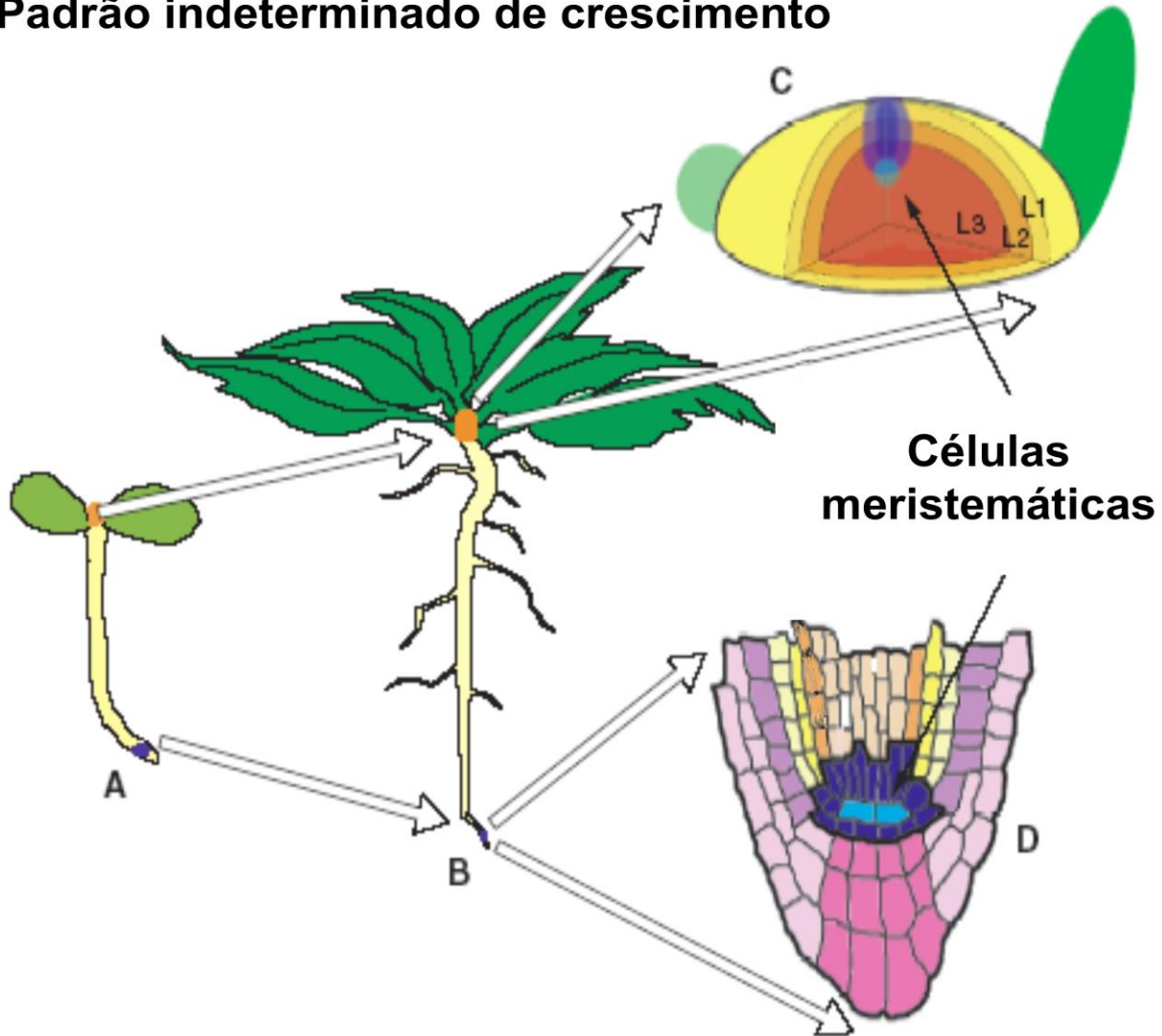
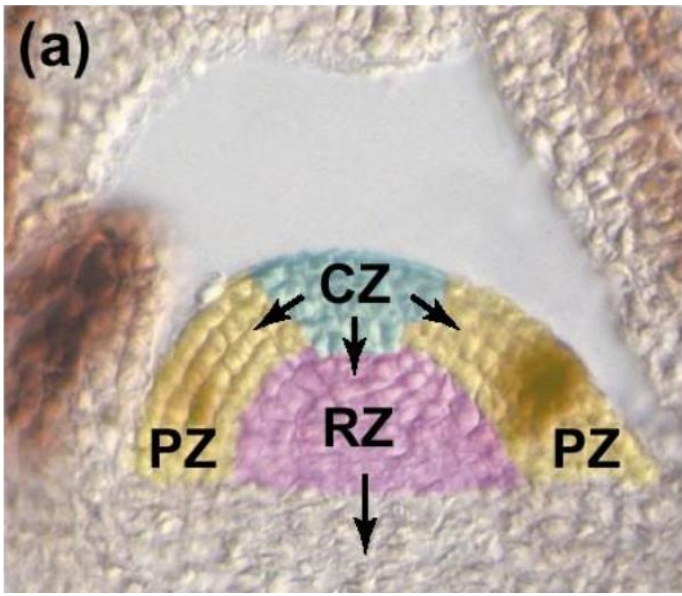


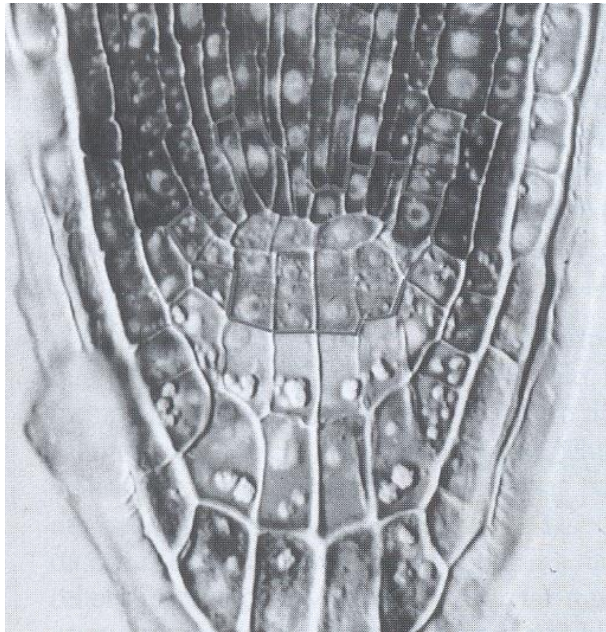
Recapitulando.....

