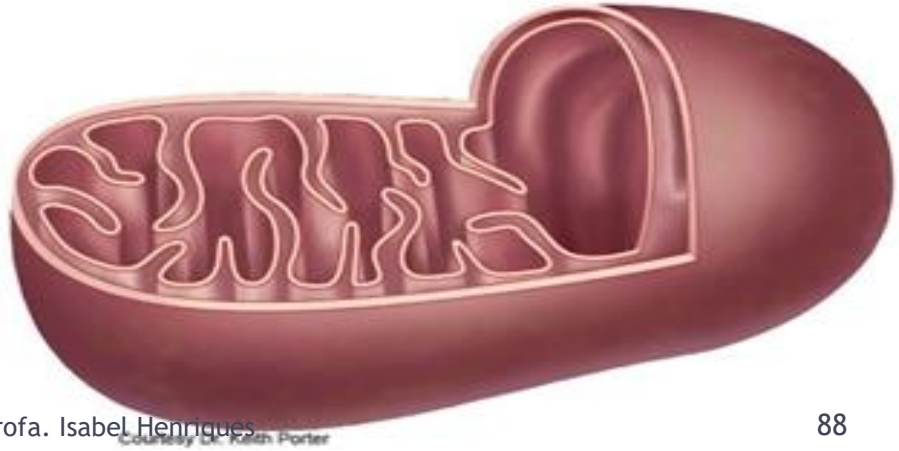
Mitocôndrias



MORFOLOGIA CELULAR

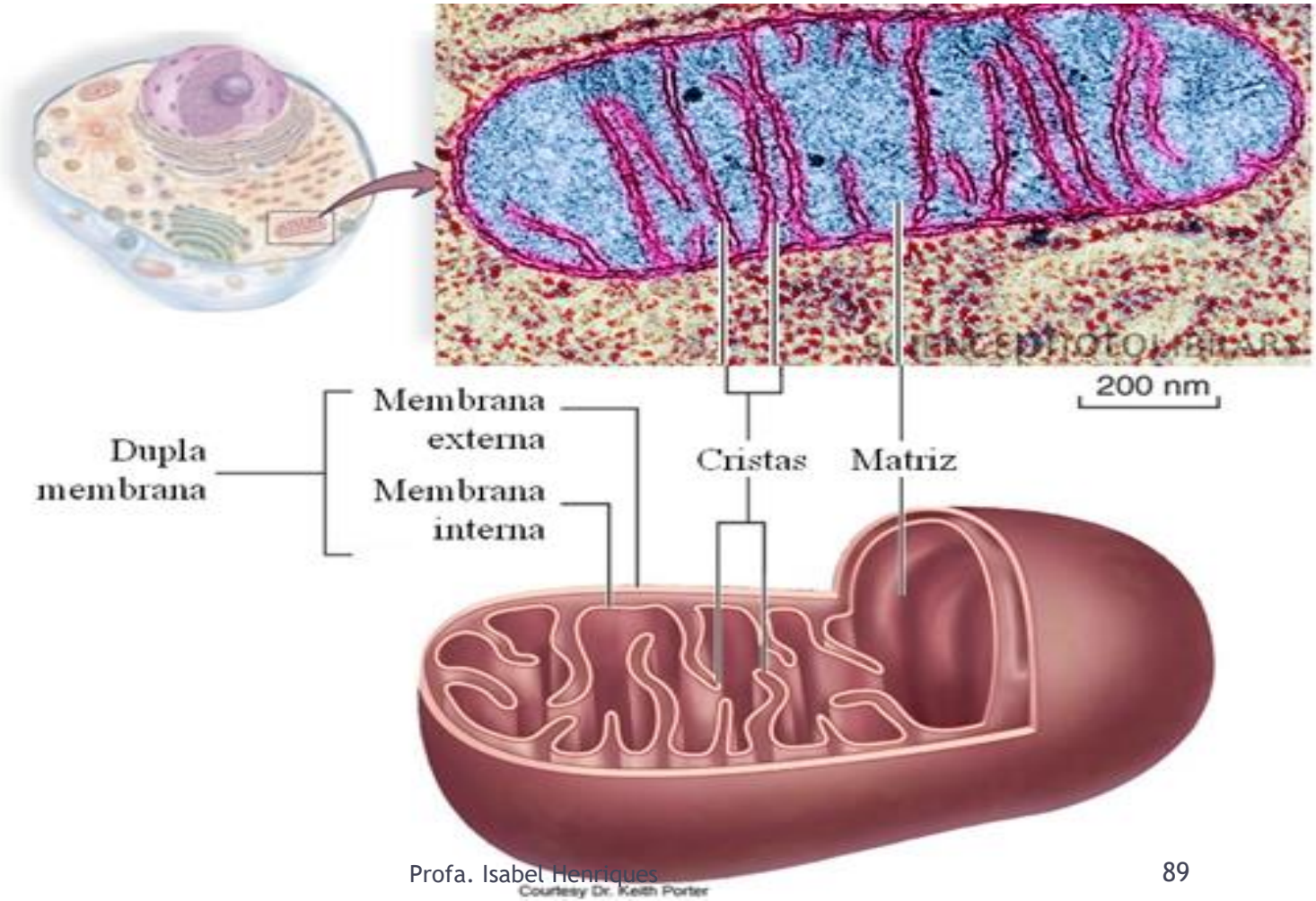
Mitocôndrias





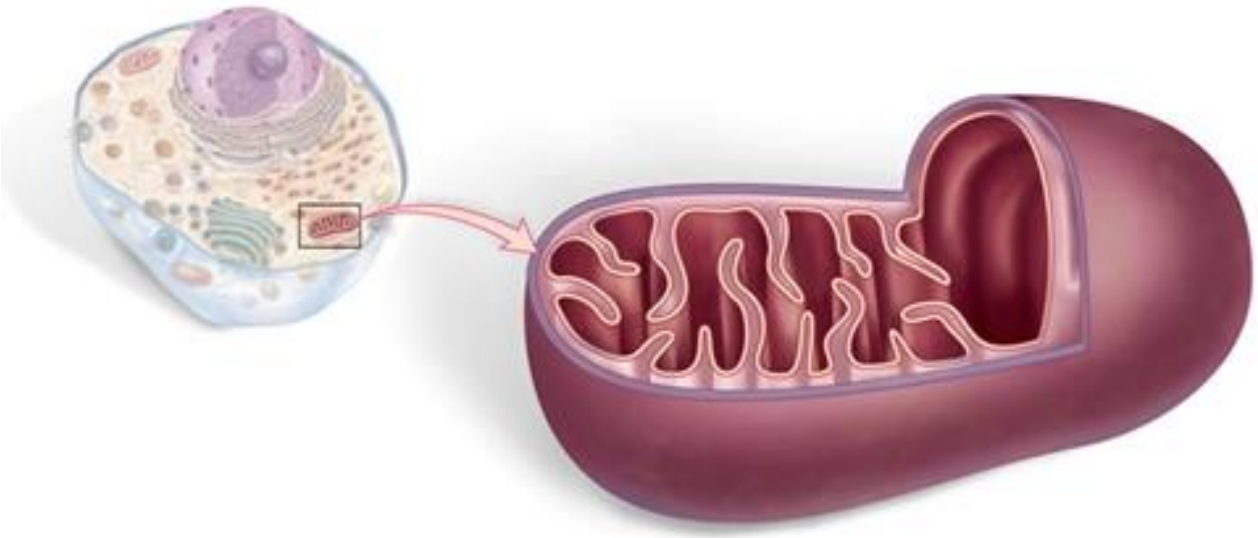
MORFOLOGIA CELULAR

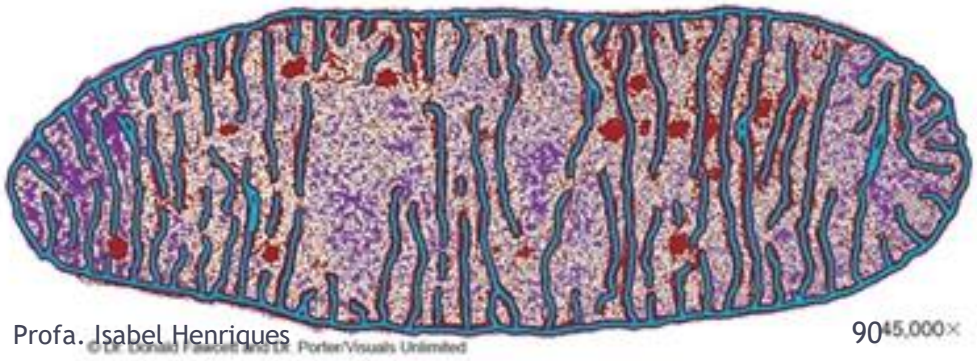
Mitocôndrias



MORFOLOGIA CELULAR

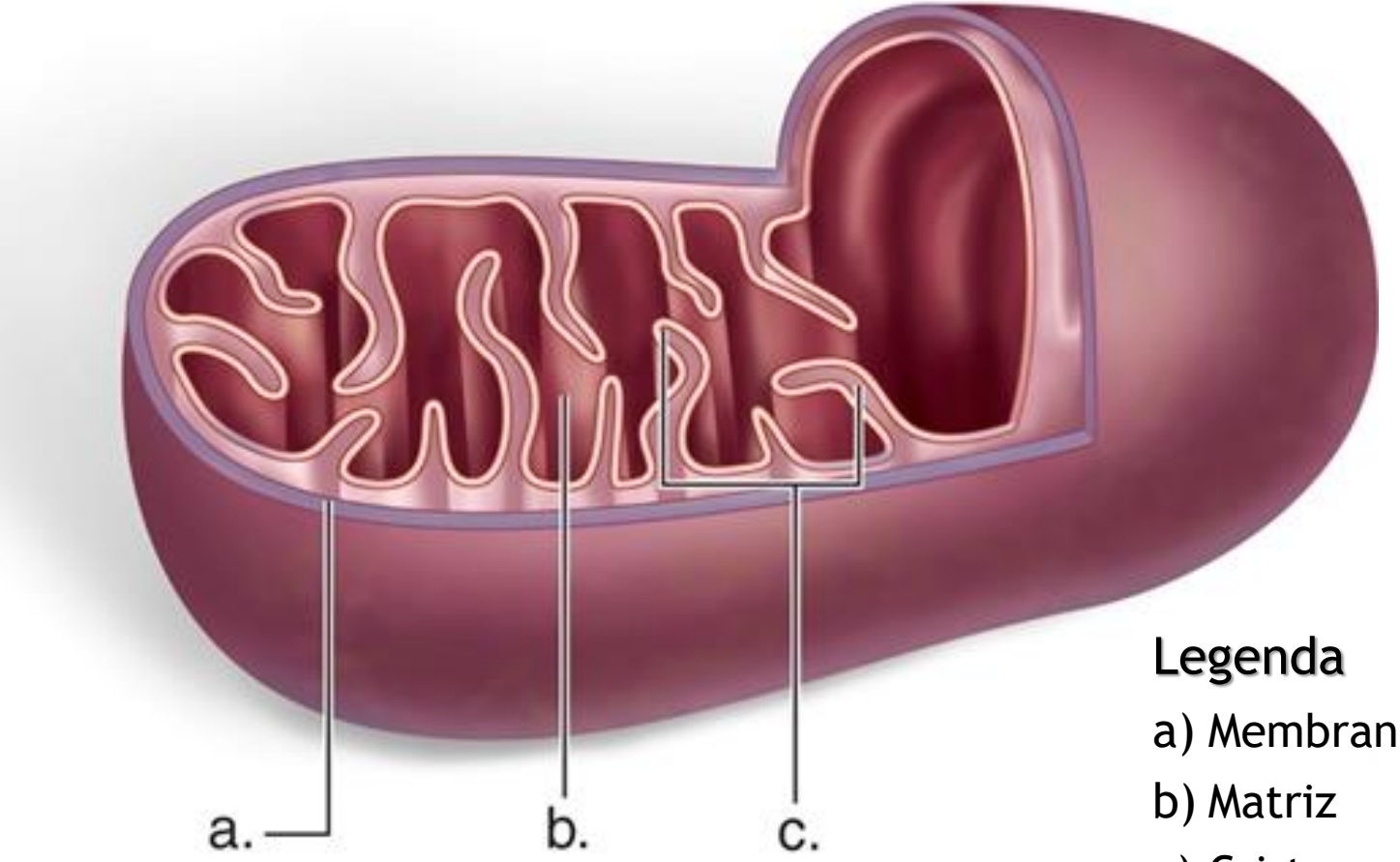
Mitocôndrias





MORFOLOGIA CELULAR

Mitocôndrias



Legenda

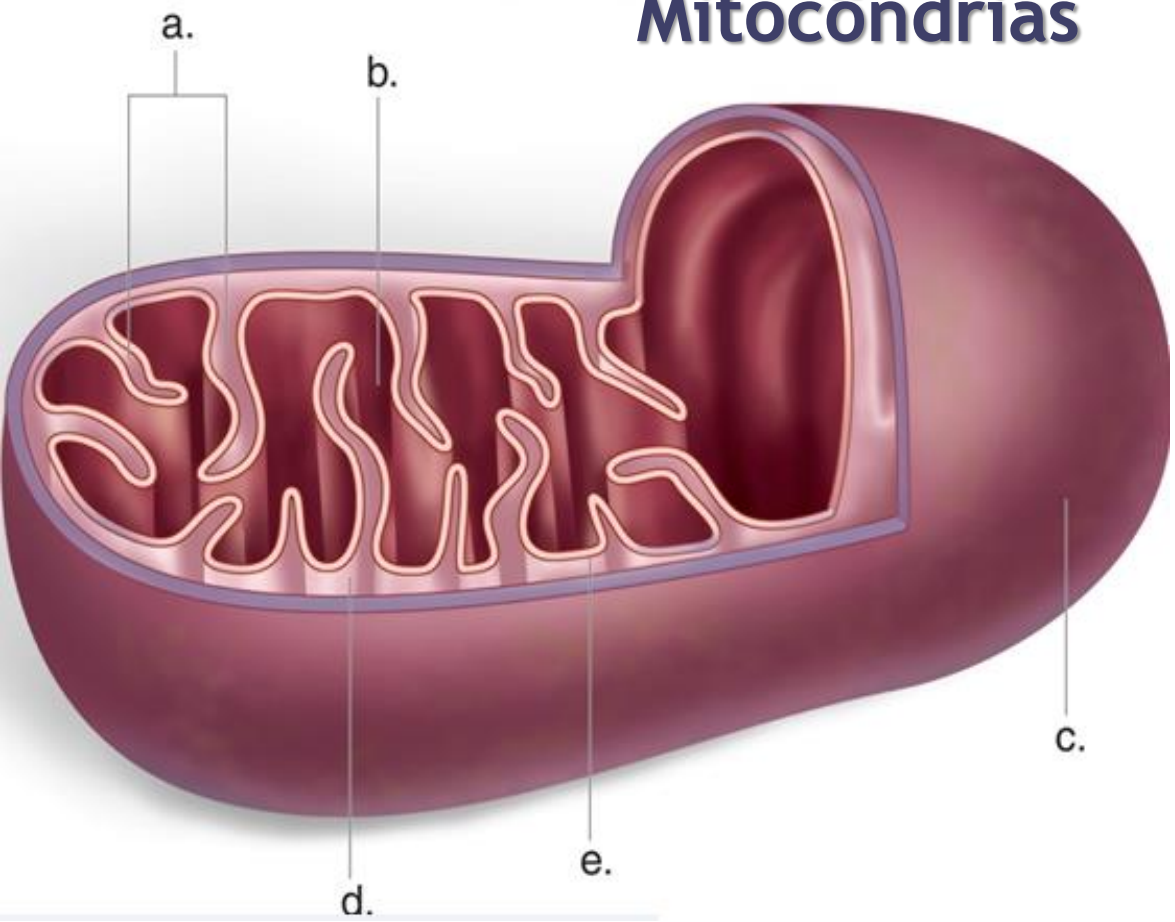
a) Membrana externa

b) Matriz

c) Cristas

MORFOLOGIA CELULAR

Mitocôndrias



Legenda

a) Cristas

b) Matriz

c) Membrana externa

d) Espaço intermembranar

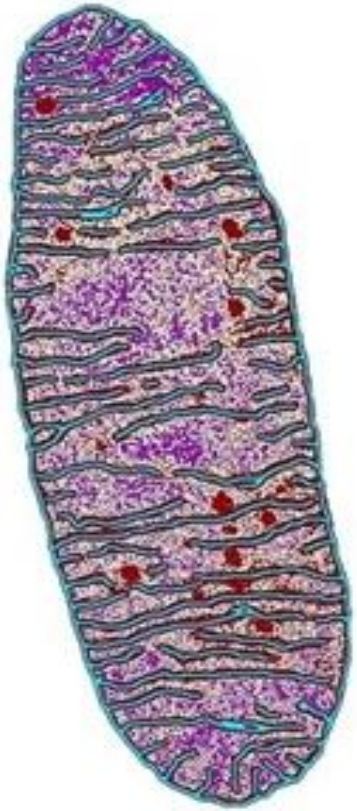
e) Membrana interna

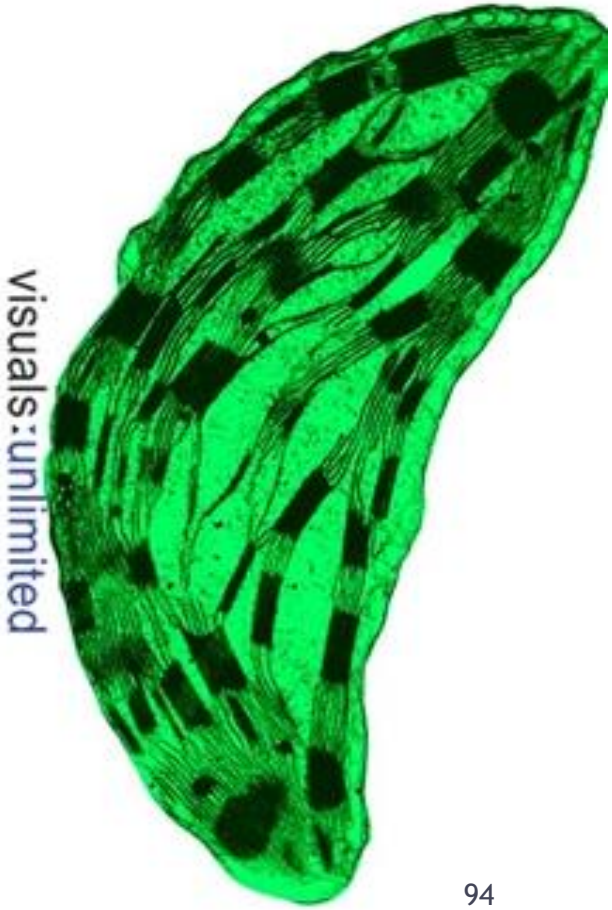
MORFOLOGIA CELULAR

Cloroplasto vs Mitocôndrias

MORFOLOGIA CELULAR

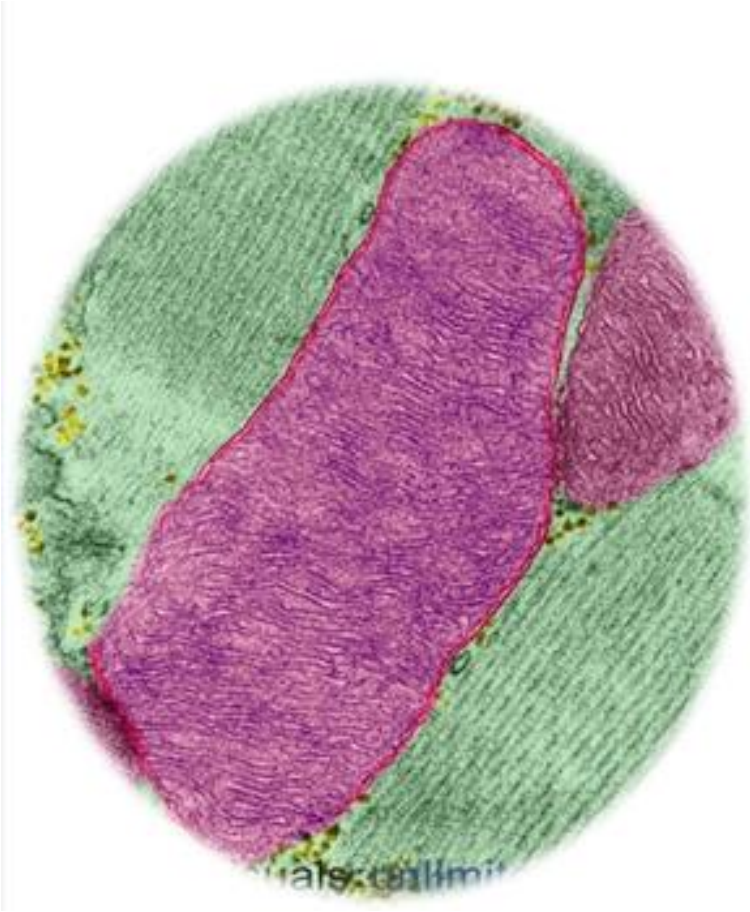
Mitocôndrias vs Cloroplasto





MORFOLOGIA CELULAR

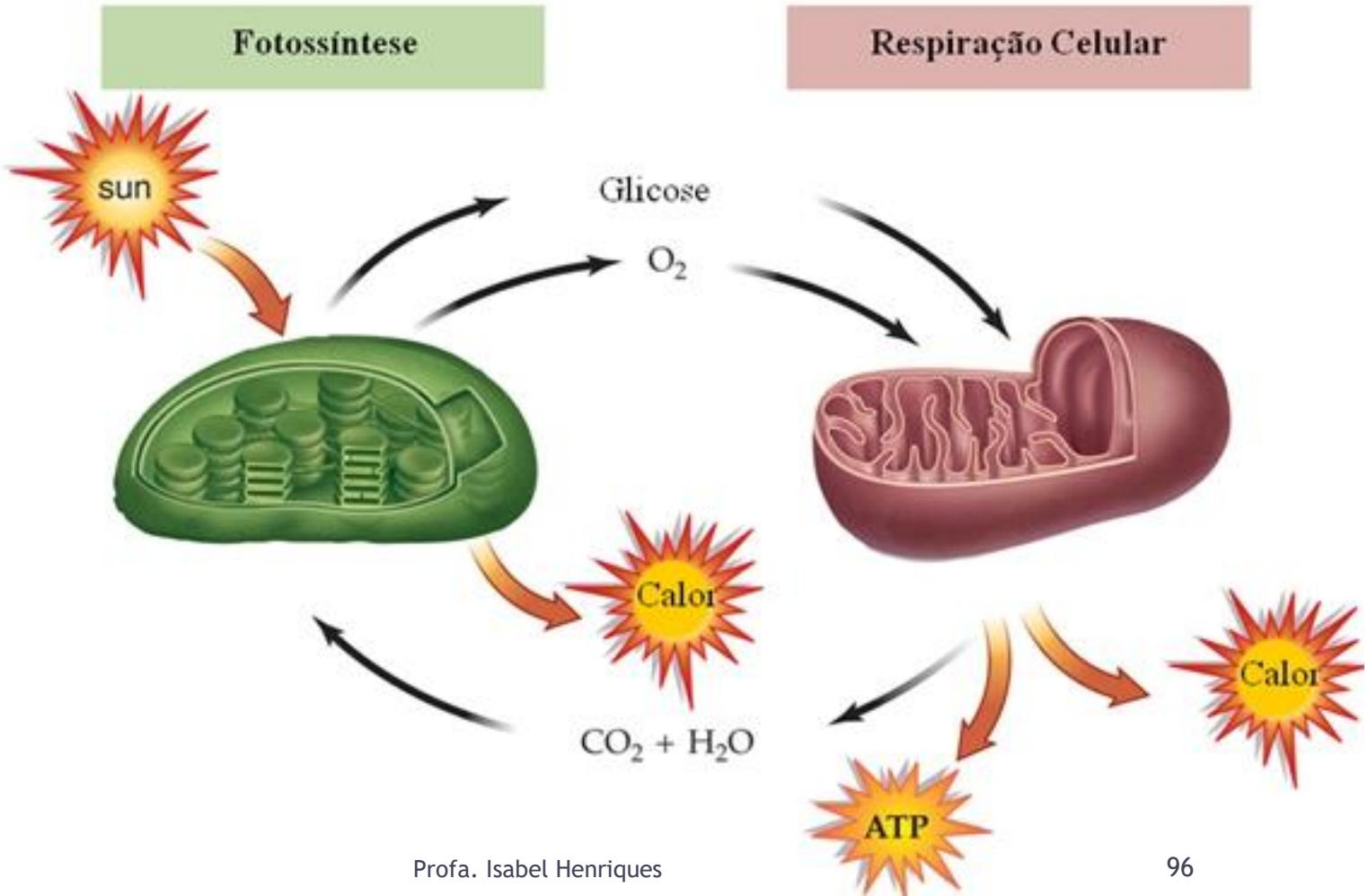
Mitocôndrias vs Cloroplasto



Cloroplastos de algas vermelhas)

MORFOLOGIA CELULAR

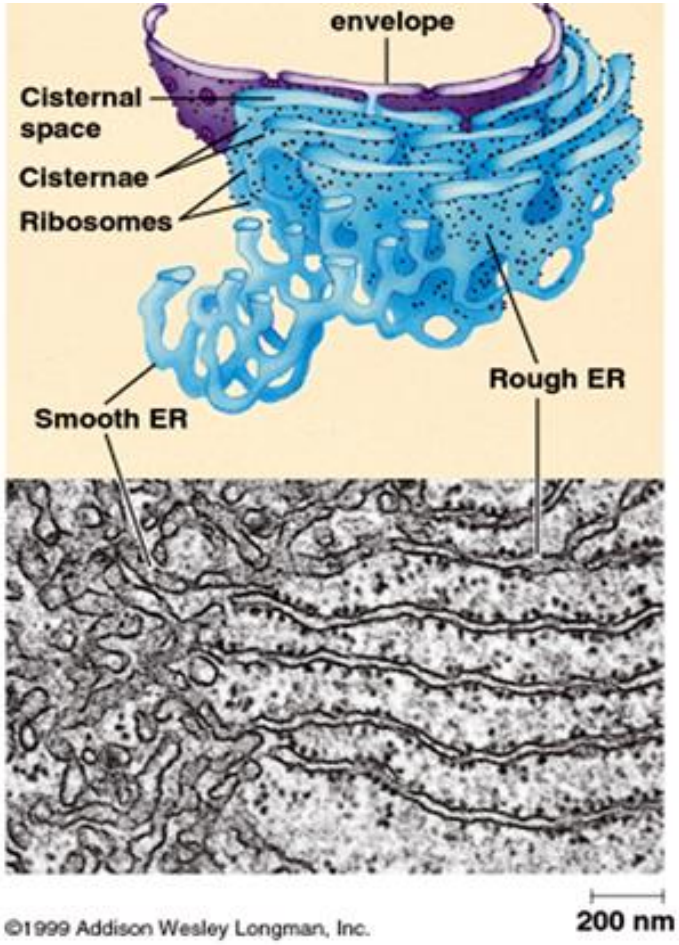
Cloroplasto vs Mitocôndrias



MORFOLOGIA CELULAR

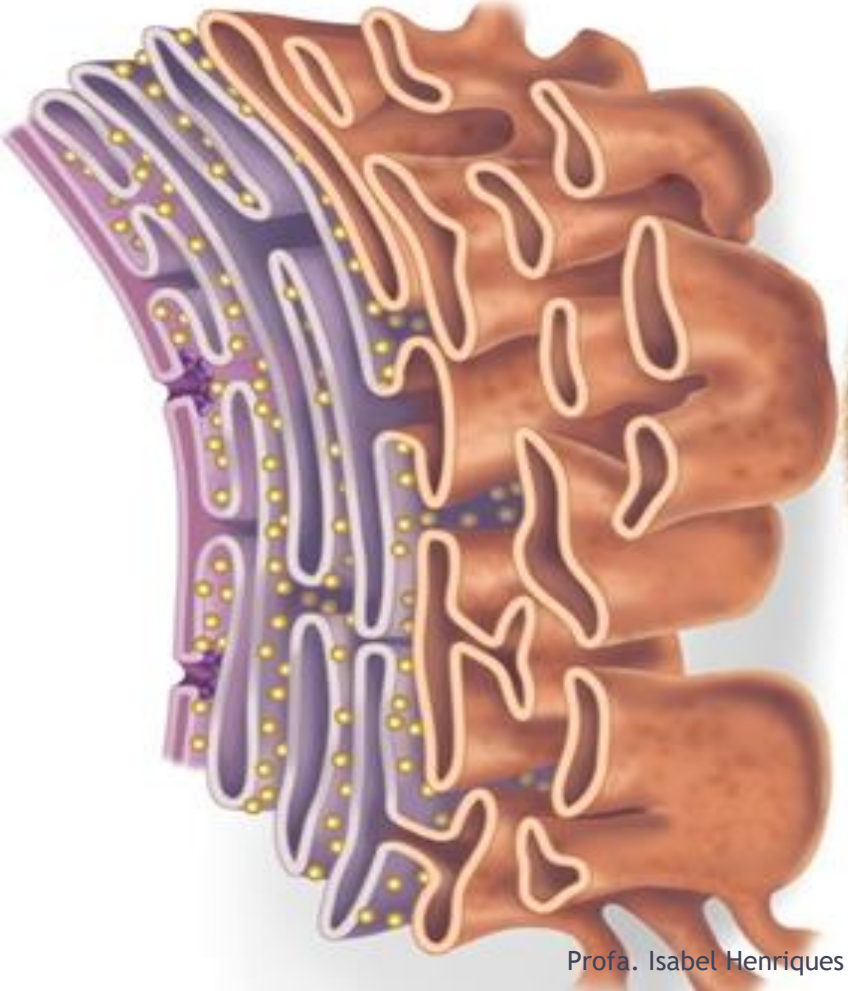
Retículo Endoplasmático

- Sistema de sáculos, vesículas e canalículos, envolvidos na **síntese de proteínas, lípidos e hormonas**.
- Também intervém no **transporte de proteínas** e outras substâncias.
- O retículo endoplasmático pode ser rugosos ou liso.