Padrão indeterminado de crescimento





Meristema apical caulinar

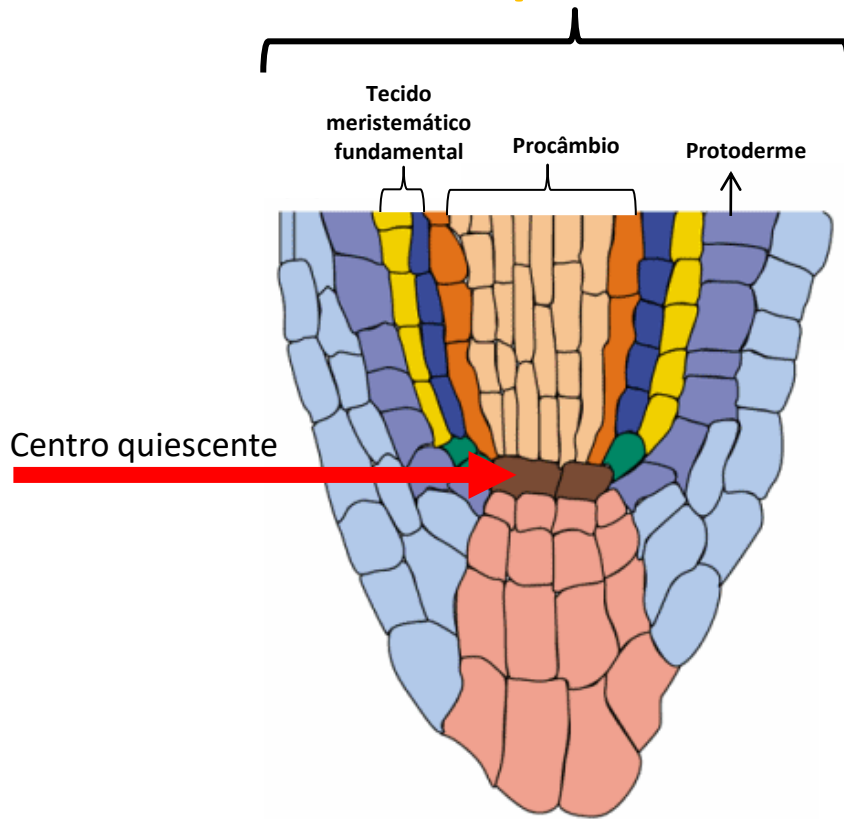


Meristema apical radicular



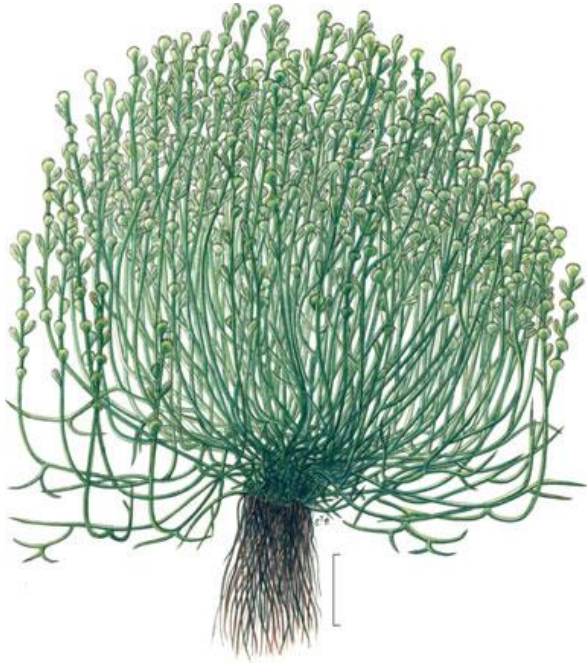
CZ – zona central; PZ – zona periférica; RZ – zona medular

Tecidos Meristemáticos Apicais

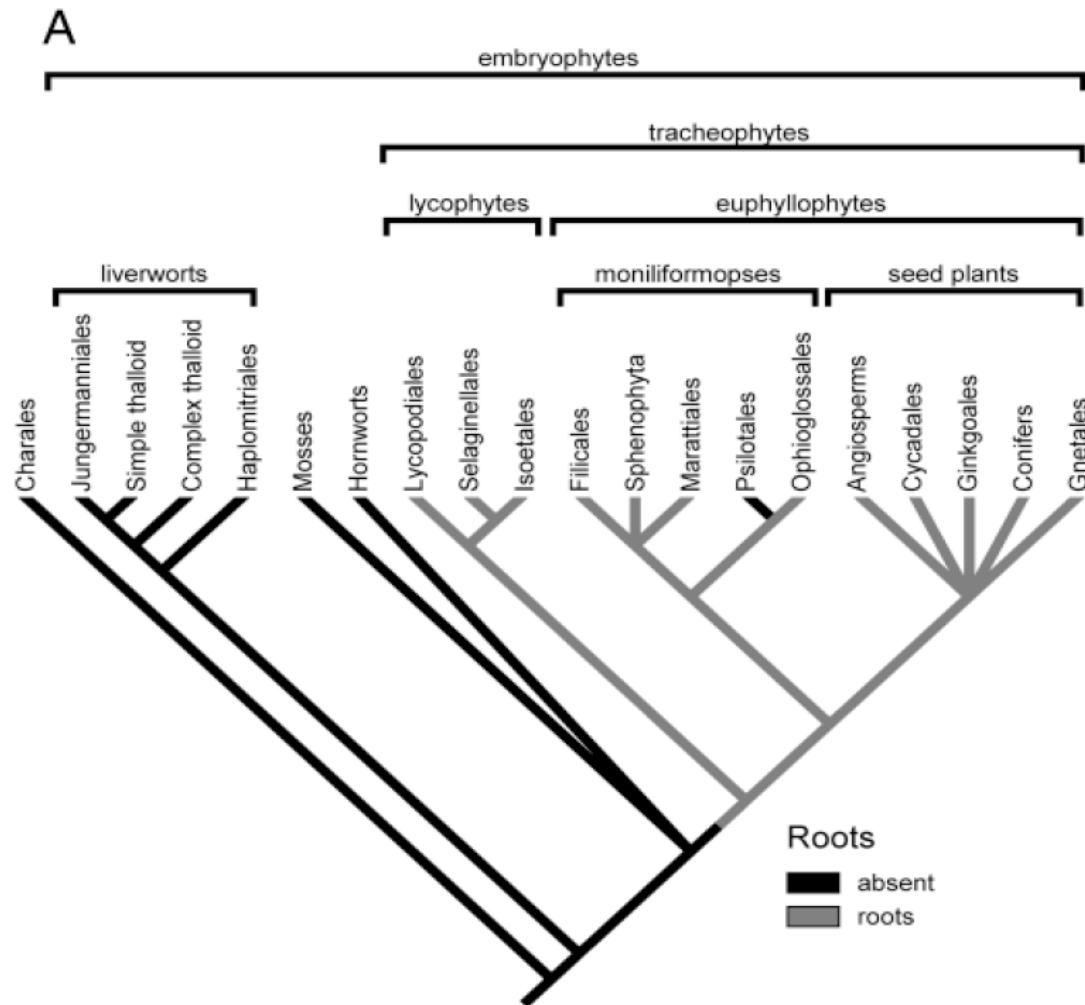


As diferentes raízes são formadas a partir da atividade do MAR (meristema apical radicular)

Morfologia e Anatomia do sistema radicular



Raiz surge nas traqueófitas com perda secundária em Psilotales.



Friedman *et al.* (2004)

Diversidade morfológica



Raízes escoras/suporte



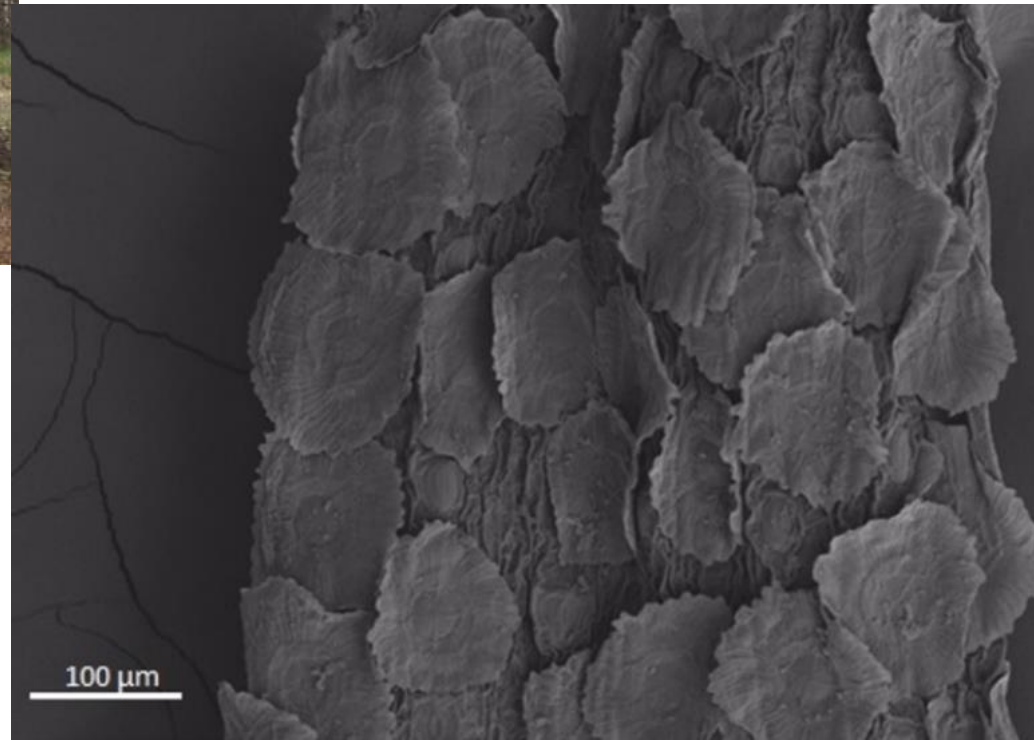
Raízes tuberosas
(armazenamento)