MORFOLOGIA CELULAR

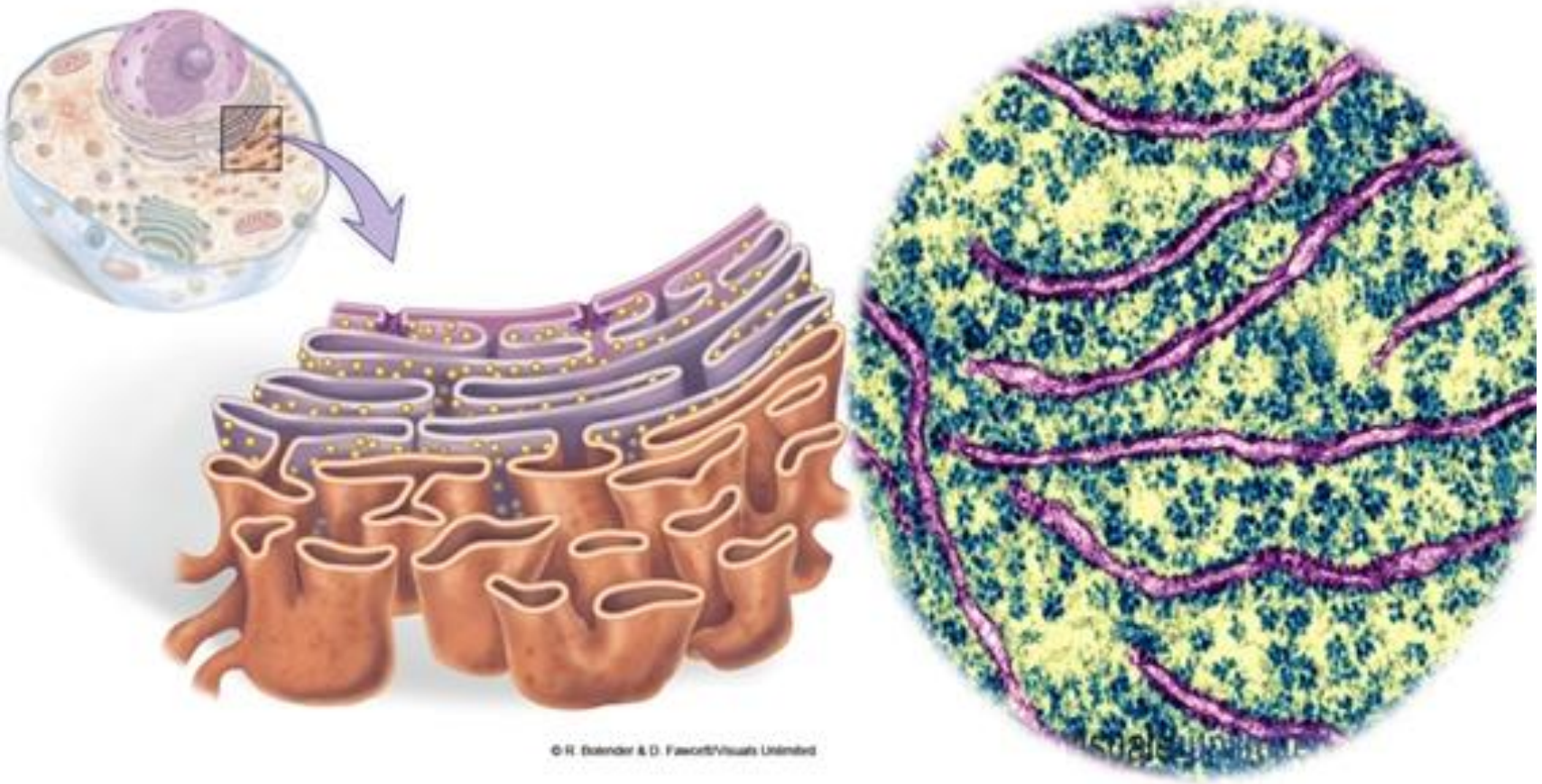
Retículo Endoplasmático



Retículo endoplasmático e mitocôndrias

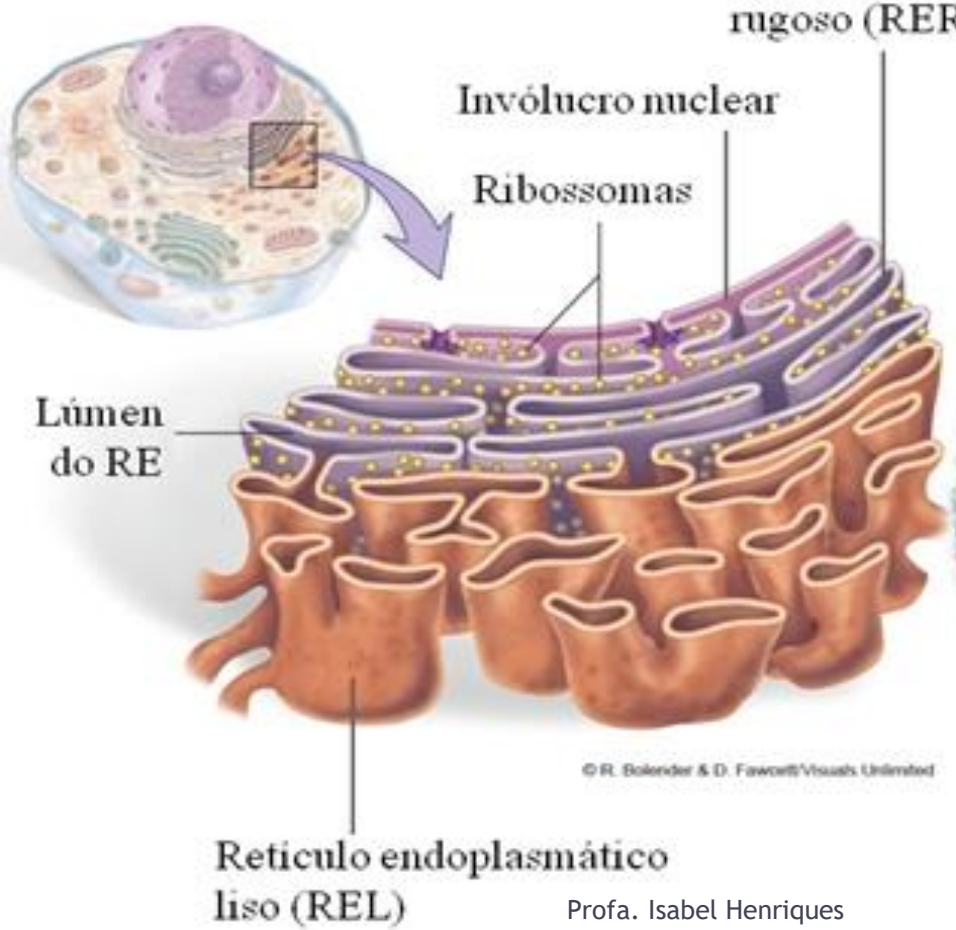
MORFOLOGIA CELULAR

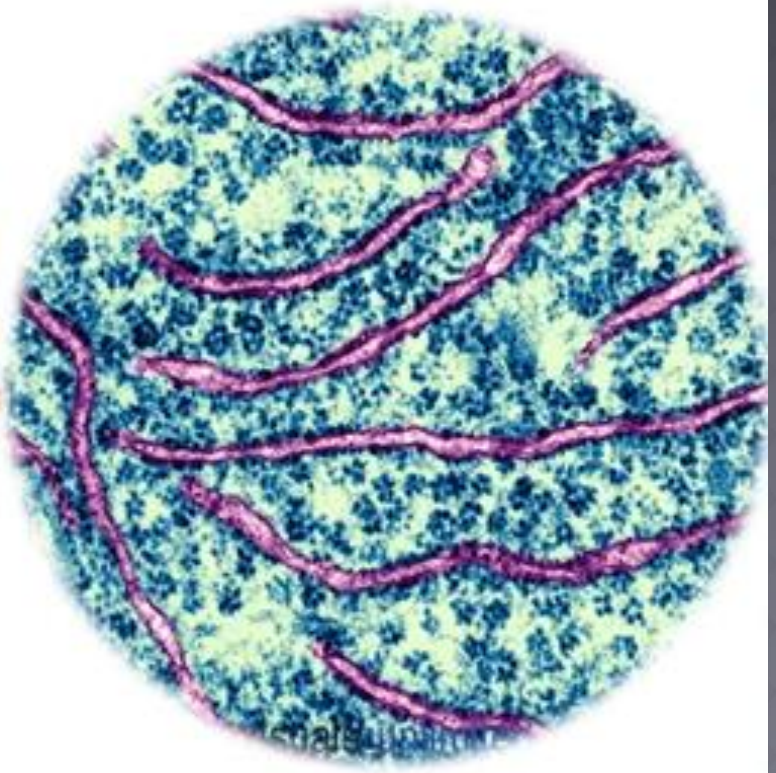
Retículo Endoplasmático



MORFOLOGIA CELULAR

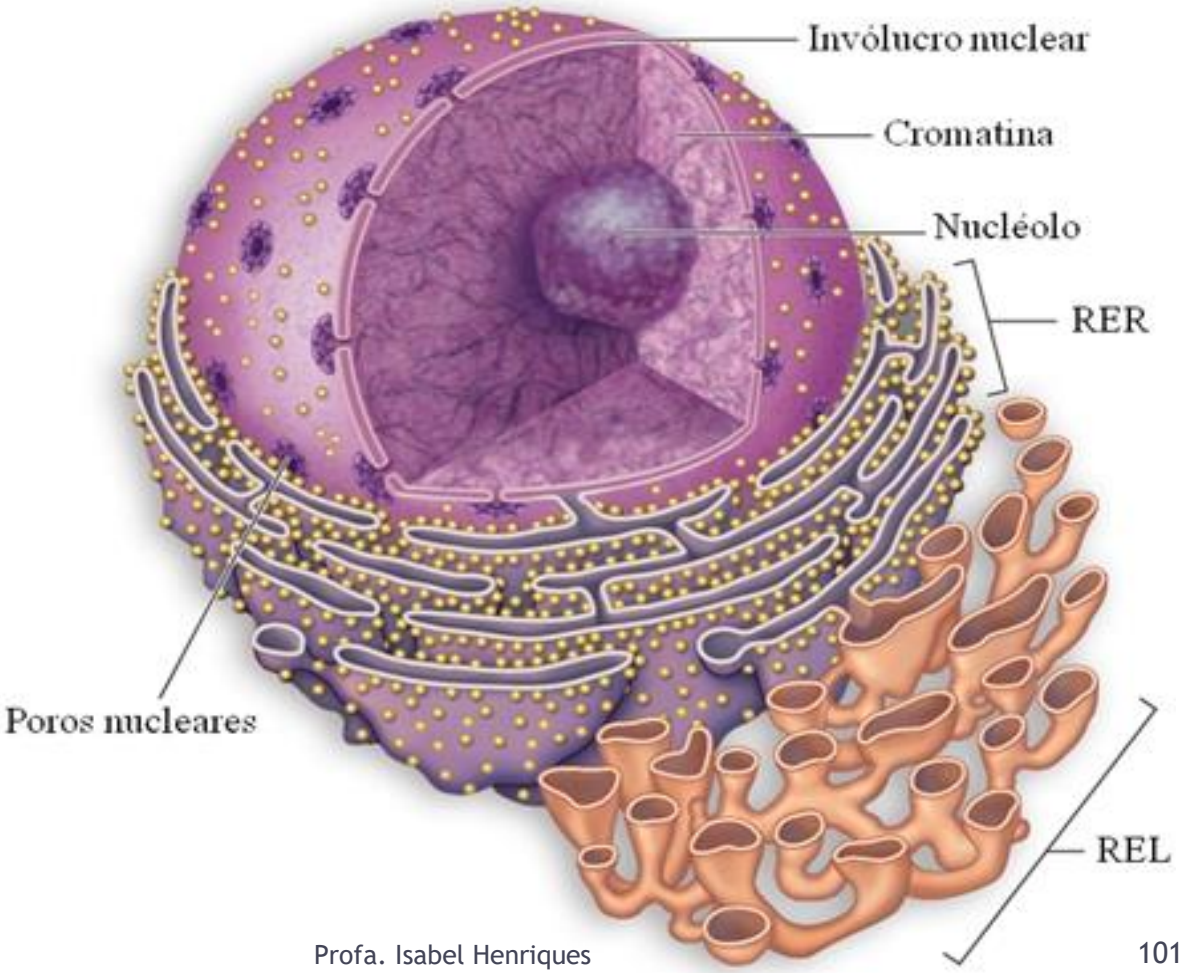
Retículo Endoplasmático





MORFOLOGIA CELULAR

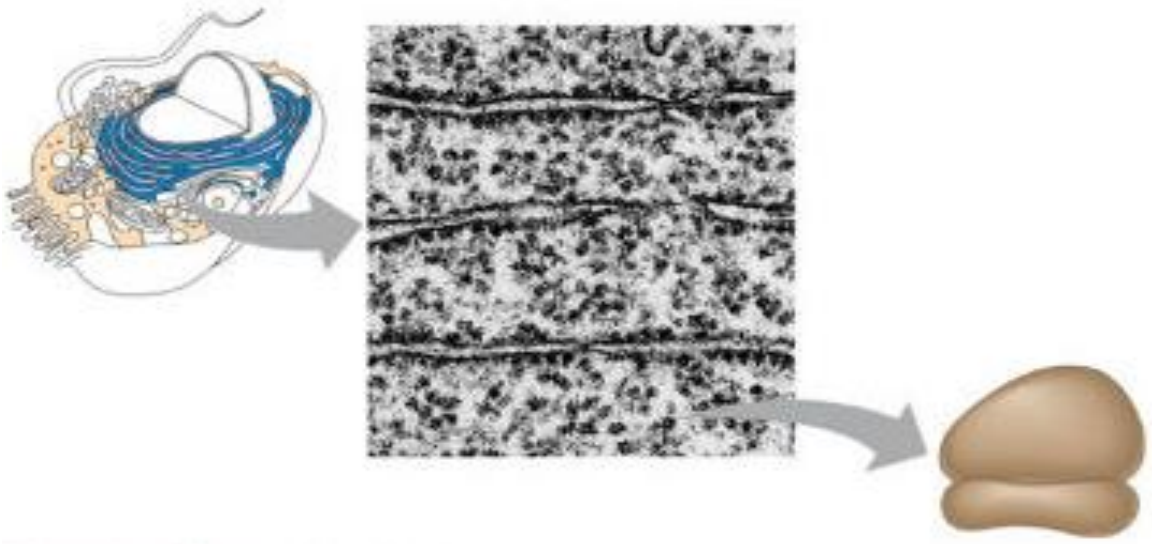
Retículo Endoplasmático e Núcleo



MORFOLOGIA CELULAR

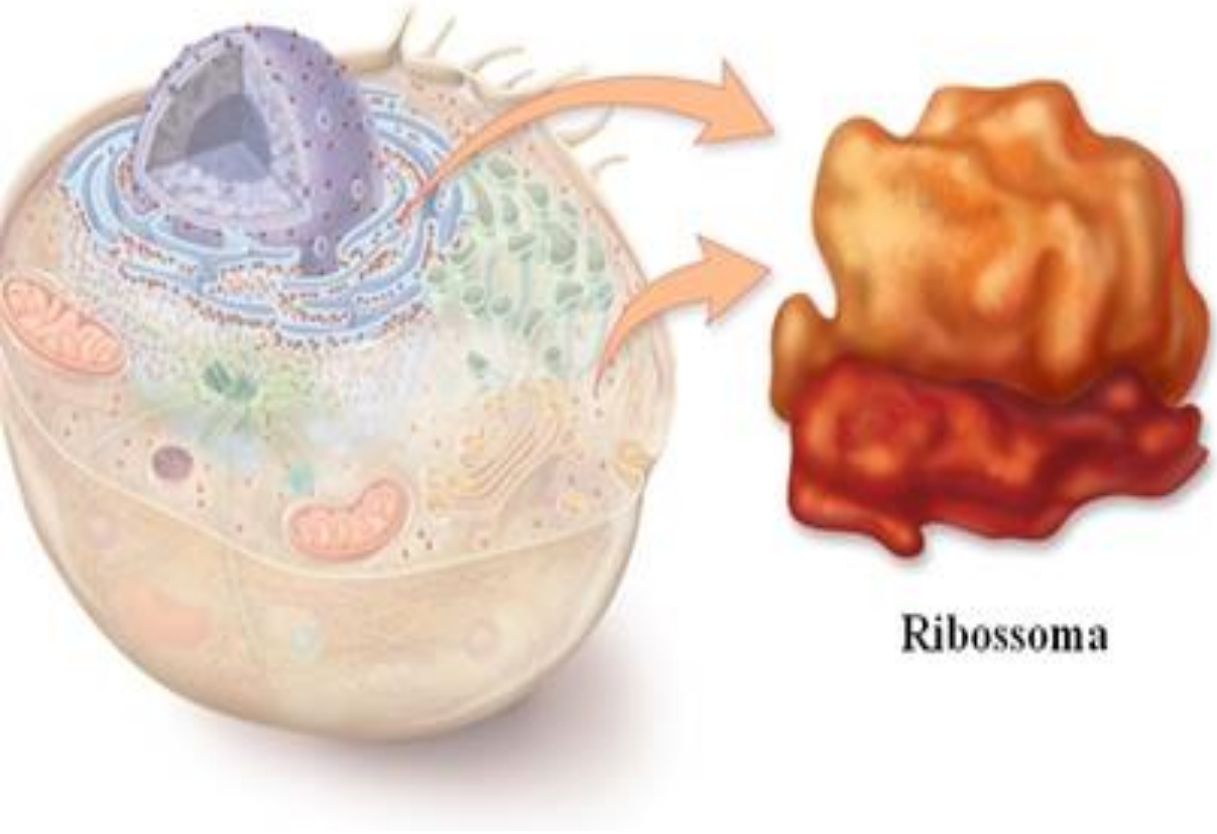
Ribossomas

- Pequenas estruturas, constituídas por **duas porções** (grande e pequena subunidade).
- Por vezes **associadas** ao retículo endoplasmático.
- São fundamentais para a **síntese de proteínas**.



MORFOLOGIA CELULAR

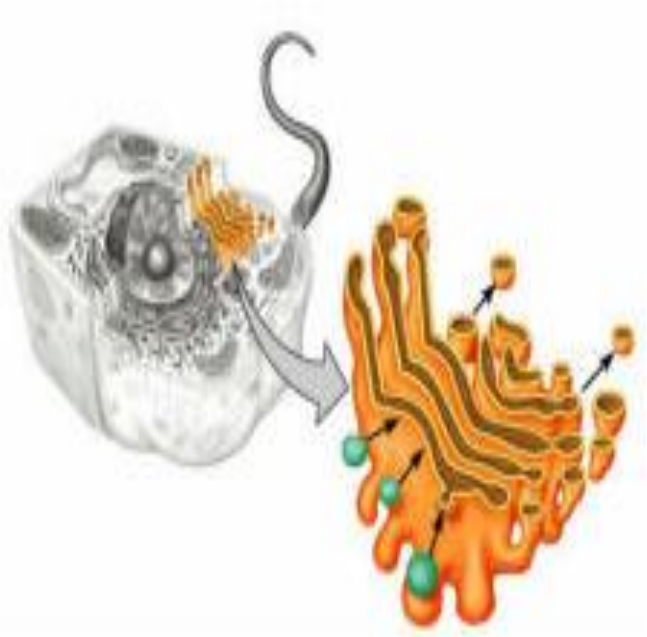
Ribossomas



MORFOLOGIA CELULAR

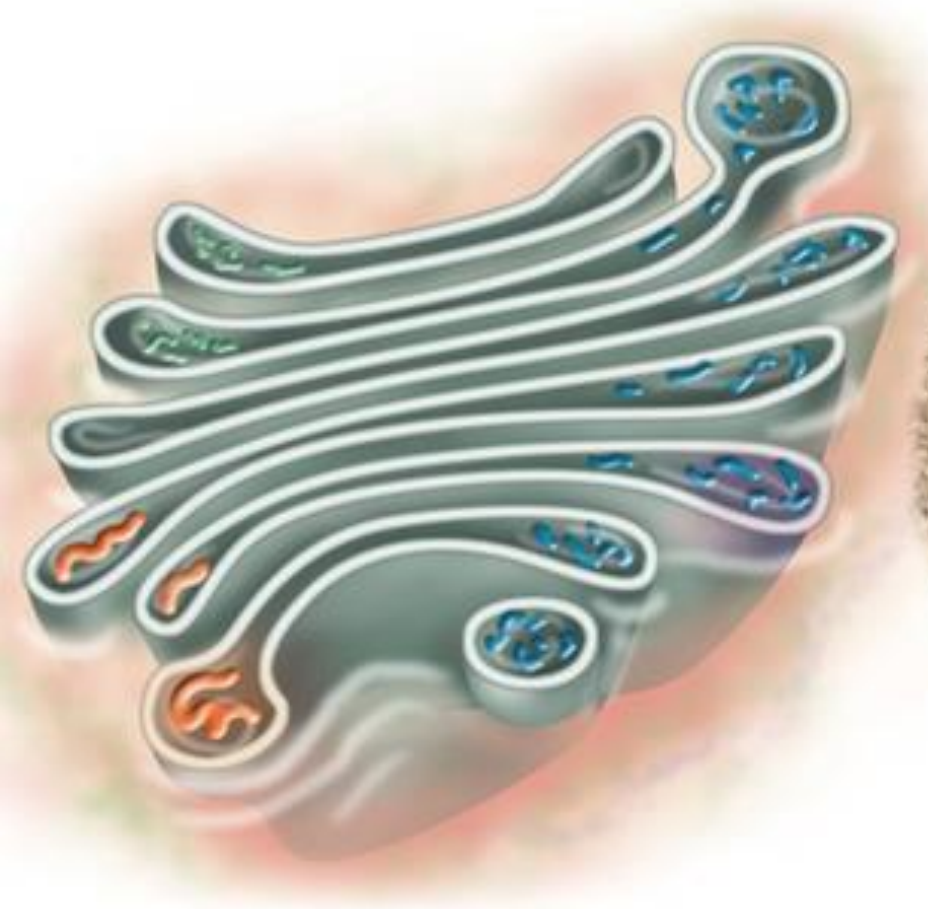
Complexo de Golgi

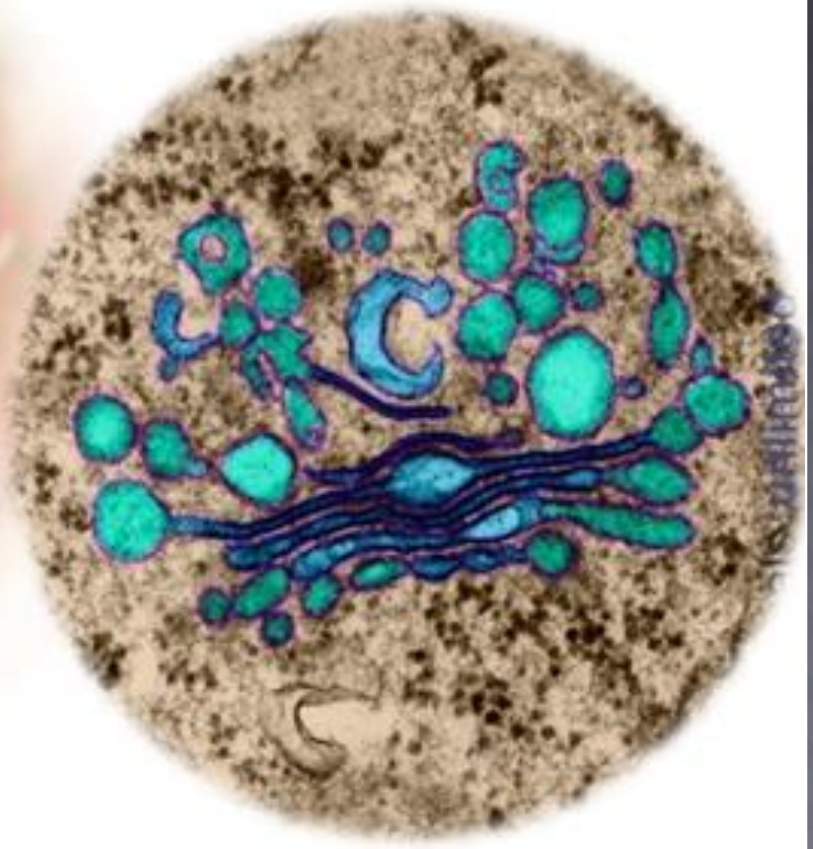
- Conjunto de **cisternas achatadas e de vesículas**.
- Intervêm em fenómenos de **secreção e digestão intracelular**.