Raízes grampiformes

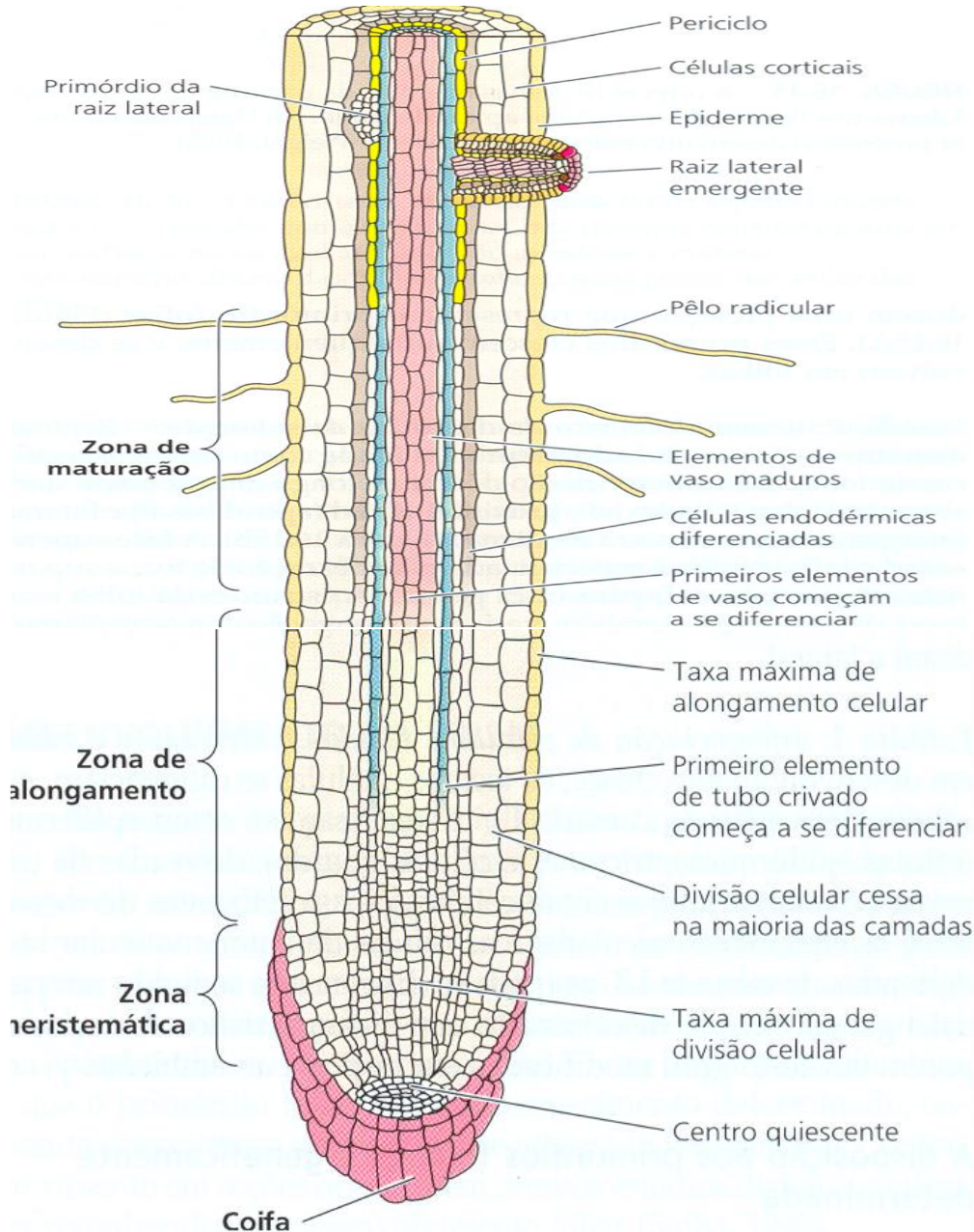
Tillandsia usneoides (Bromeliaceae)



Tricomas desempenhando função de absorção!!



Partes da raiz



Zona de ramificação: região de formação de raízes laterais ou secundárias.

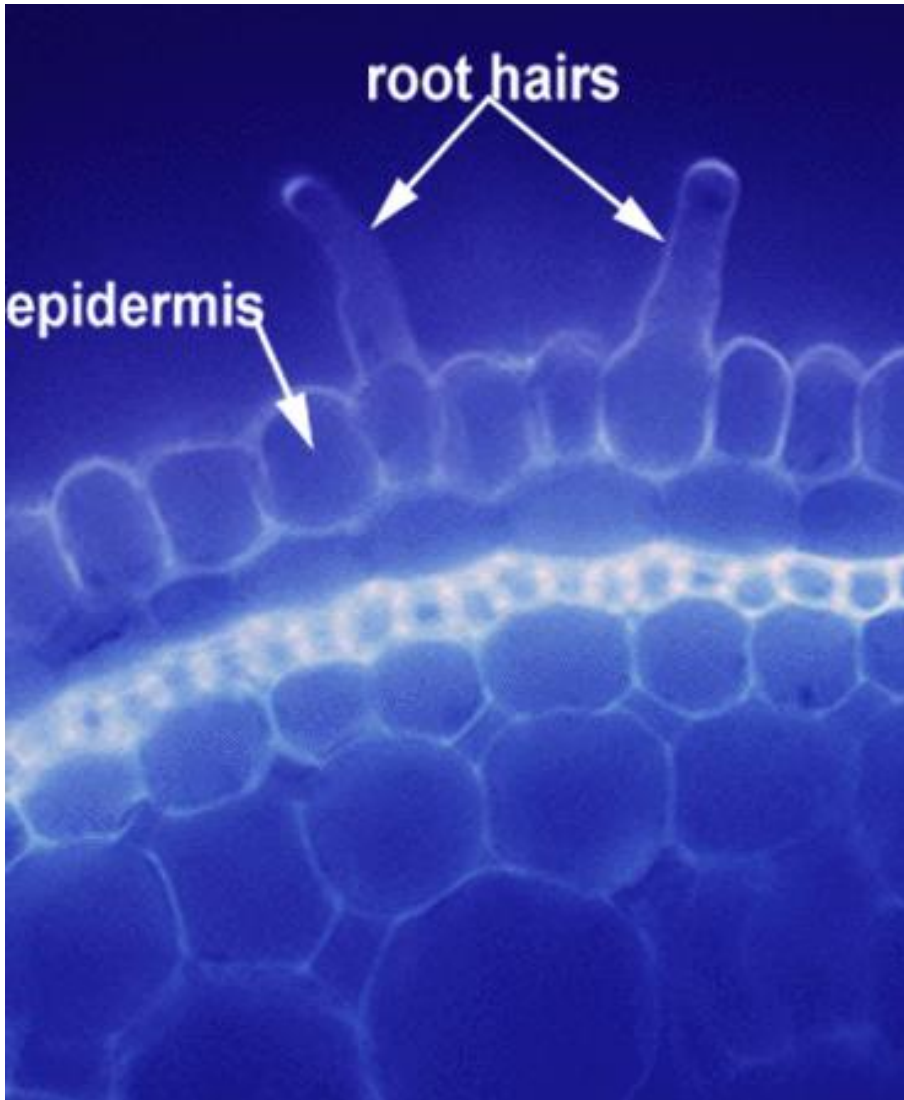
Zona de maturação: região onde são formados os pelos radiculares.

Zona de alongamento/crescimento: região acima do ápice meristemático onde células estão em alongamento; ausência de pelos radiculares.

Zona meristemática

Coifa: região protetora do ápice meristemático radicular.