MORFOLOGIA CELULAR

Complexo de Golgi



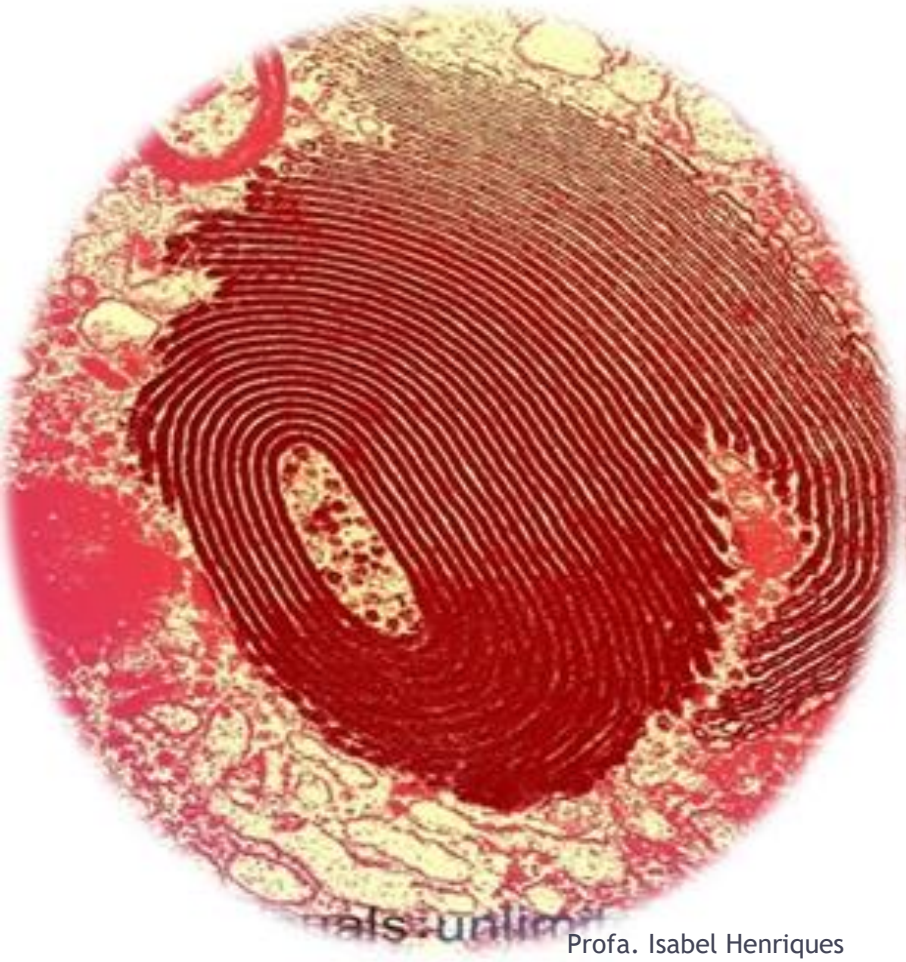


MORFOLOGIA CELULAR

Complexo de Golgi

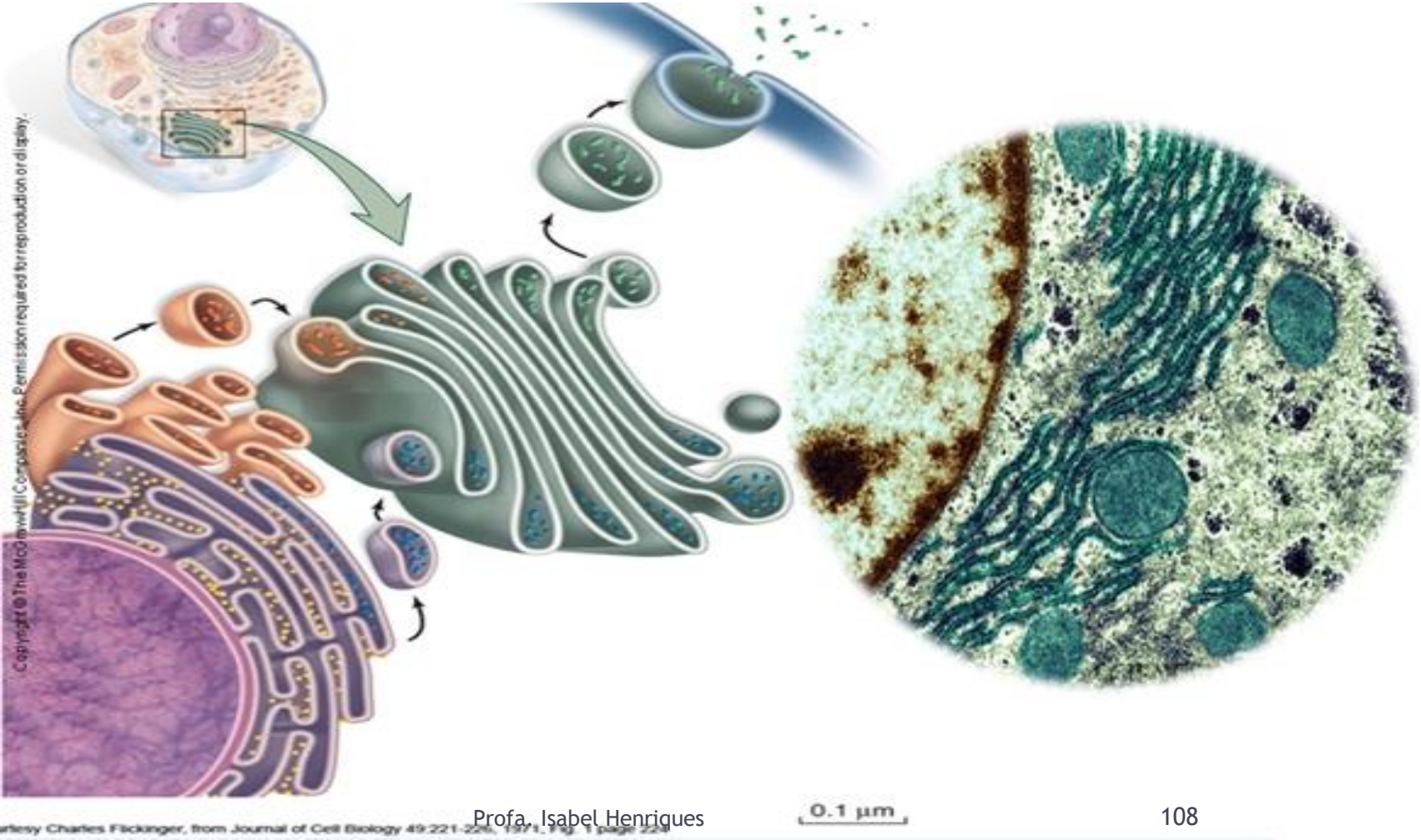
MORFOLOGIA CELULAR

Complexo de Golgi vs Retículo endoplasmático



MORFOLOGIA CELULAR

Sistema Endomembranar (secreção)

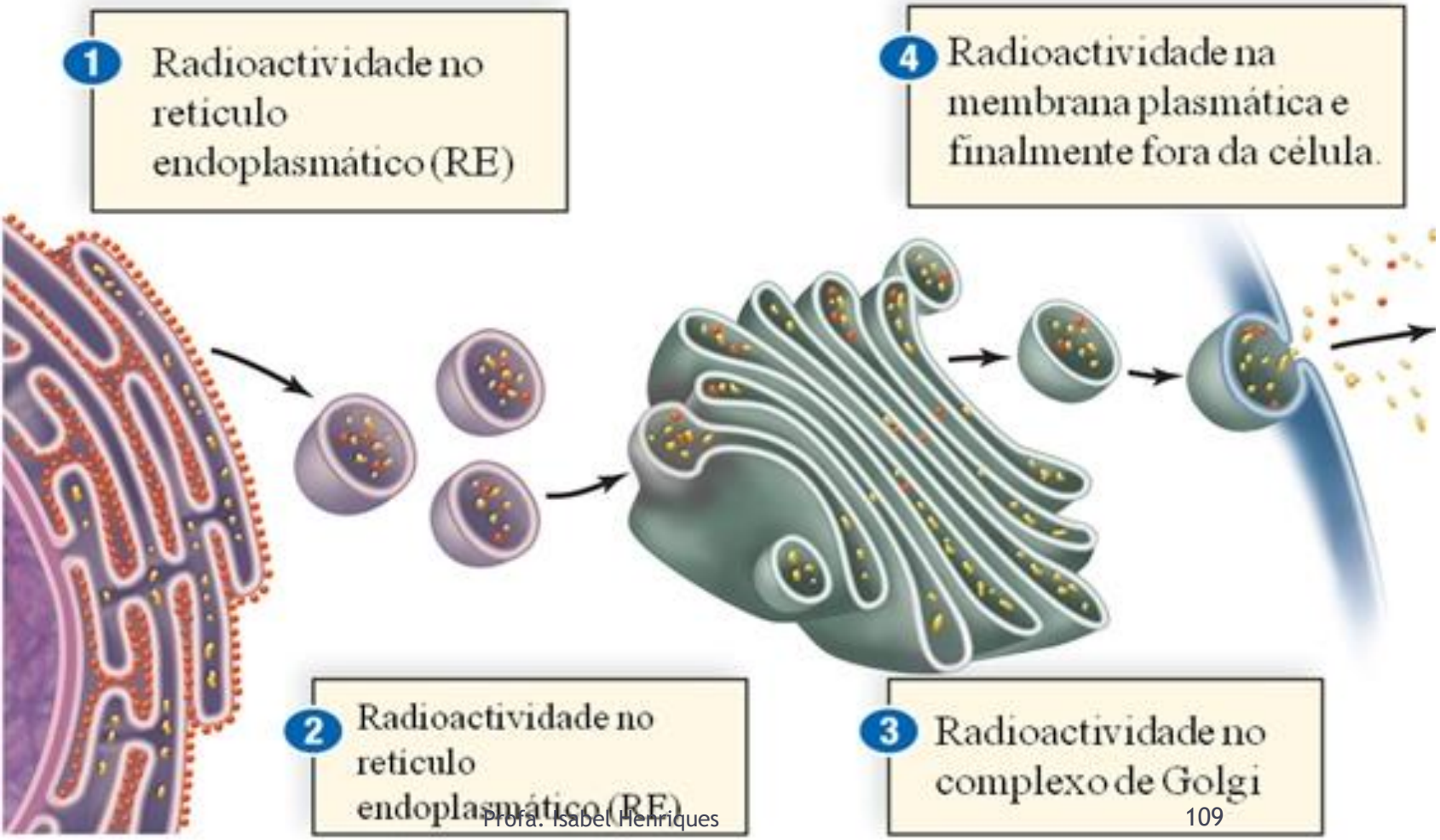


Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

artesy Charles Flickinger, from Journal of Cell Biology 49:221-226, 1971, Fig. 1 page 224

MORFOLOGIA CELULAR

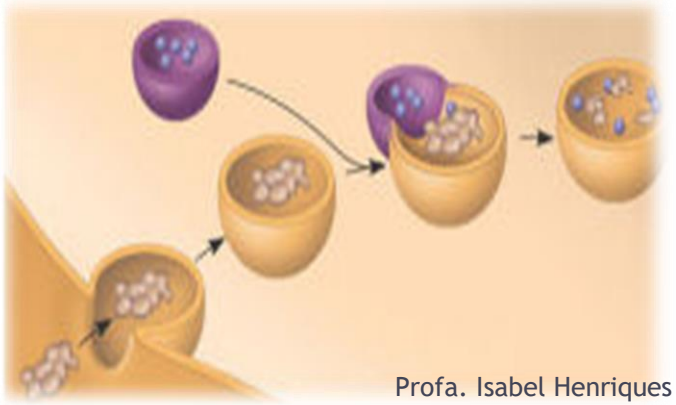
Sistema Endomembranar (secreção)

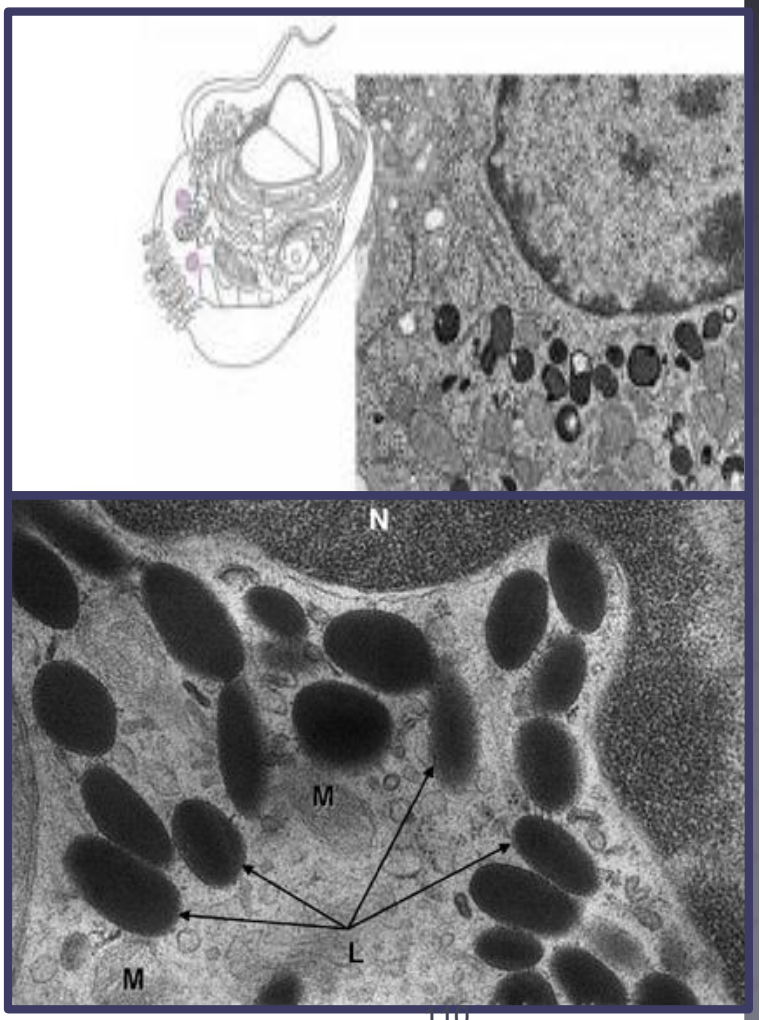


MORFOLOGIA CELULAR

Lisossomas

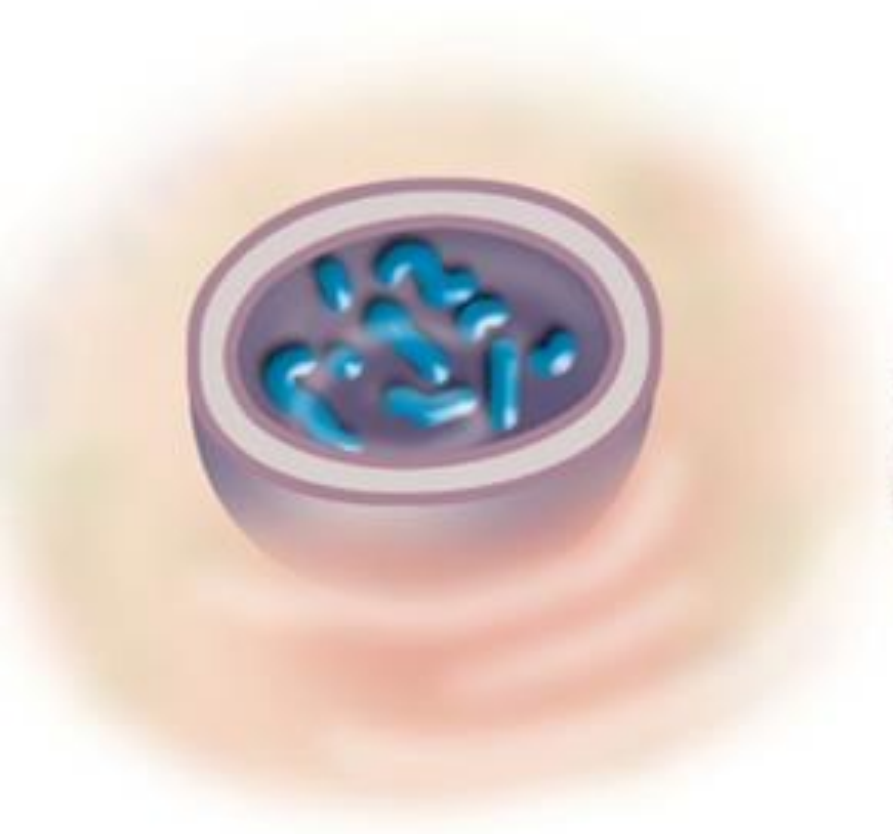
Estruturas esféricas, rodeada por uma membrana simples, que contêm no seu interior enzimas (hidrolases) que intervêm na decomposição de moléculas e estruturas celulares.