Tricomas (pelos) radiculares



Caso: Planta com 4 meses apresentando 14 bilhões de pelos radiculares, os quais se colocados lado a lado alcançariam cerca de 10.000Km

MORFOLOGIA

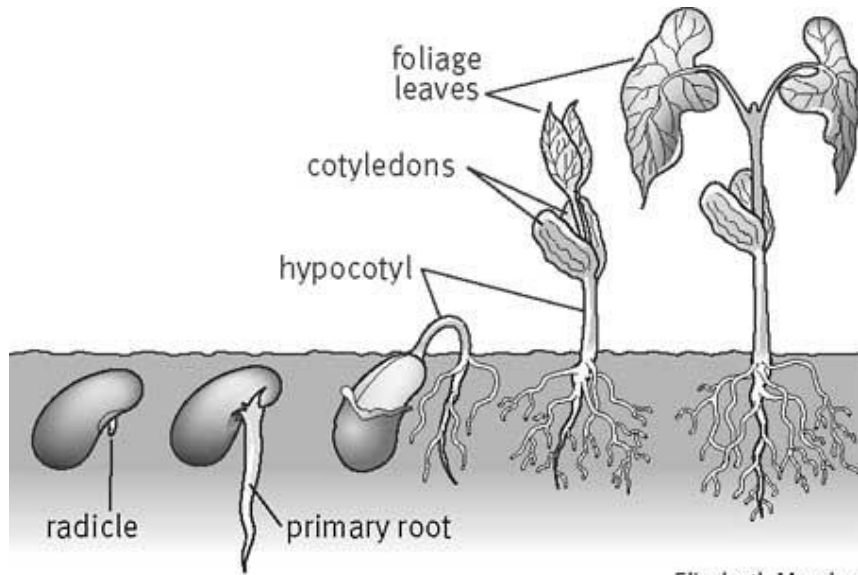
- Tipos principais de raízes:
 - a) **Raiz primária**: originada da radícula do embrião
 - b) **Raiz adventícia**: originada a partir de caule ou folha
 - c) **Raiz lateral**: originada a partir de uma raiz principal

SISTEMAS RADICULARES

1. Pivotante ou axial : formado por raiz primária, podendo ter raízes laterais.

2. Fasciculado : formado por raízes adventícias, podendo ter raízes laterais.

Raiz primária: originada da radícula do embrião. **Sistema axial ou pivotante**



Elizabeth Morales



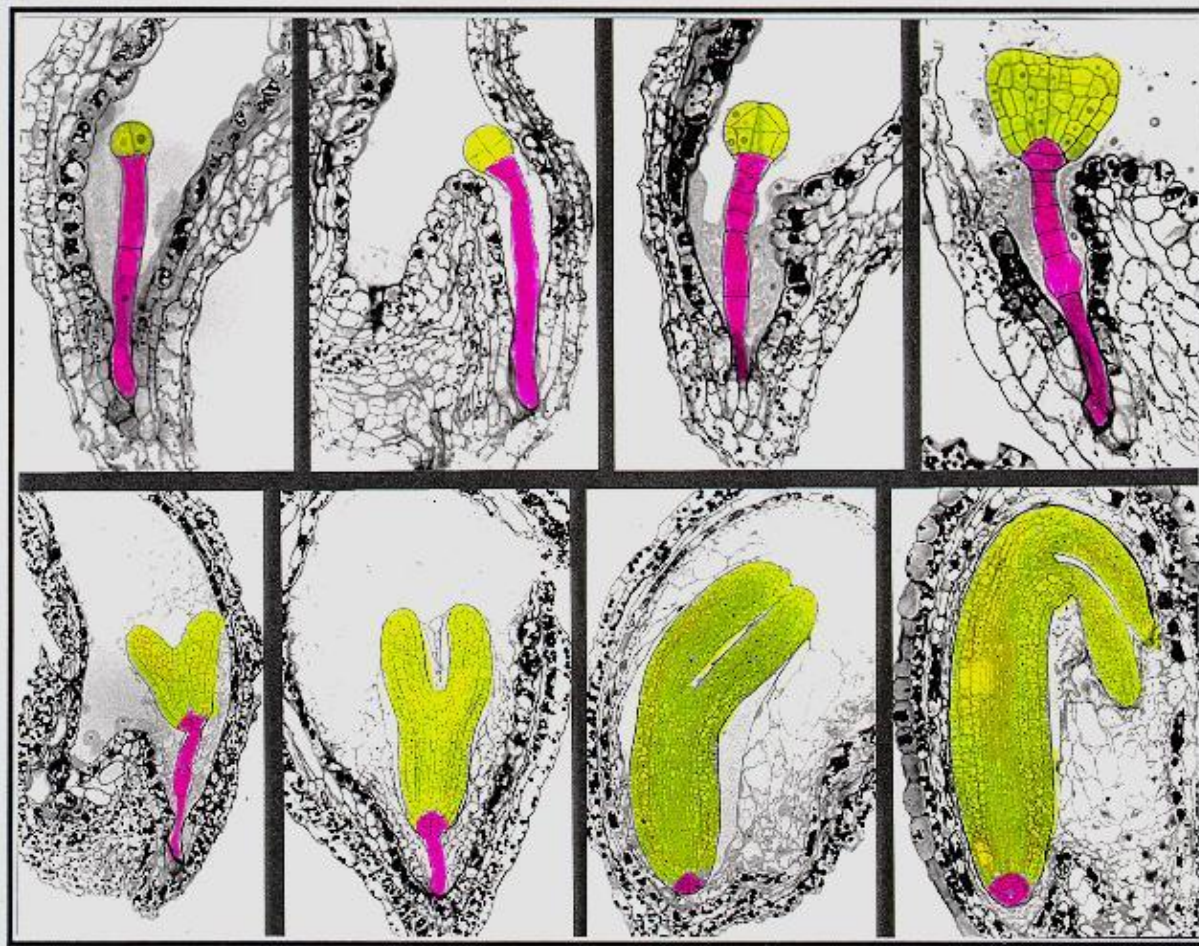
Raiz adventícia: originada a partir do caule ou da folha. **Sistema fasciculado**

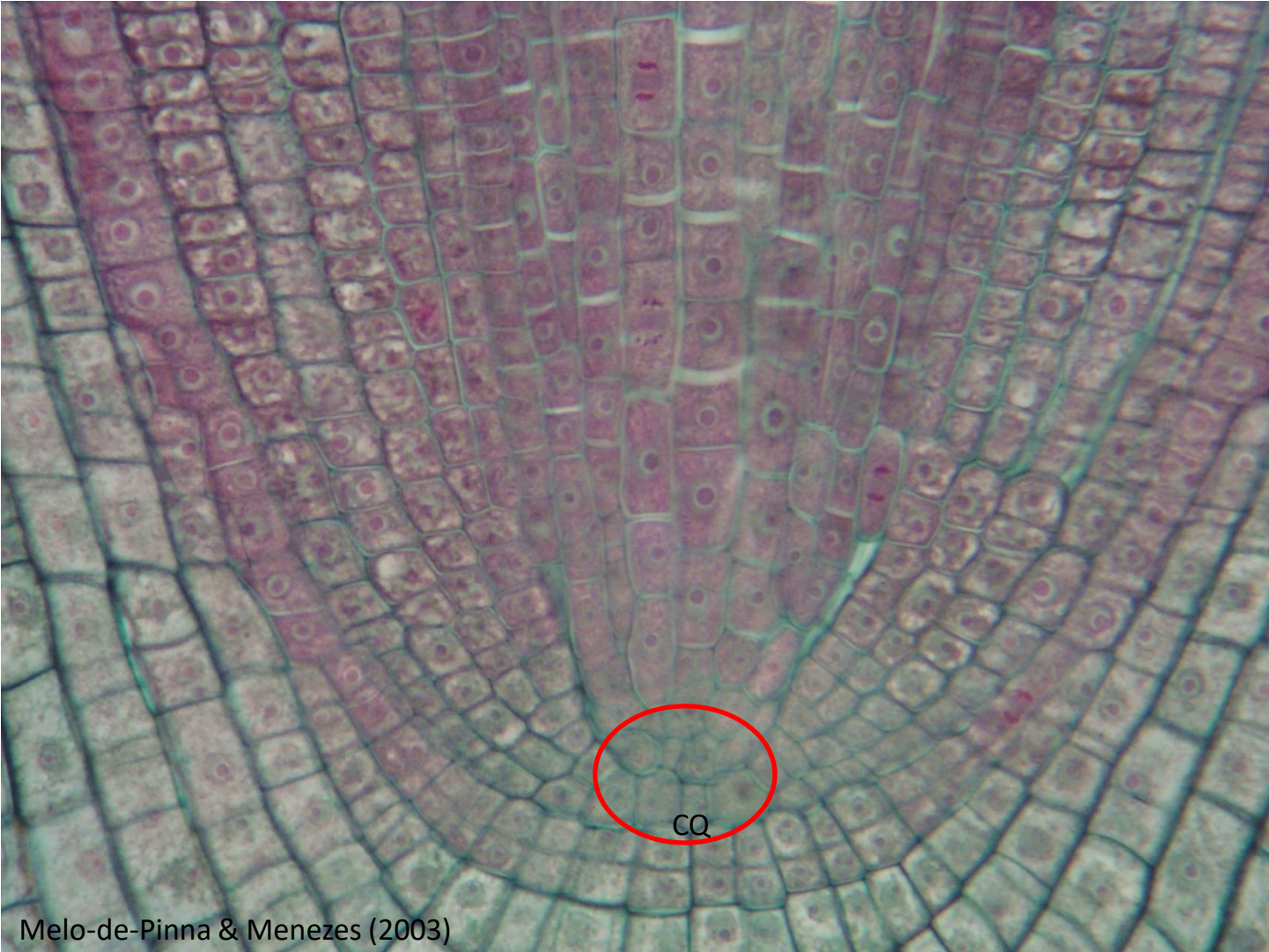


Estabelecimento do meristema apical radicular



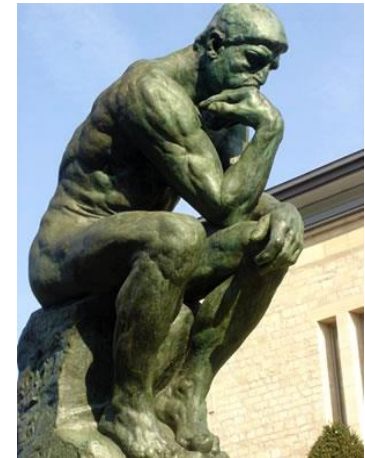
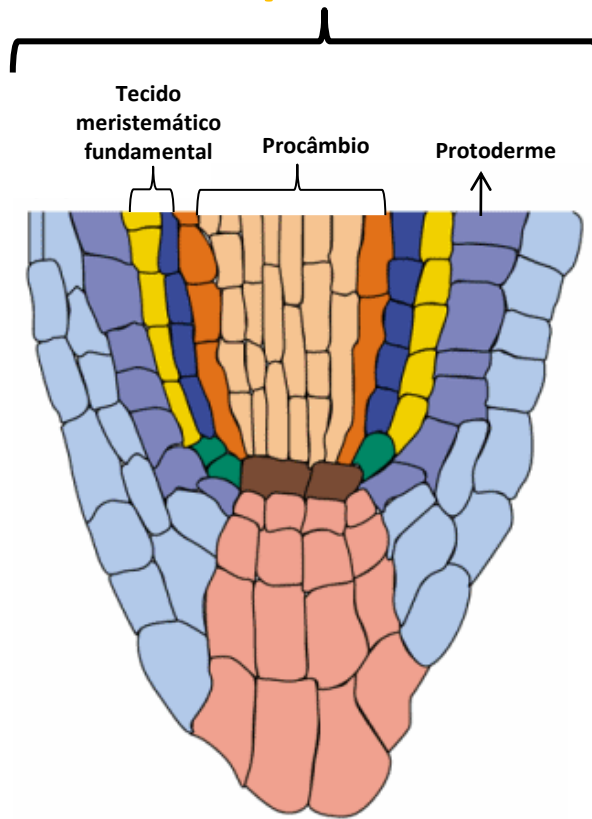
Estabelecimento da raiz primária: a partir da embriogênese



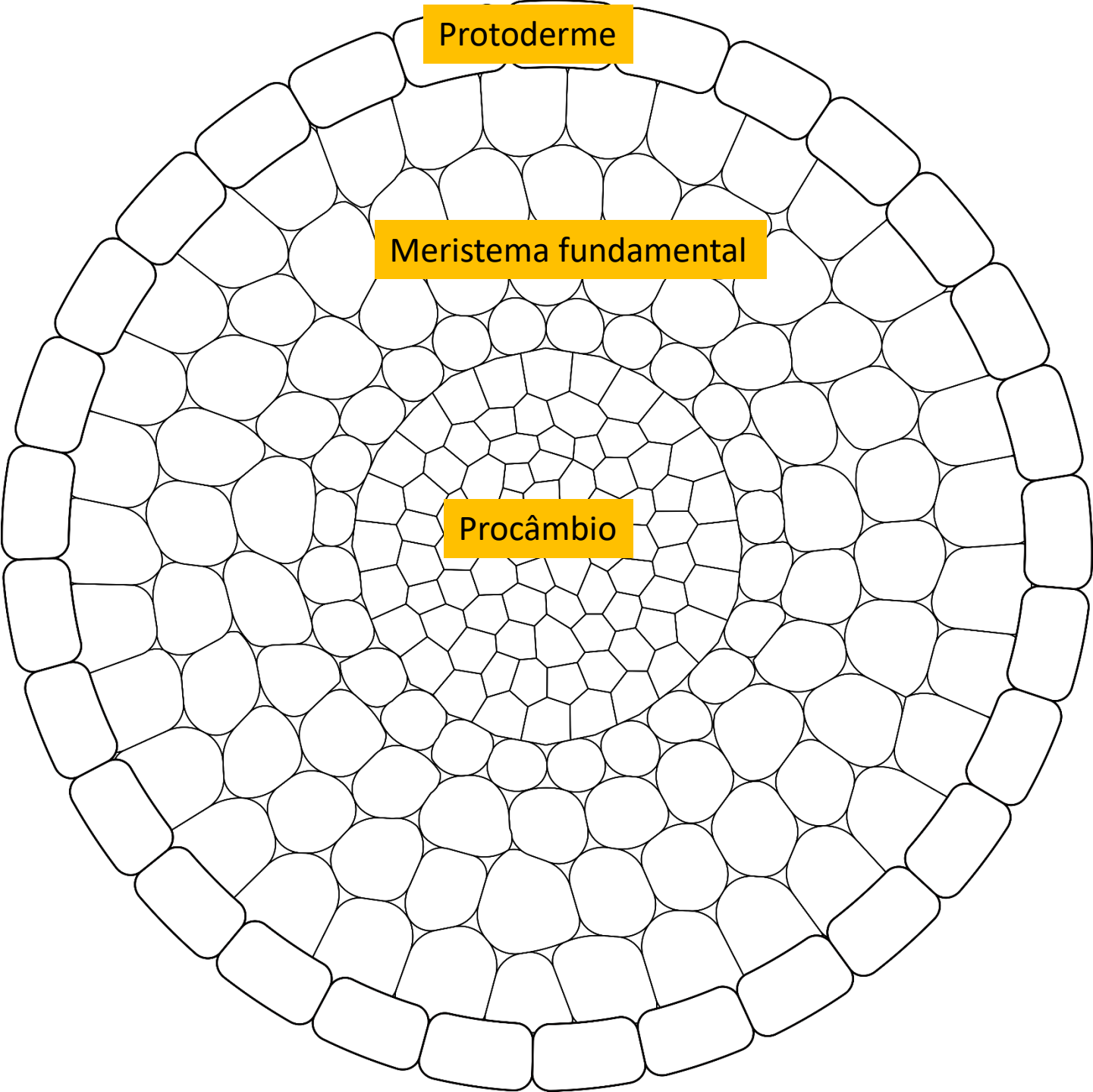


Melo-de-Pinna & Menezes (2003)

Tecidos Meristemáticos Apicais



Qual é a organização em secção transversal?