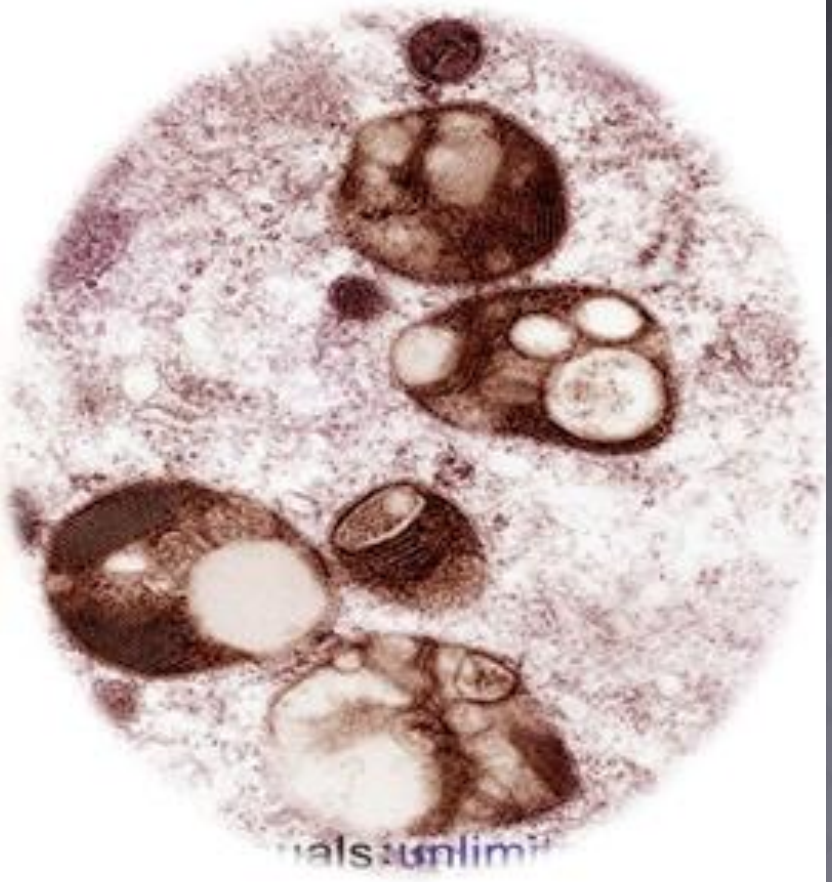




MORFOLOGIA CELULAR

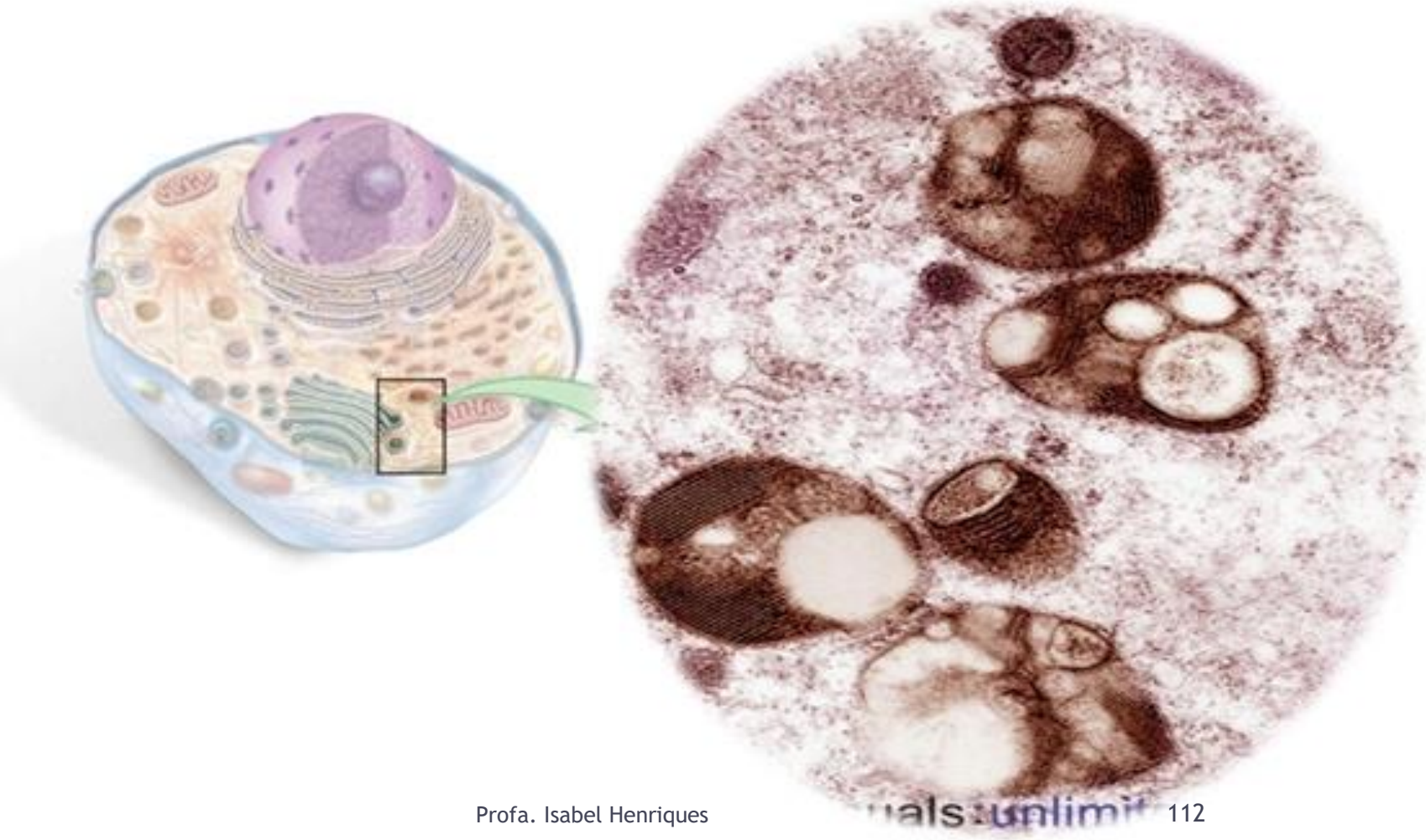
Lisossomas





MORFOLOGIA CELULAR

Lisossomas



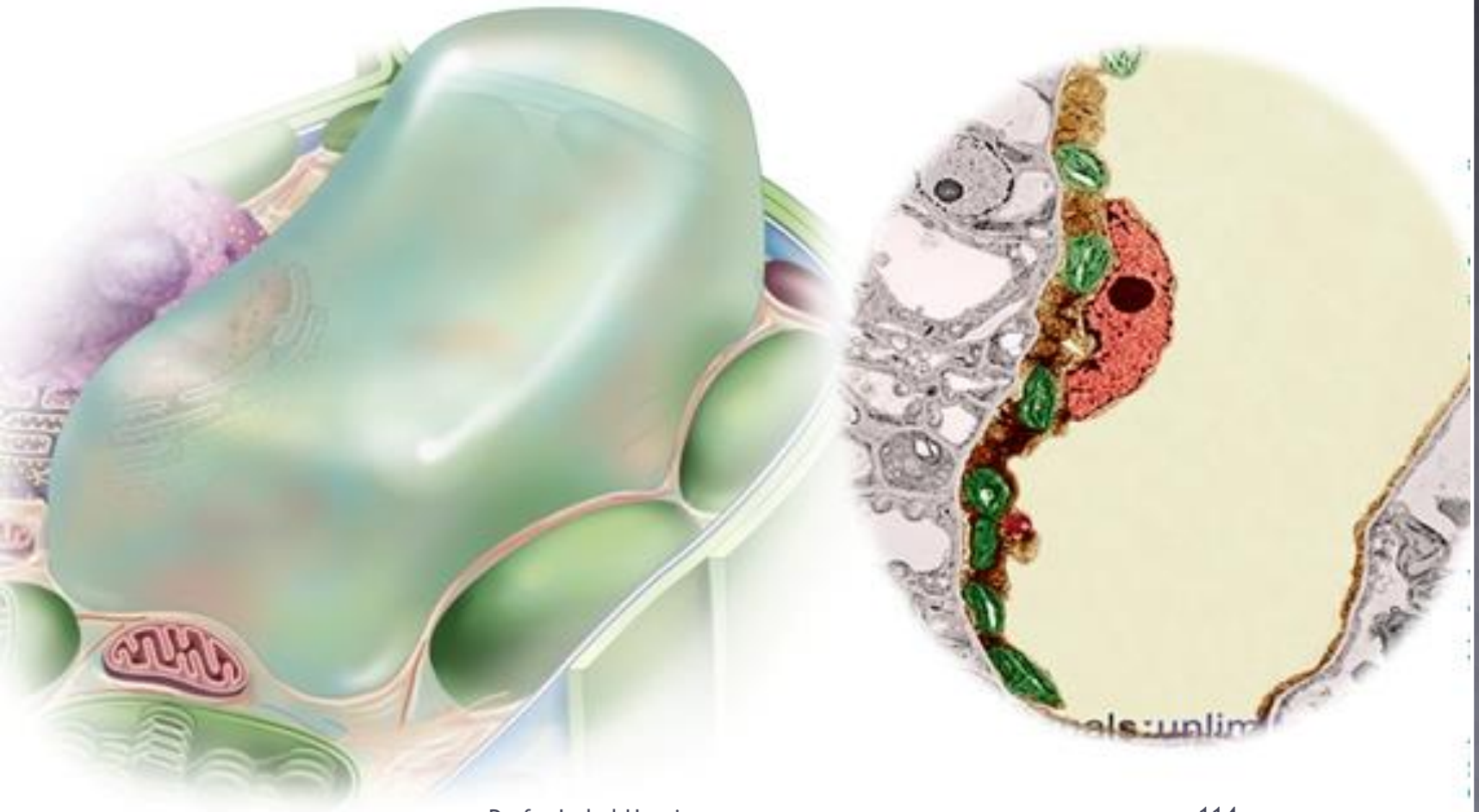
MORFOLOGIA CELULAR

Vacúolos

- Organelos de tamanho variável, rodeados por uma membrana.
- Os vacúolos armazenam água com substâncias dissolvidas como gases, pigmentos, açucares, proteínas ou outras substâncias.

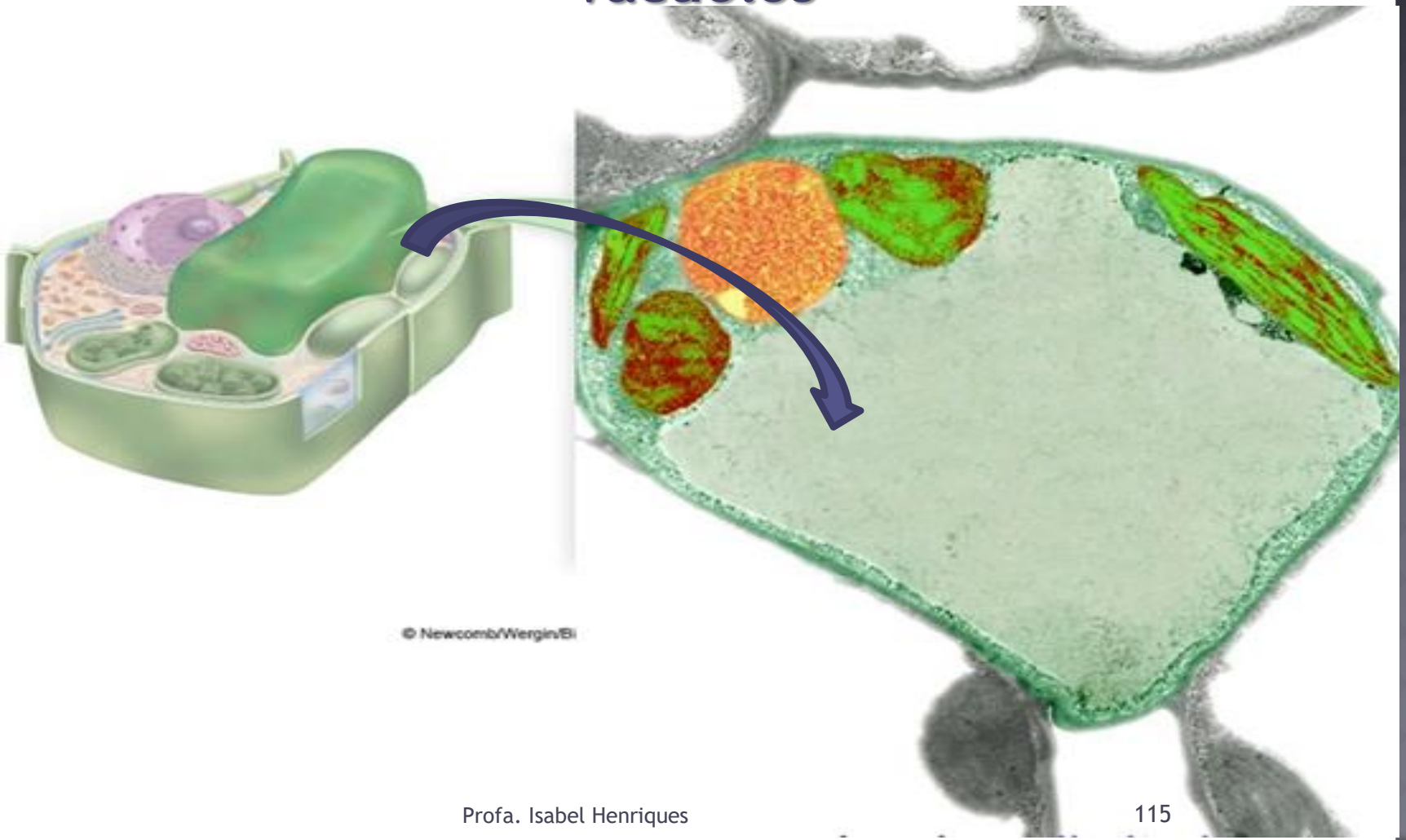
MORFOLOGIA CELULAR

Vacúolos



MORFOLOGIA CELULAR

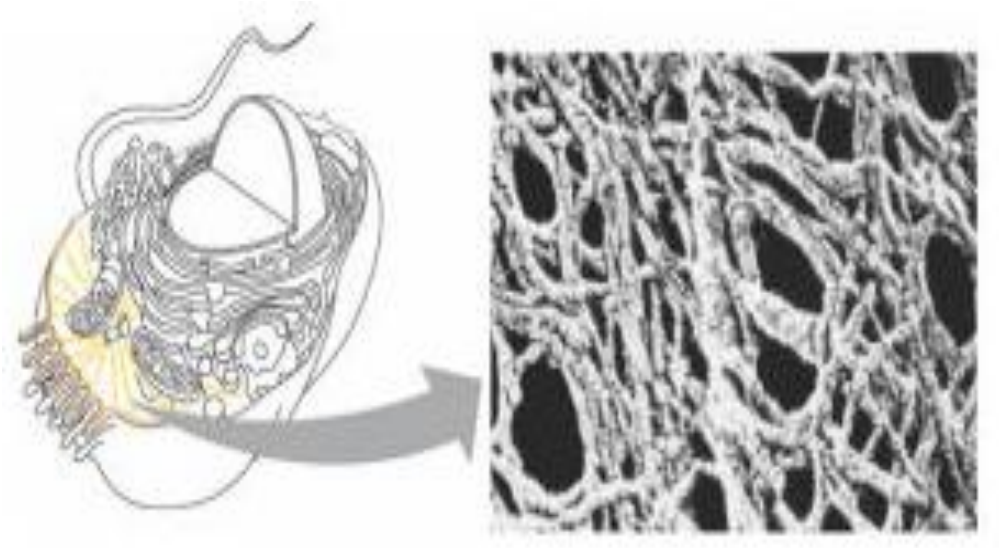
Vacúolos



MORFOLOGIA CELULAR

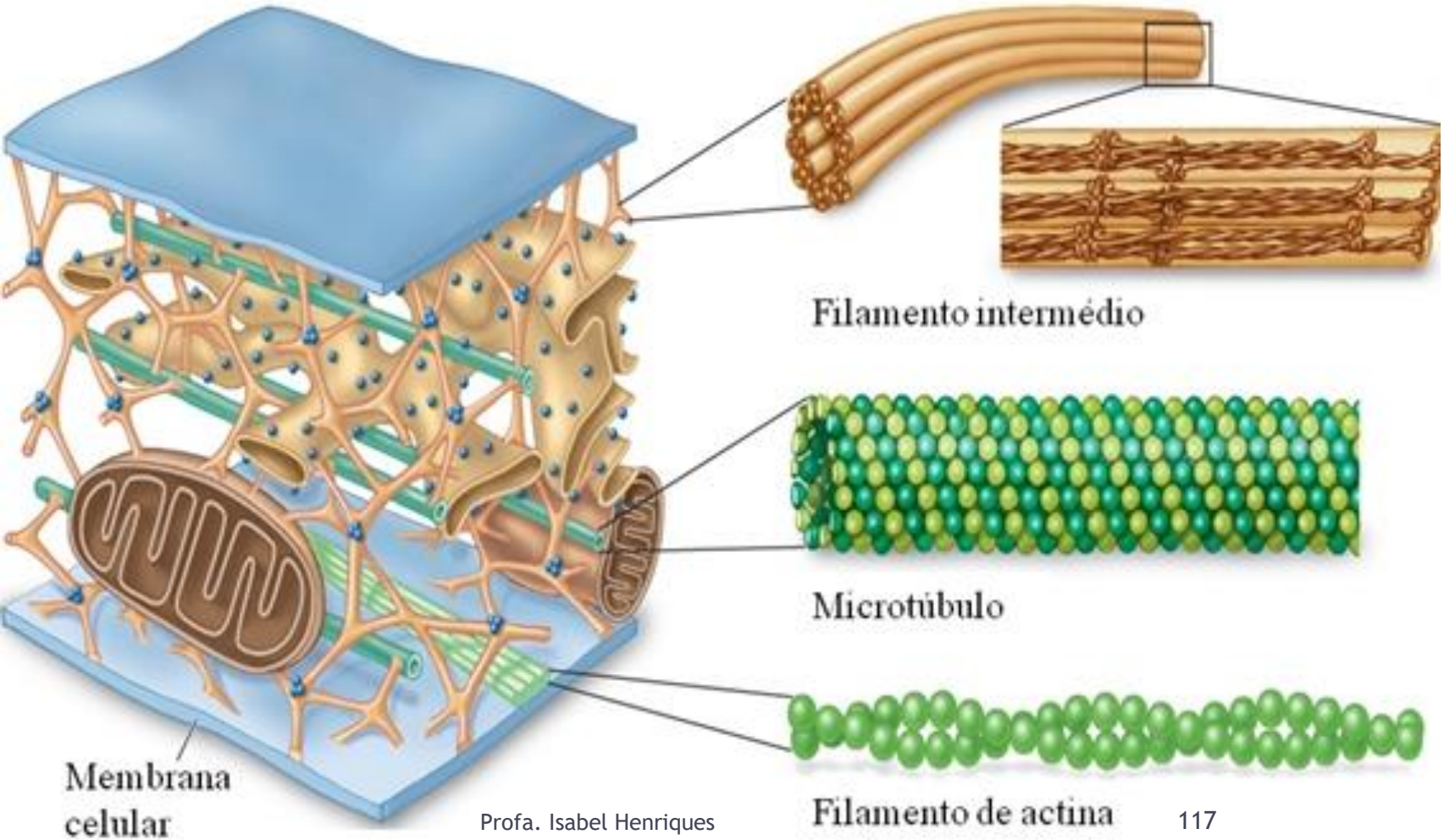
Citoesqueleto

- Rede de fibras intercruzadas, existente no citoplasma.
- O citoesqueleto mantém a forma da célula.