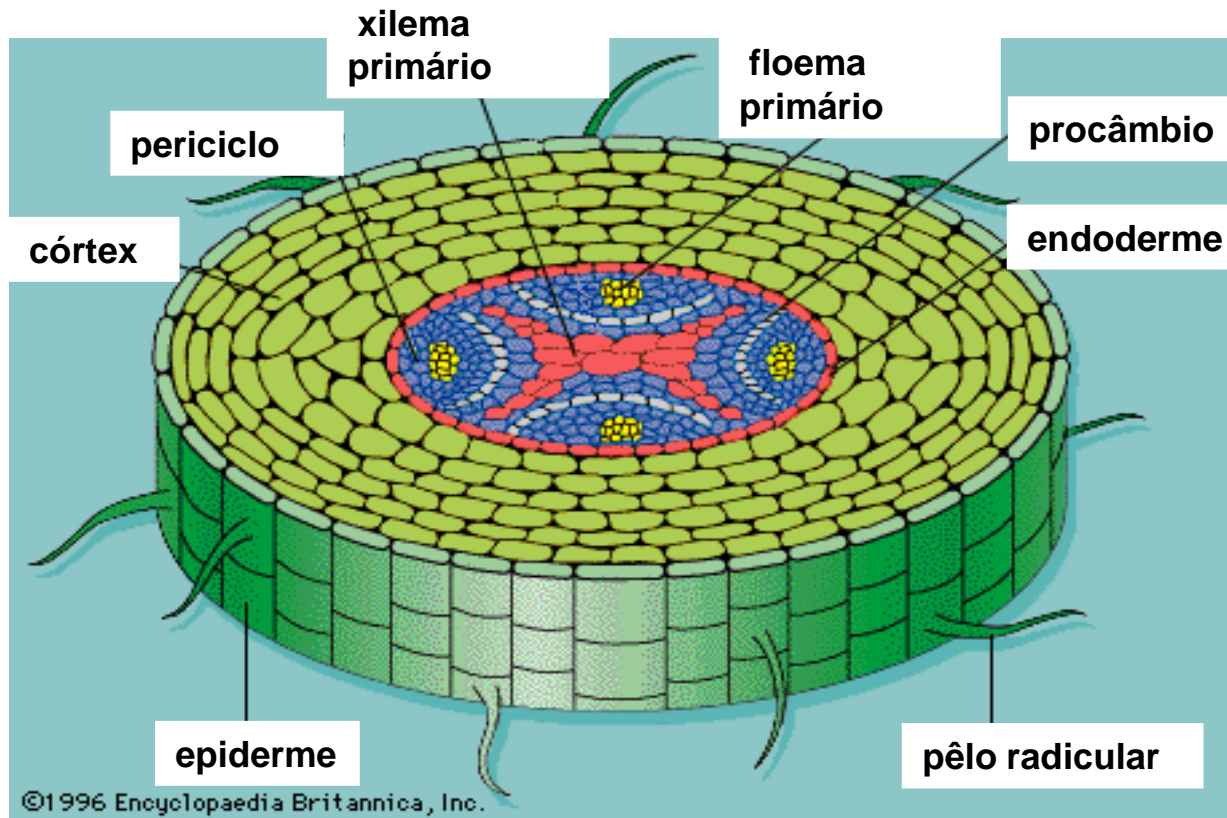


Protoderme

Meristema fundamental

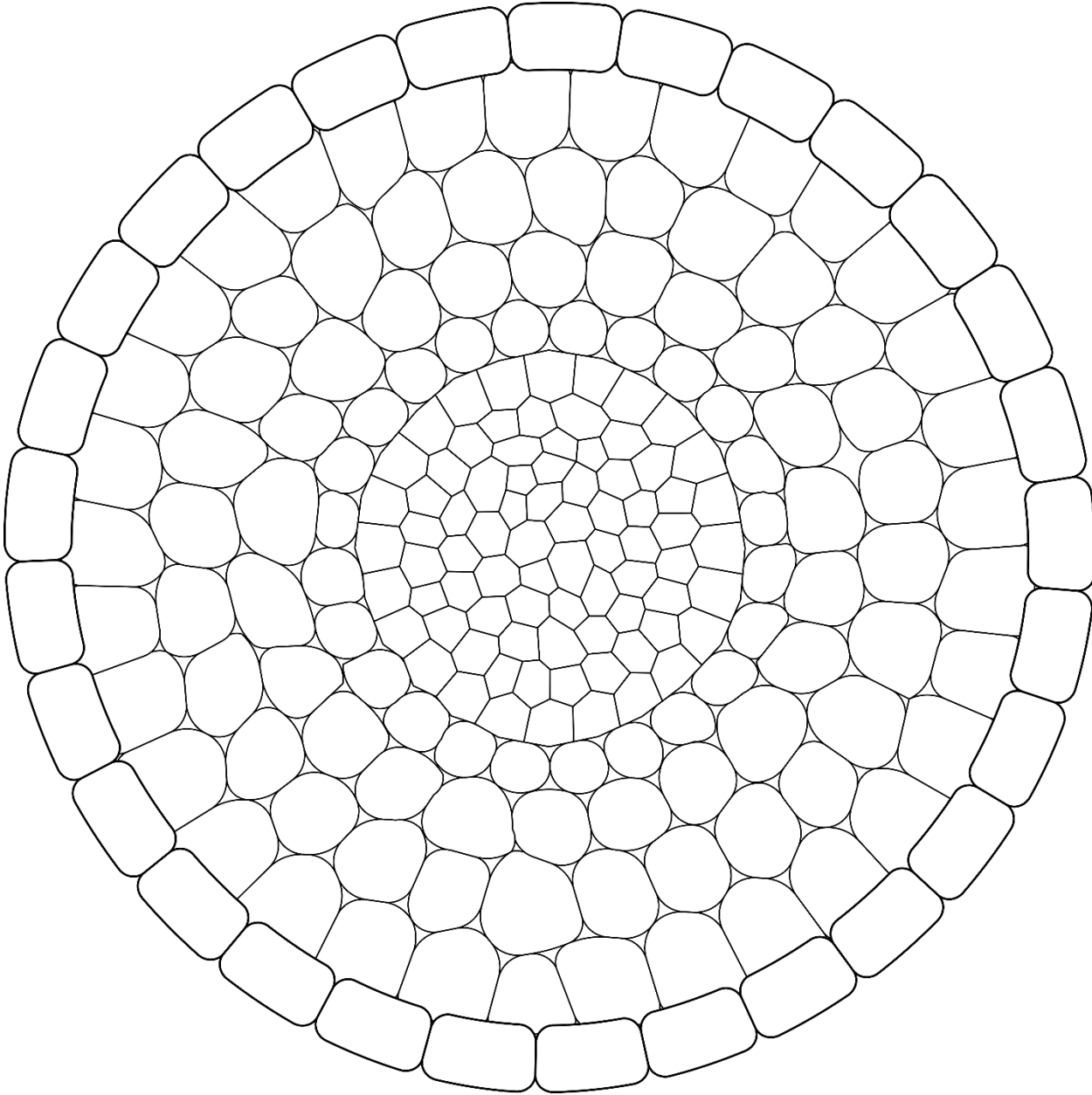
Procâmbio

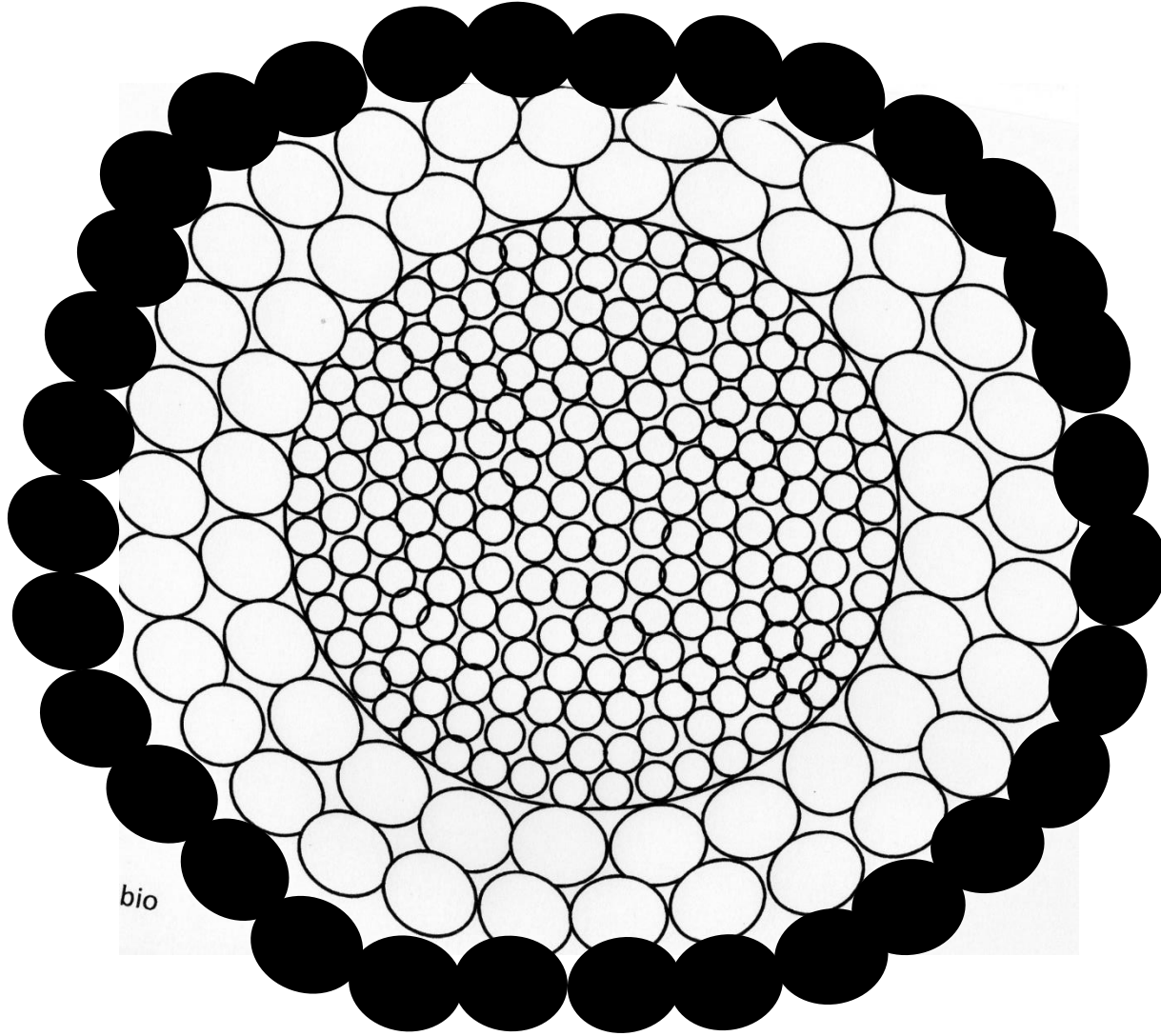
Diferenciação da estrutura primária da raiz