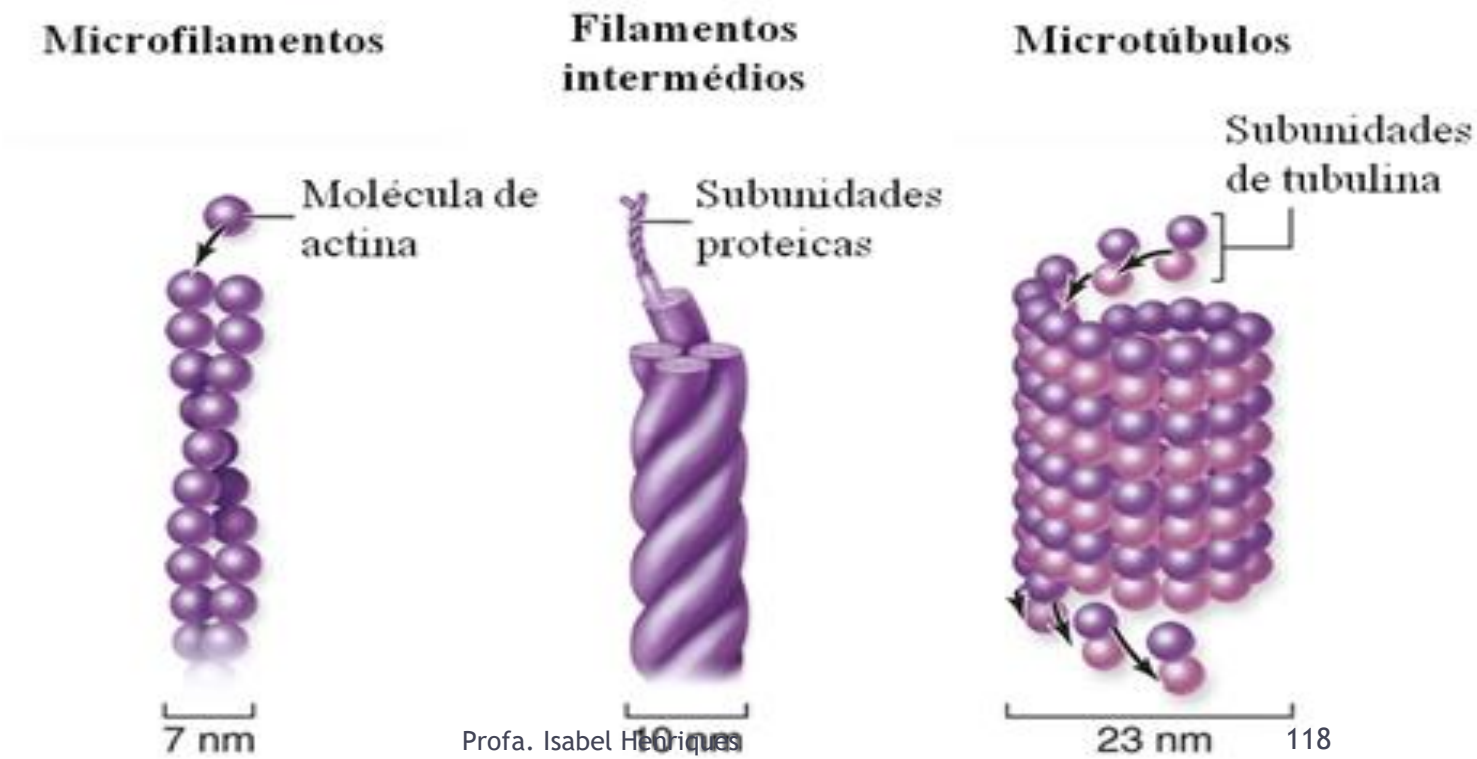
MORFOLOGIA CELULAR

Citoesqueleto



MORFOLOGIA CELULAR

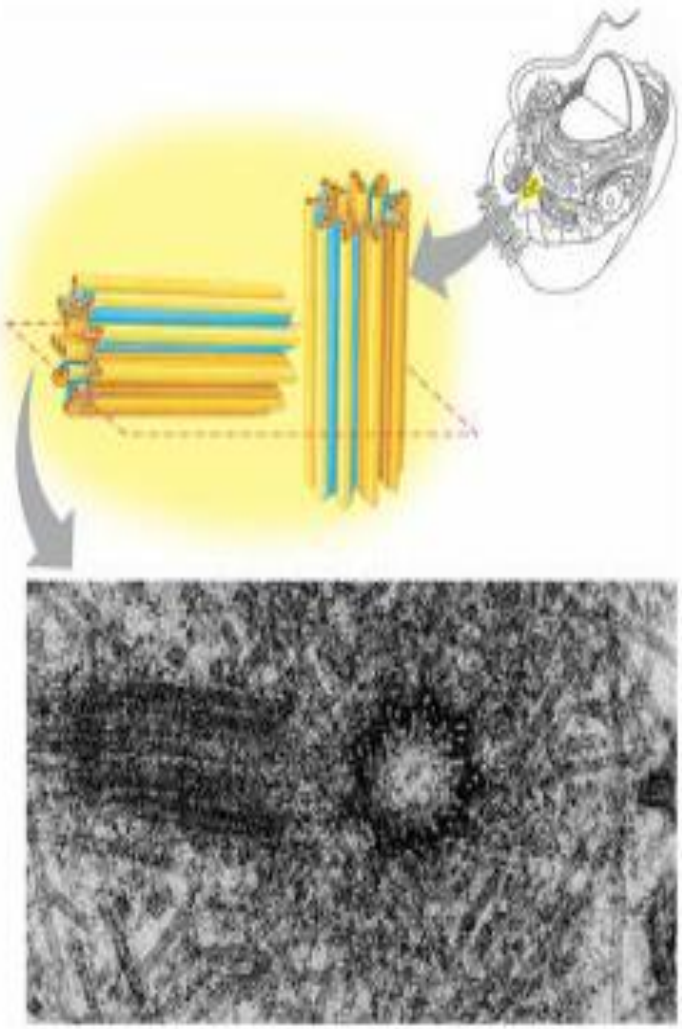
Citoesqueleto



MORFOLOGIA CELULAR

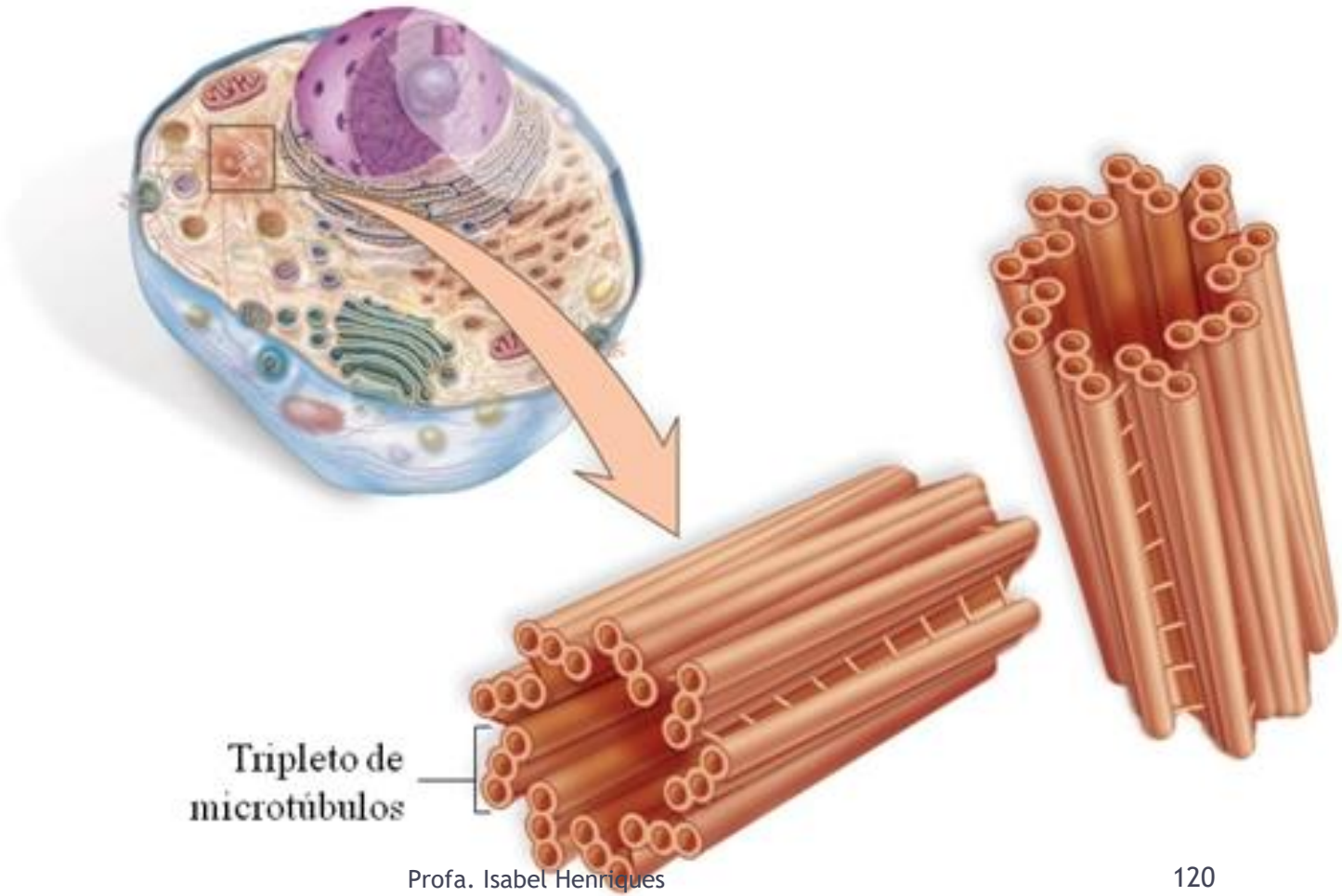
Centríolos

- Estruturas de aspecto cilíndrico, constituída por microtúbulos.
- Os centríolos intervêm na divisão celular.



MORFOLOGIA CELULAR

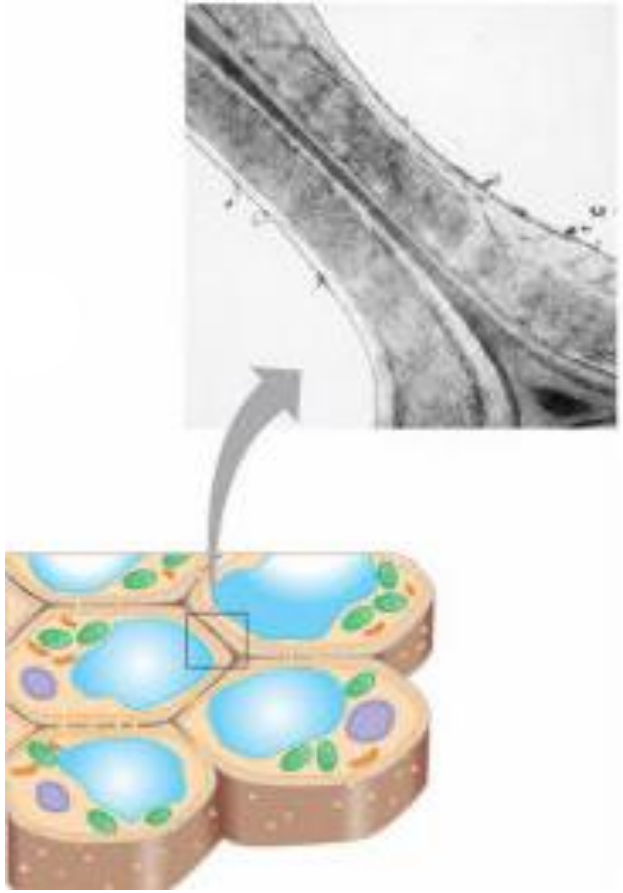
Centríolos



MORFOLOGIA CELULAR

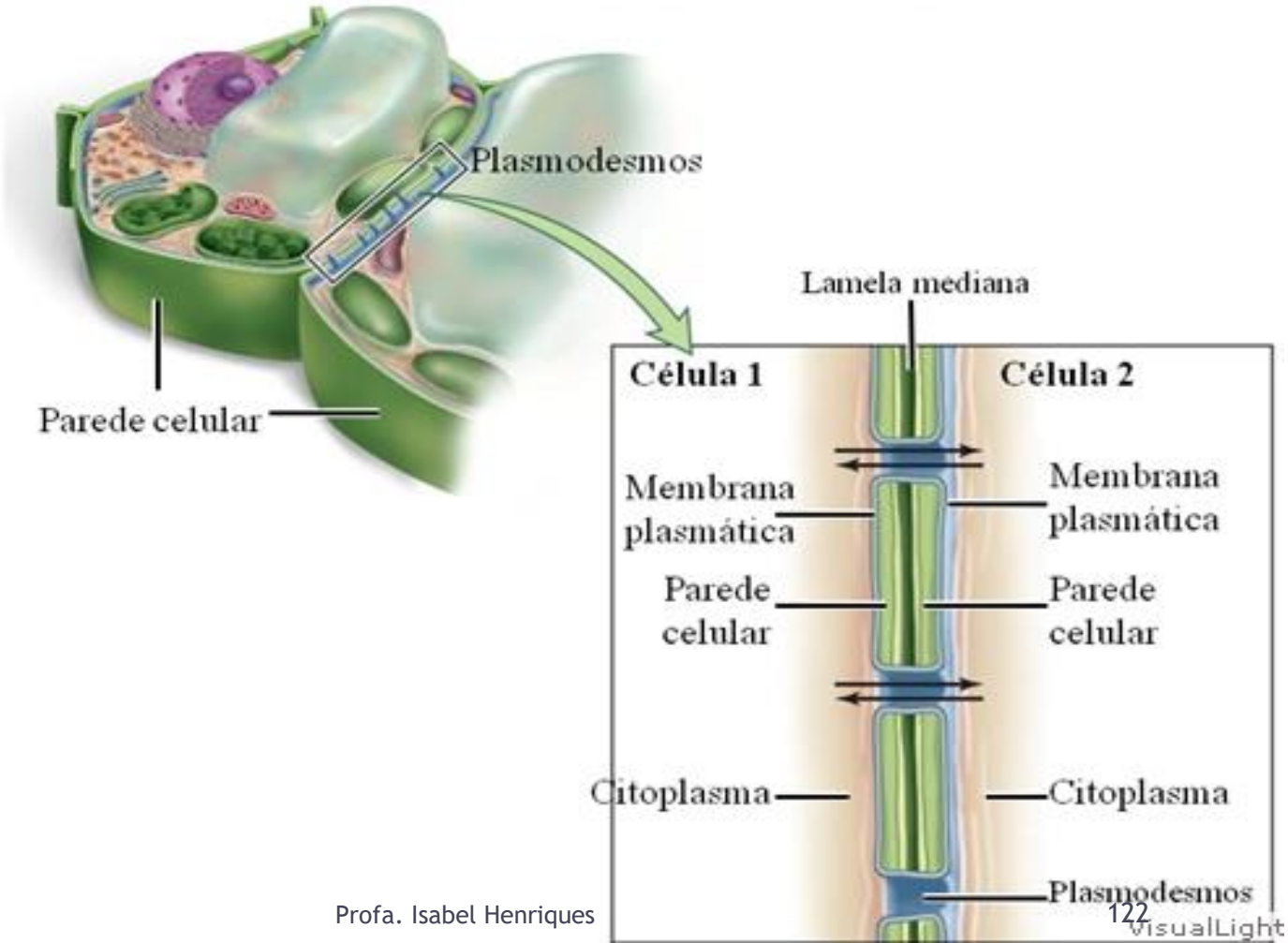
Parede celular

Parede rígida que envolve células vegetais e bacterianas, conferindo-lhes protecção e suporte.



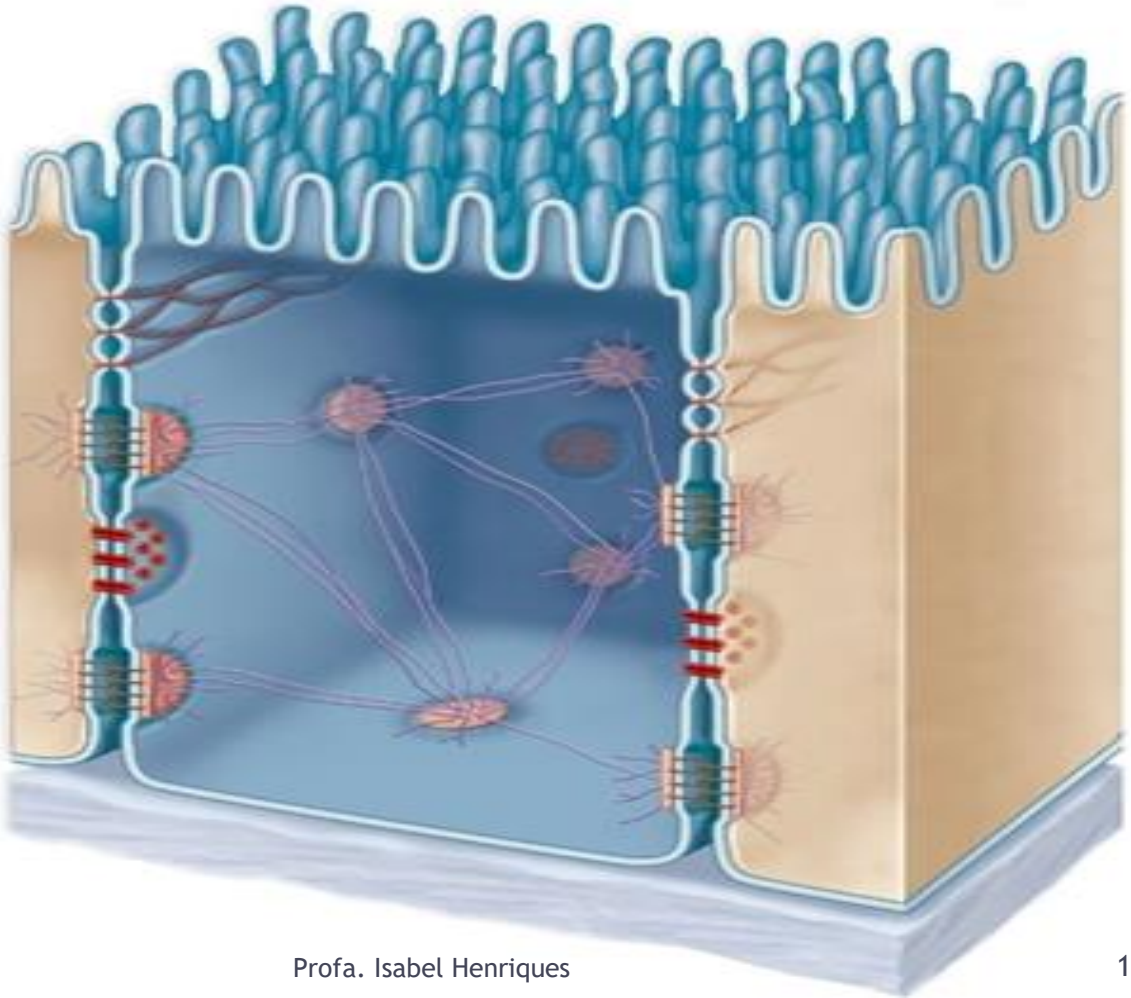
MORFOLOGIA CELULAR

Parede Celular



MORFOLOGIA CELULAR

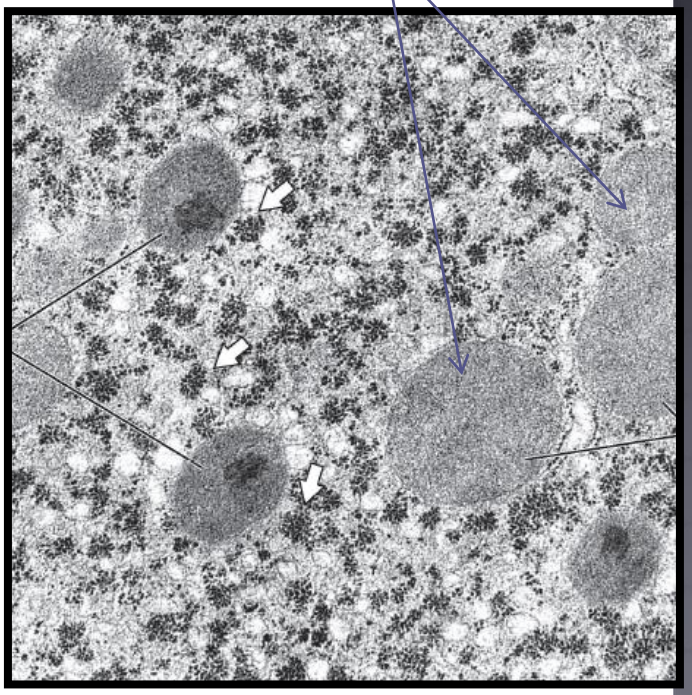
Junções Inter-celulares



MORFOLOGIA CELULAR

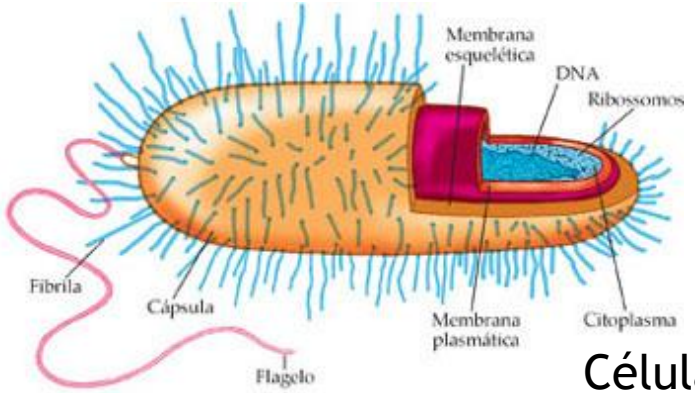
Peroxissomo

- É um organito esférico, envolvido por uma membrana, vesicular presente no citoplasma, sobretudo em células vegetais.
- São as organitos responsáveis pelo armazenamento das enzimas diretamente relacionadas com o metabolismo do peróxido de hidrogénio, substância.

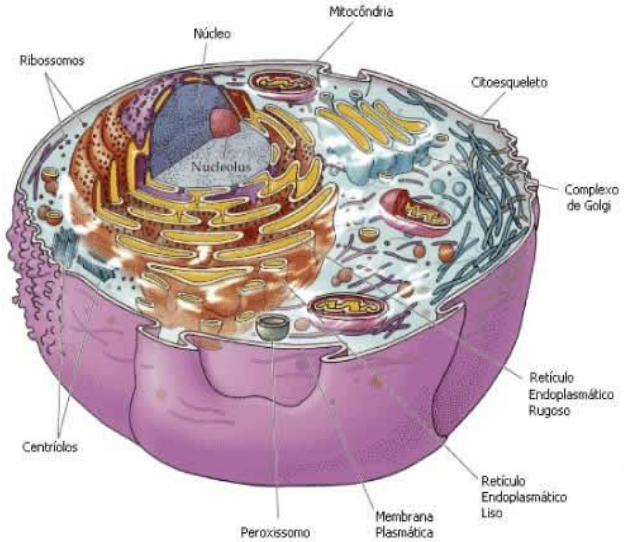


Setas: glicogênio

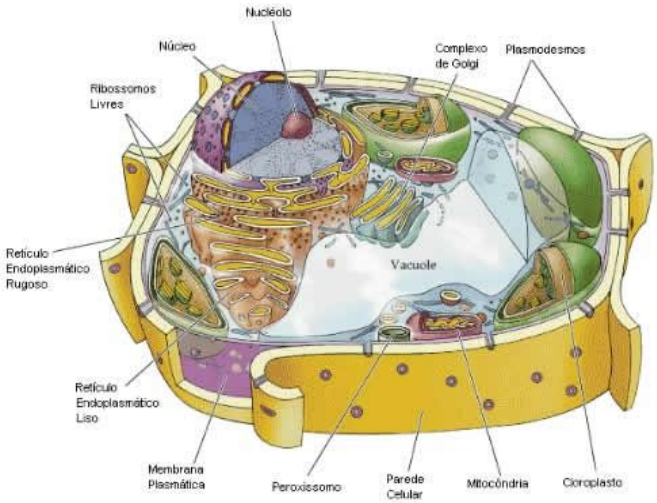
ORGANIZAÇÃO CELULAR



Célula Procariota

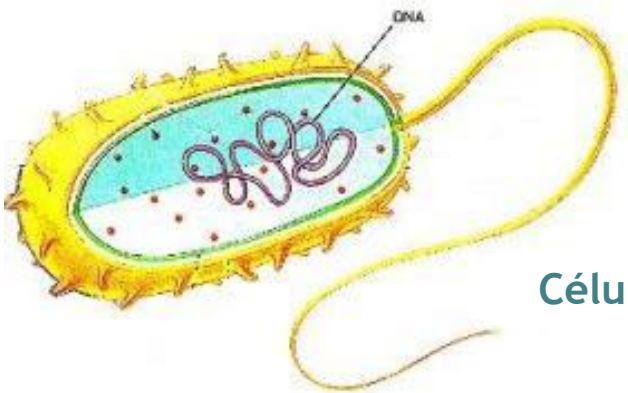


Célula Eucariota Animal

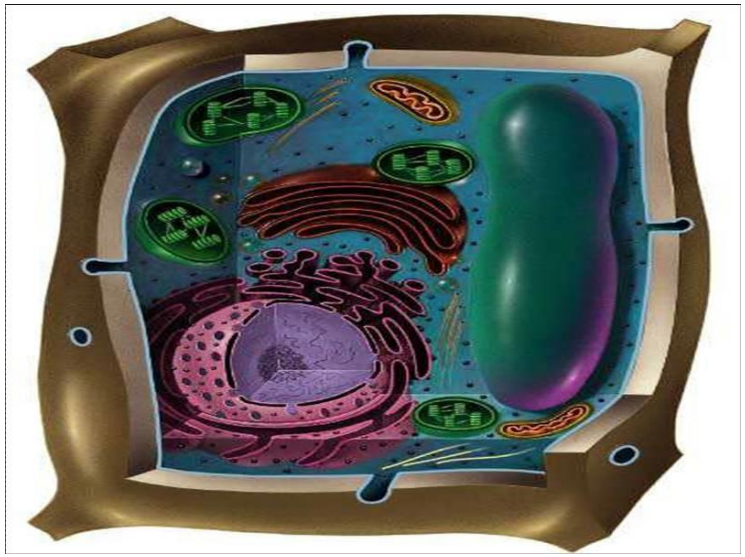


Célula Eucariota Vegetal

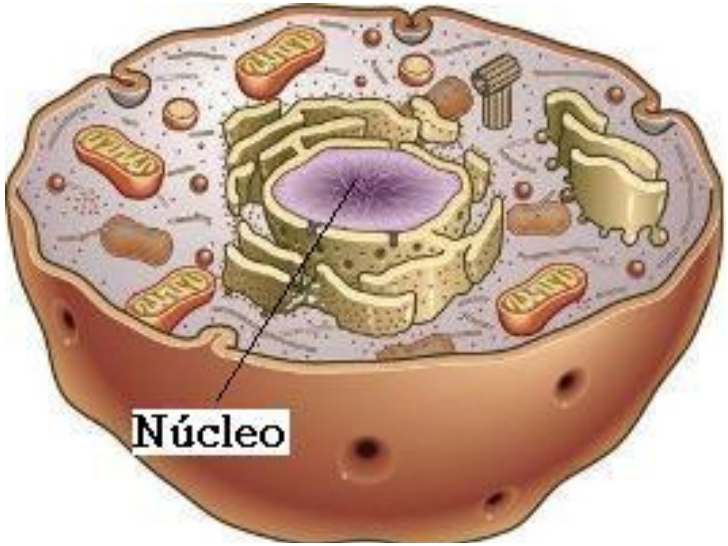
ORGANIZAÇÃO CELULAR



Célula Procariota



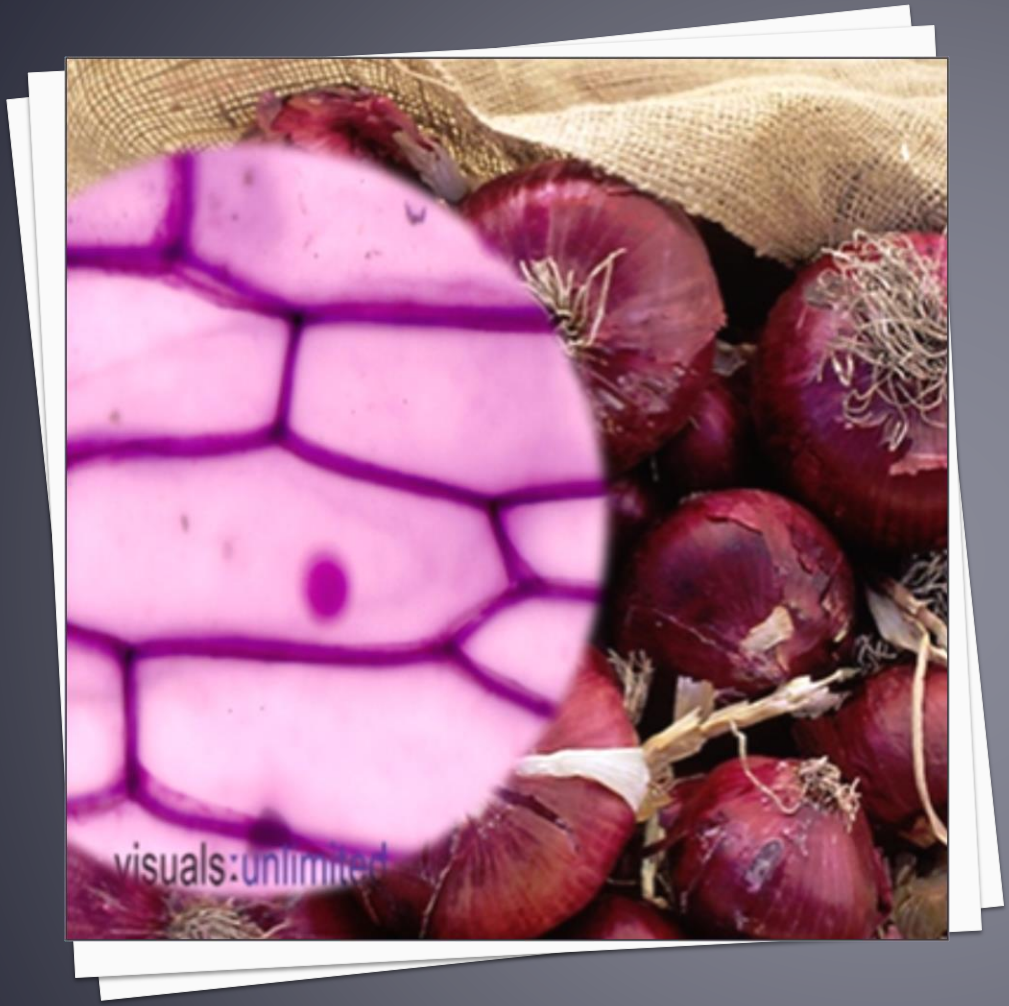
Célula Eucariota Vegetal



Célula Eucariota Animal

ORGANIZAÇÃO CELULAR

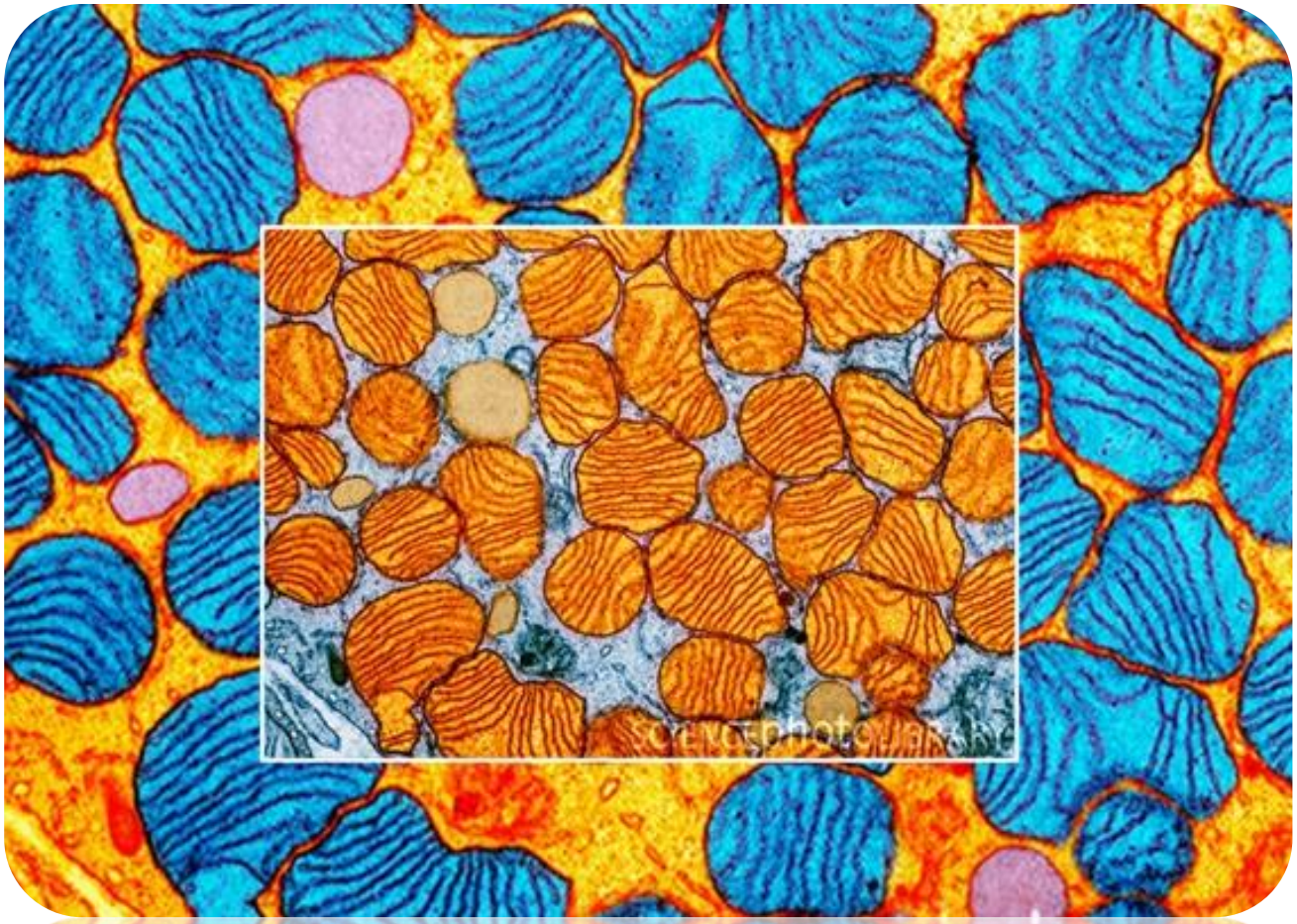
Componentes celulares	Função	Procariótica (bactérias)	Eucariótica	
			Plantas	Animais
Parede celular	Protecção; estrutura de suporte	√	√	--
Membrana celular	Controlo do movimento de substâncias	√	√	√
Núcleo	Contém o material genético	--	√	√
Nucleóide	Material genético	√	--	--
Mitocôndrias	Respiração aeróbia	--	√	√
Cloroplastos	Fotossintese	--	√	--
Vacúolo central	Reserva de água e outras substâncias	--	√	--
Citoplasma	Contém várias substâncias	√	√	√
Ribossomas	Síntese de proteínas	√	√	√
Retículo endoplasmático	Síntese de lípidos e proteínas; transporte	--	√	√
Complexo de Golgi	Transformação de proteínas e de lípidos	--	√	√
Lisossomas	Contém enzimas digestivas	--	-- ?	√