EPIDERME

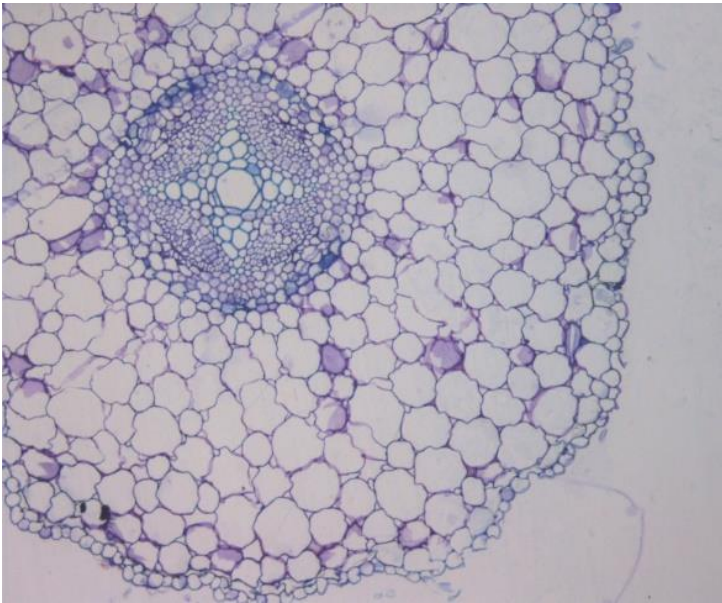
(tecido do sistema de revestimento primário)



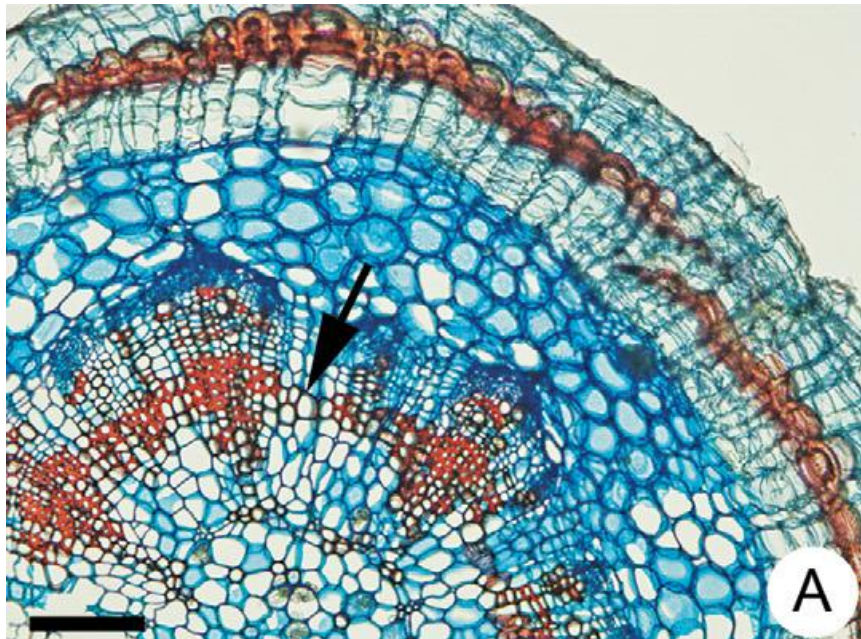


bio

Epiderme unisseriada



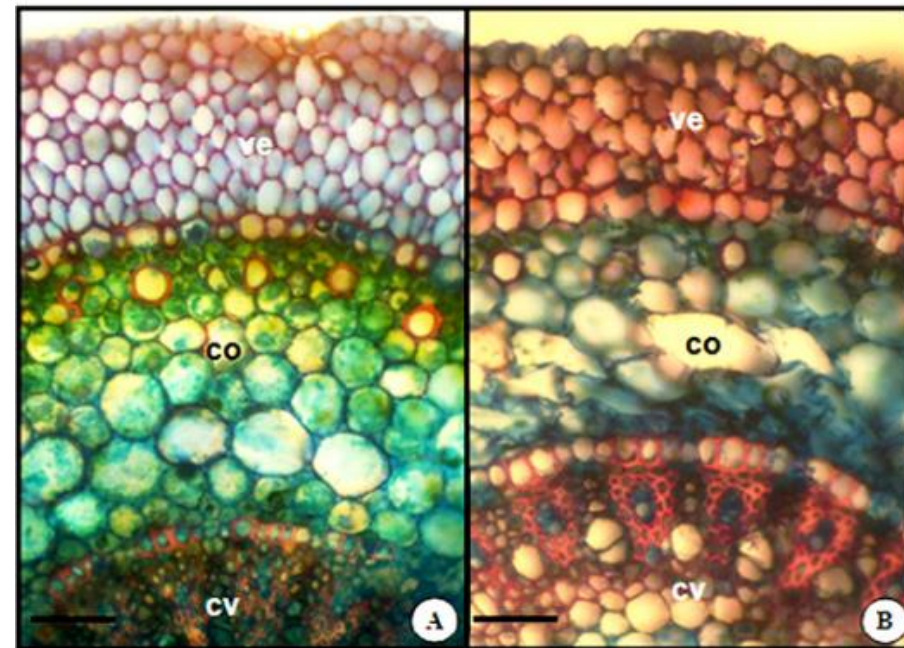
Periderme: sistema de revestimento secundário formada pelo felogênio

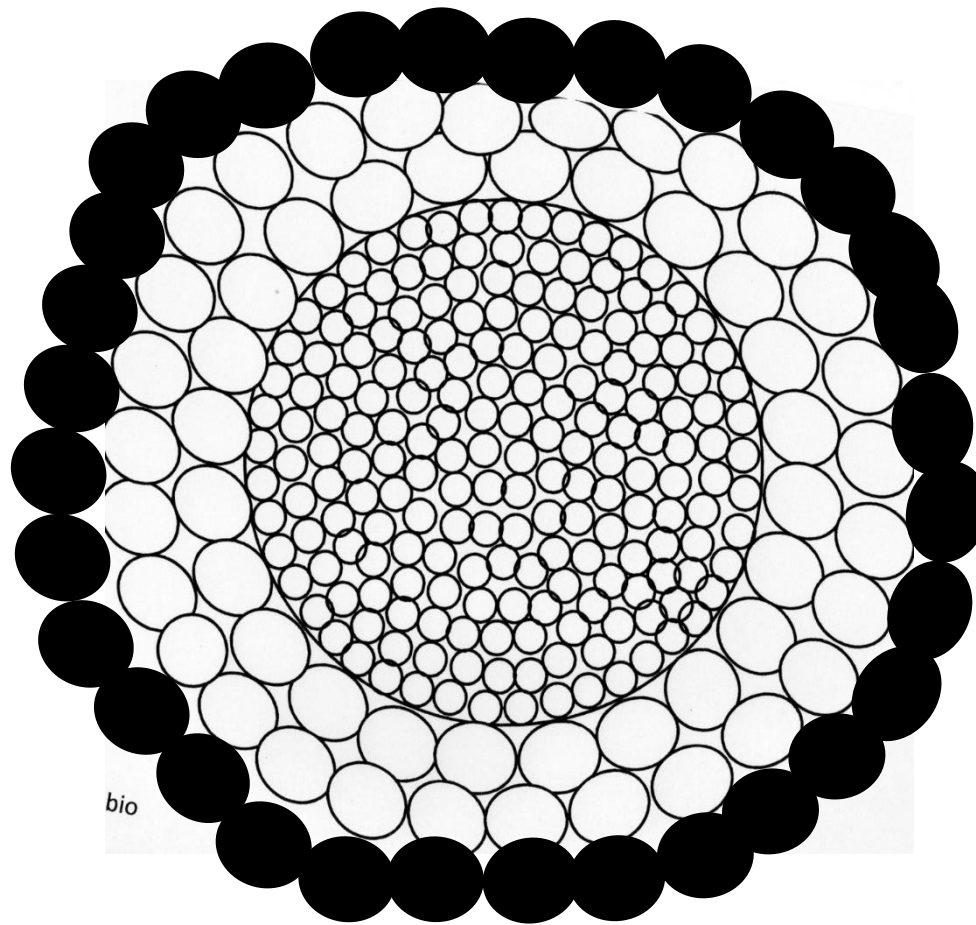


Epiderme formada por células mortas (velame)