FOTOS MICROSCOPIA

ORGANIZAÇÃO CELULAR

Mitocôndrias



ORGANIZAÇÃO CELULAR

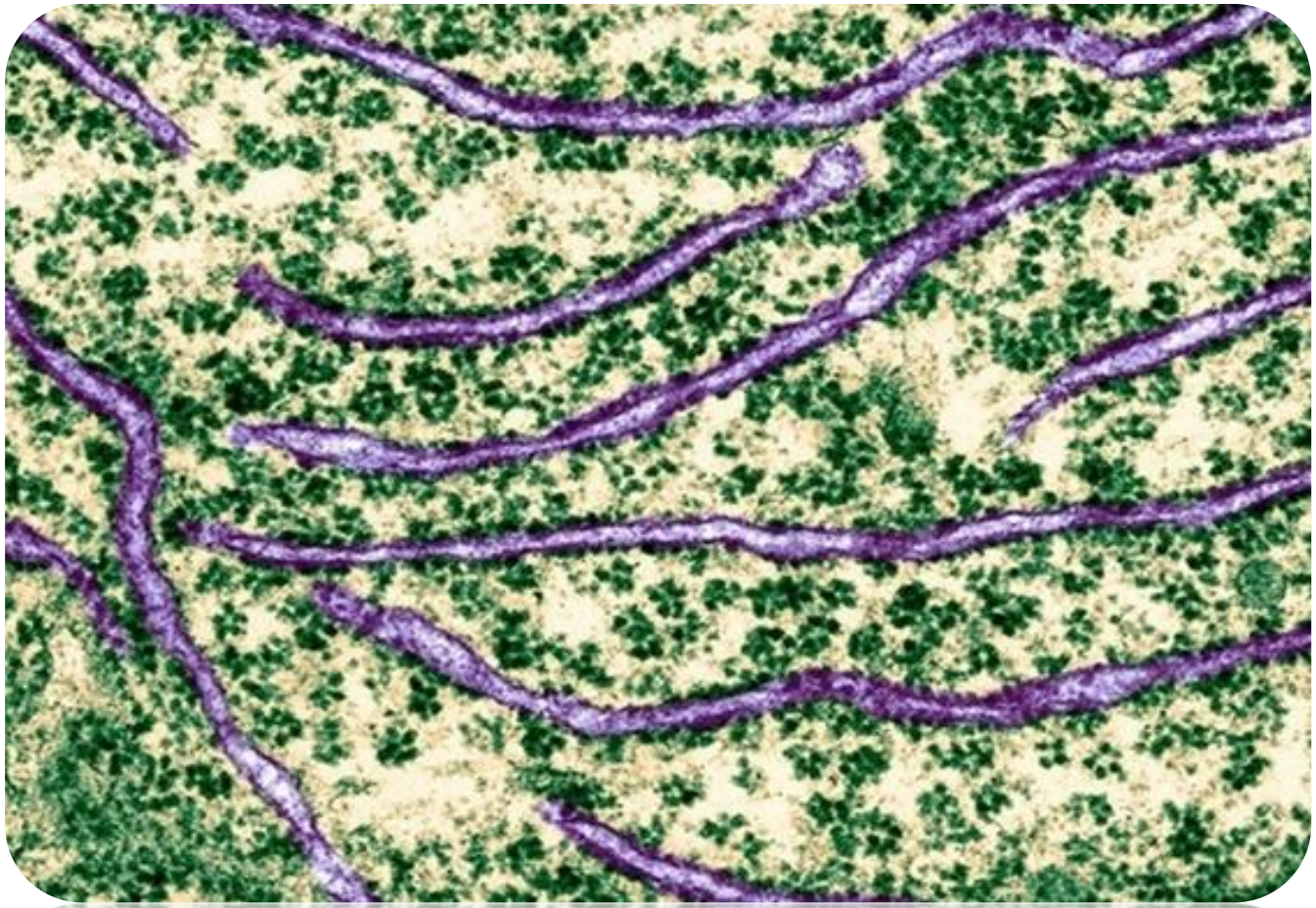
Mitocôndrias

ORGANIZAÇÃO CELULAR

Mitocôndrias

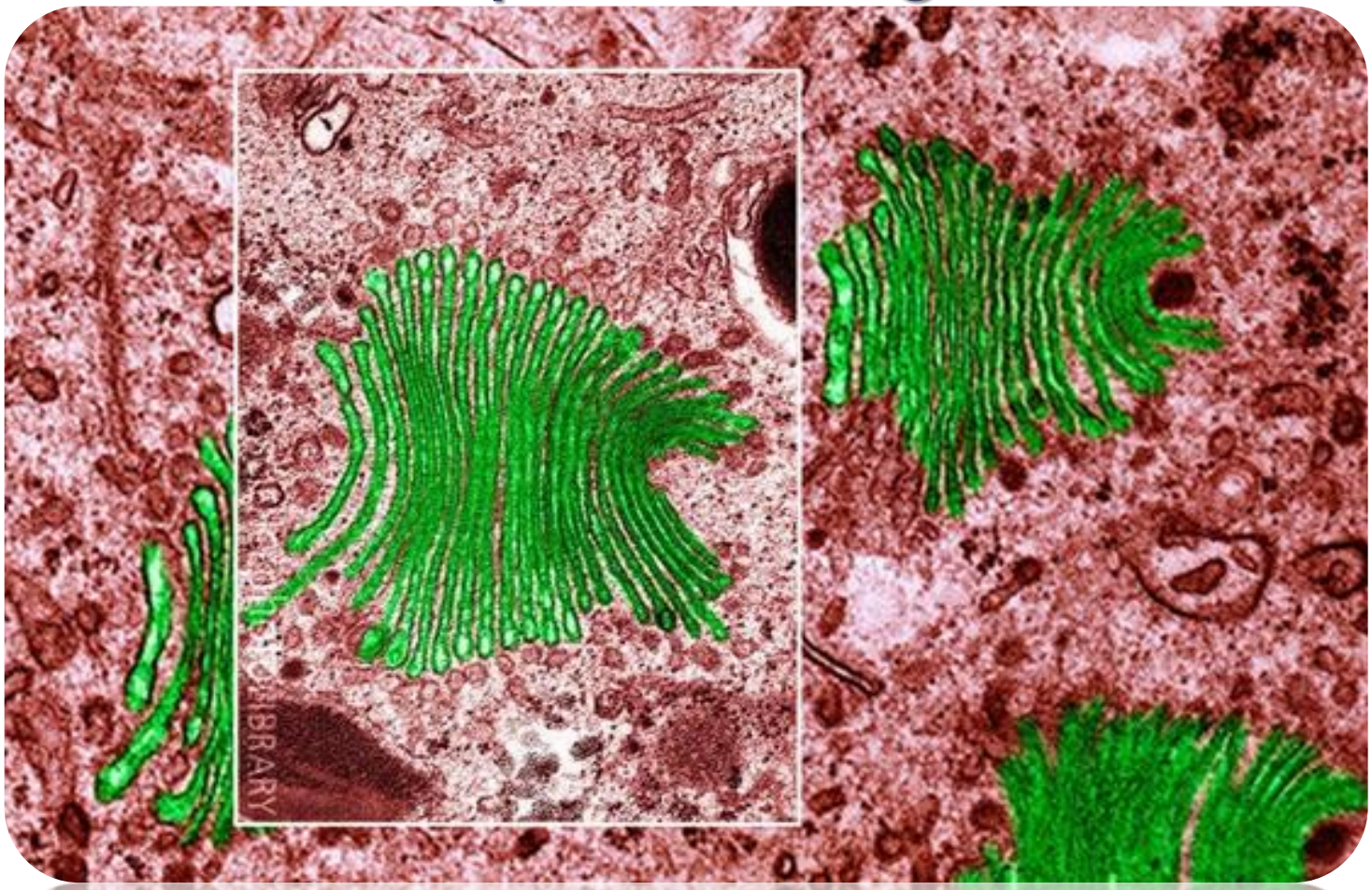
ORGANIZAÇÃO CELULAR

Retículo Endoplasmático



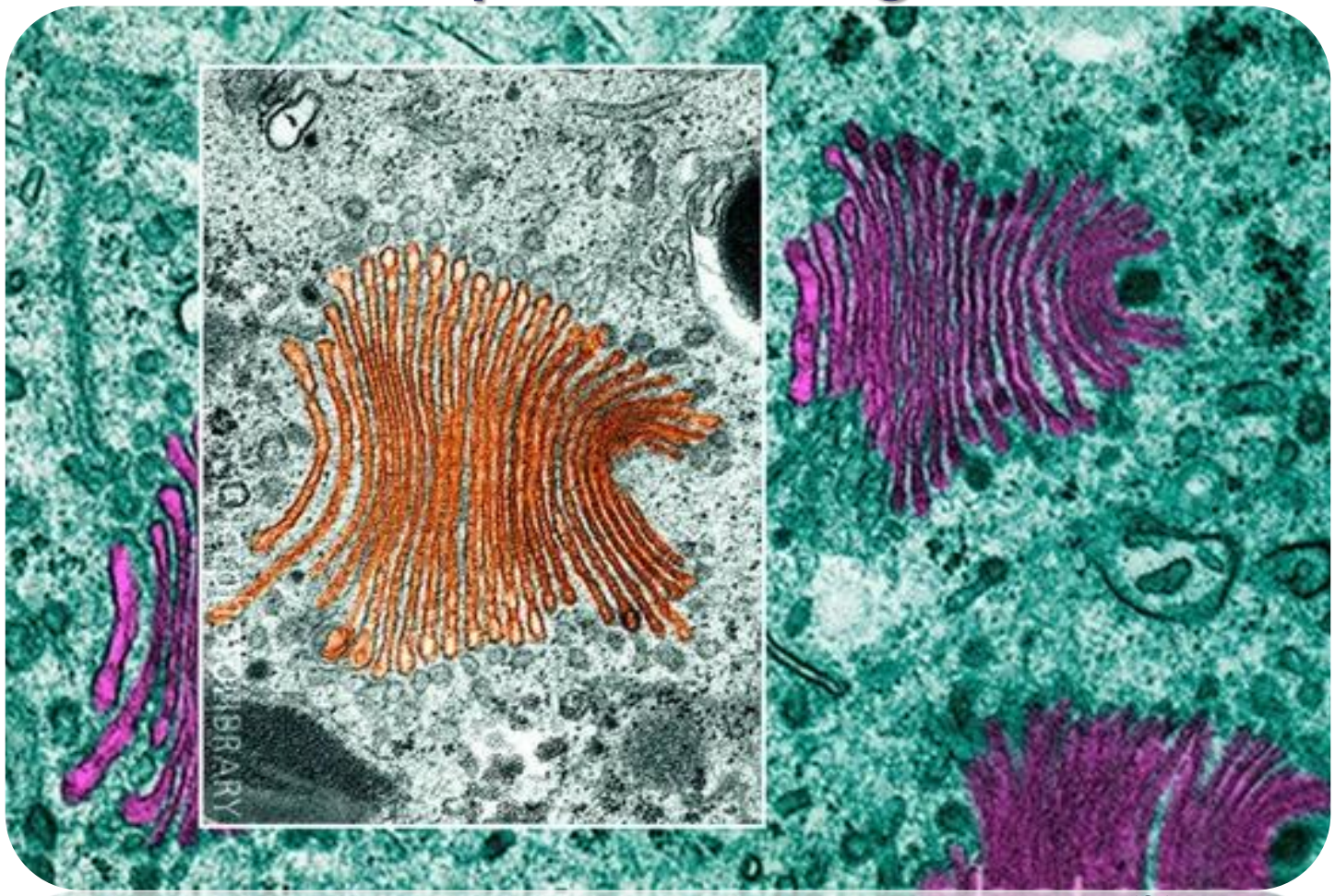
ORGANIZAÇÃO CELULAR

Complexo de Golgi



ORGANIZAÇÃO CELULAR

Complexo de Golgi

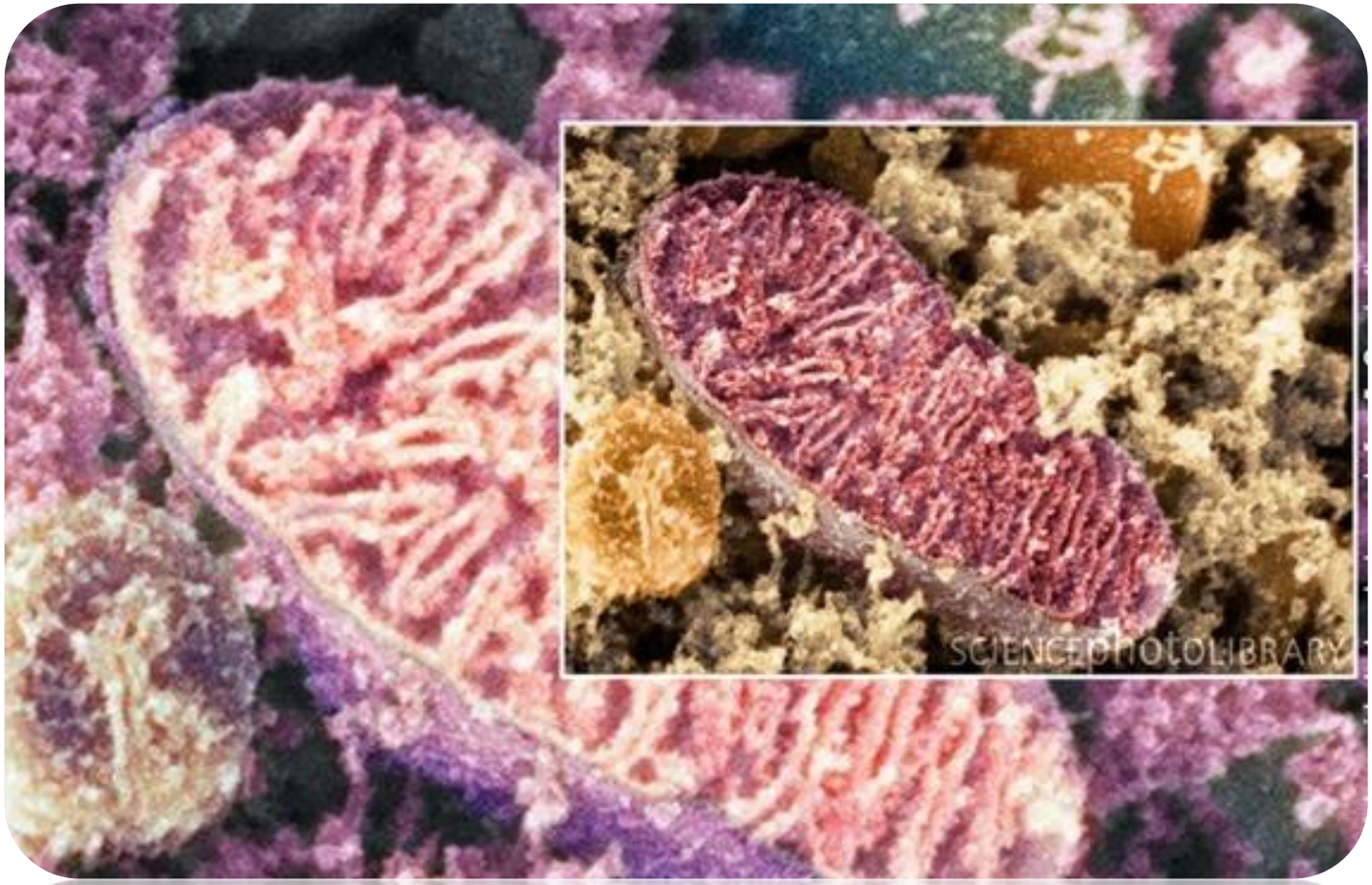


ORGANIZAÇÃO CELULAR

Cloroplasto

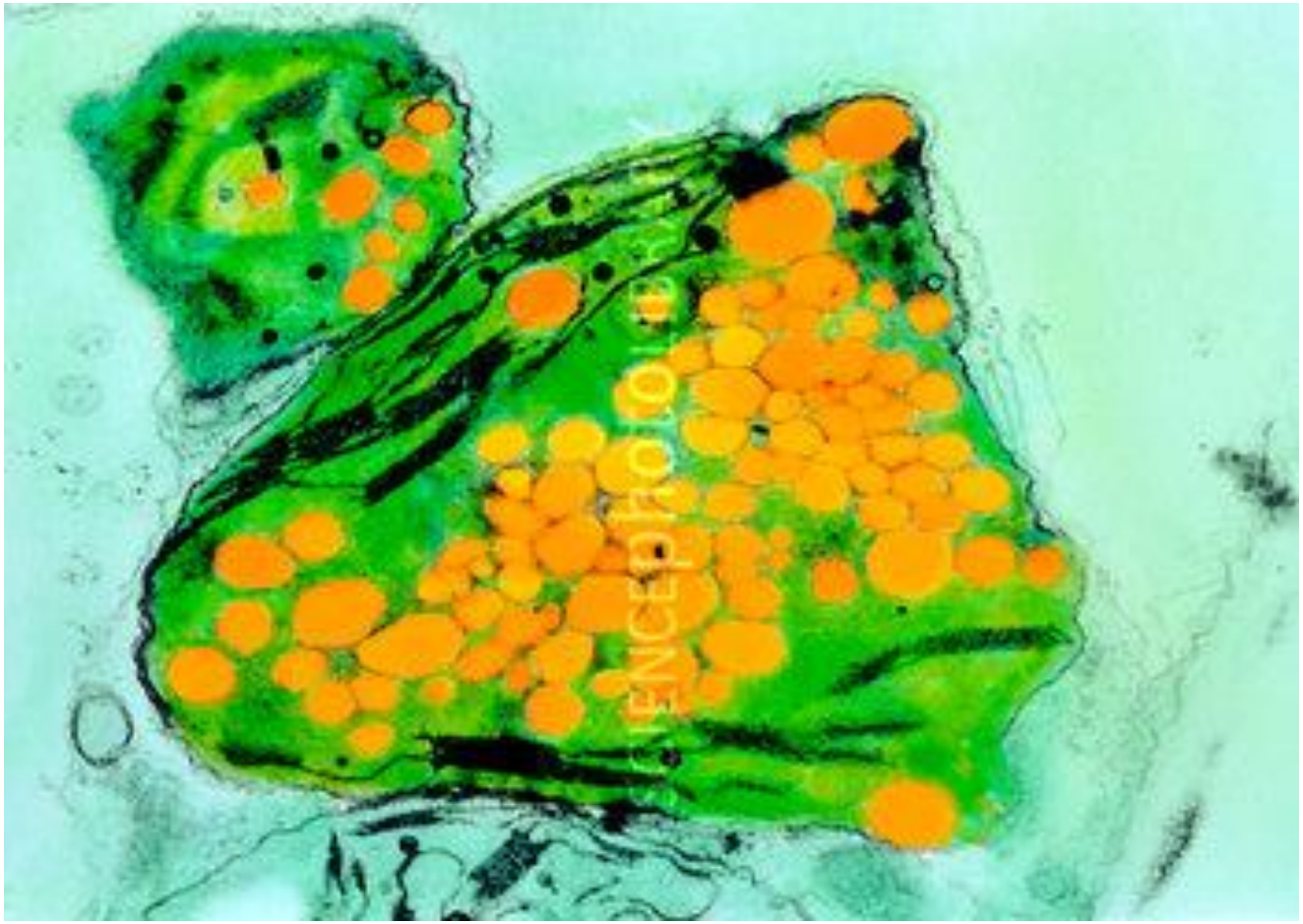
ORGANIZAÇÃO CELULAR

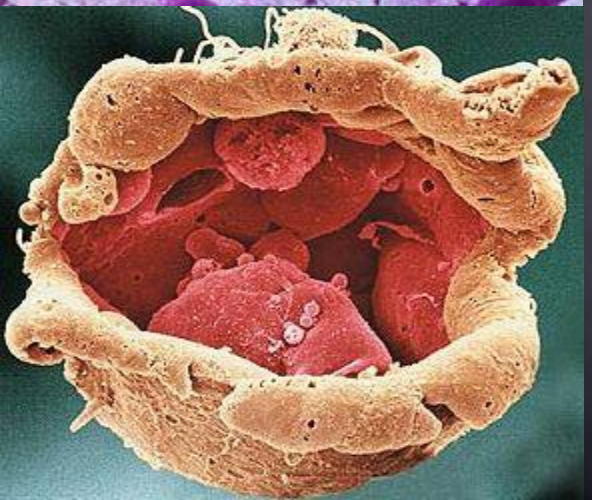
Mitocôndria



ORGANIZAÇÃO CELULAR

Cloroplasto





Diversidade e Unidade Biológica

Módulo A1

A CÉLULA – unidade estrutural e funcional dos seres vivos