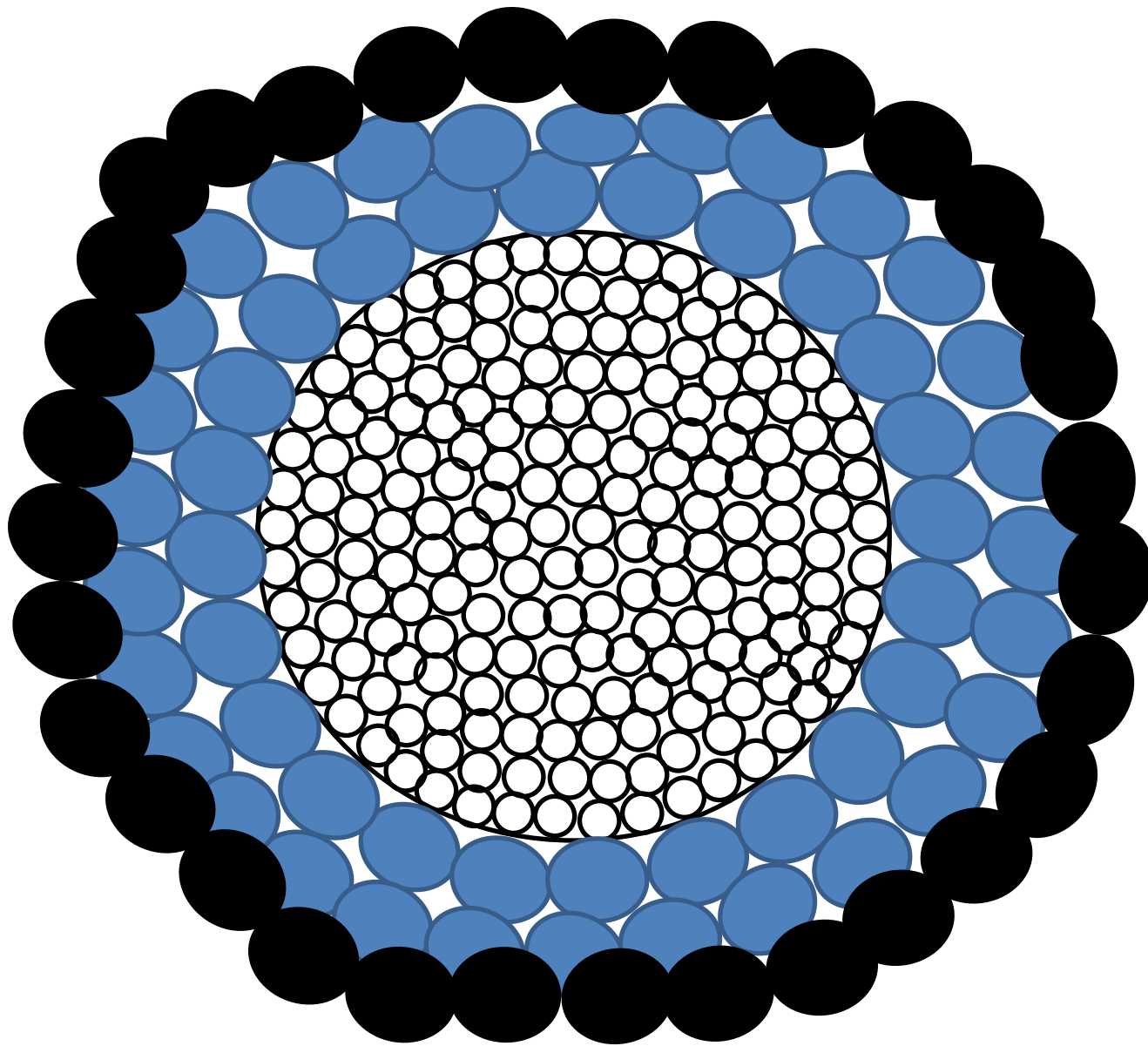
ISSN 1806-7409 - <http://www.naturczaonline.com.br>





Córtex

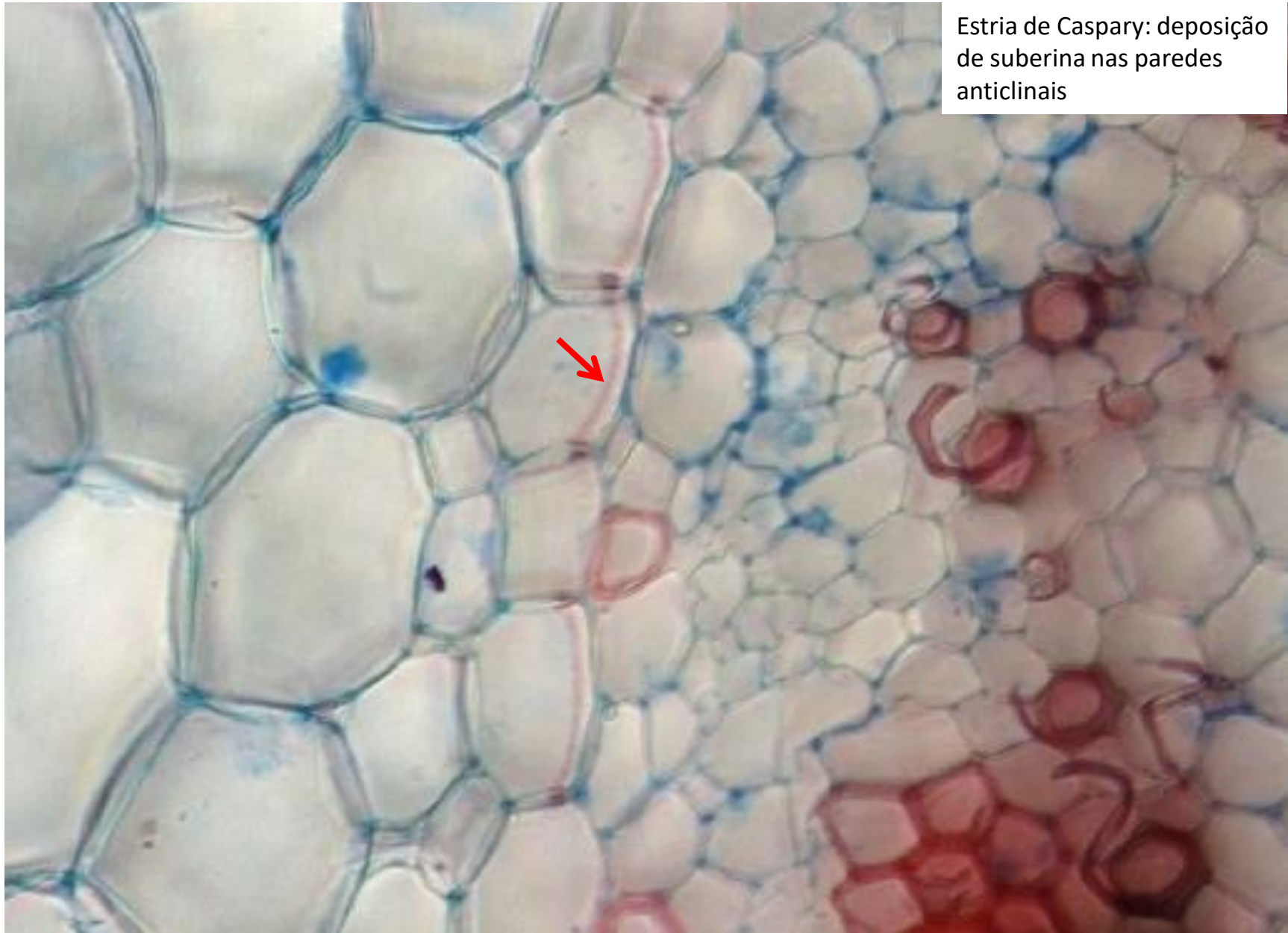
(região formada a partir do meristema fundamental)

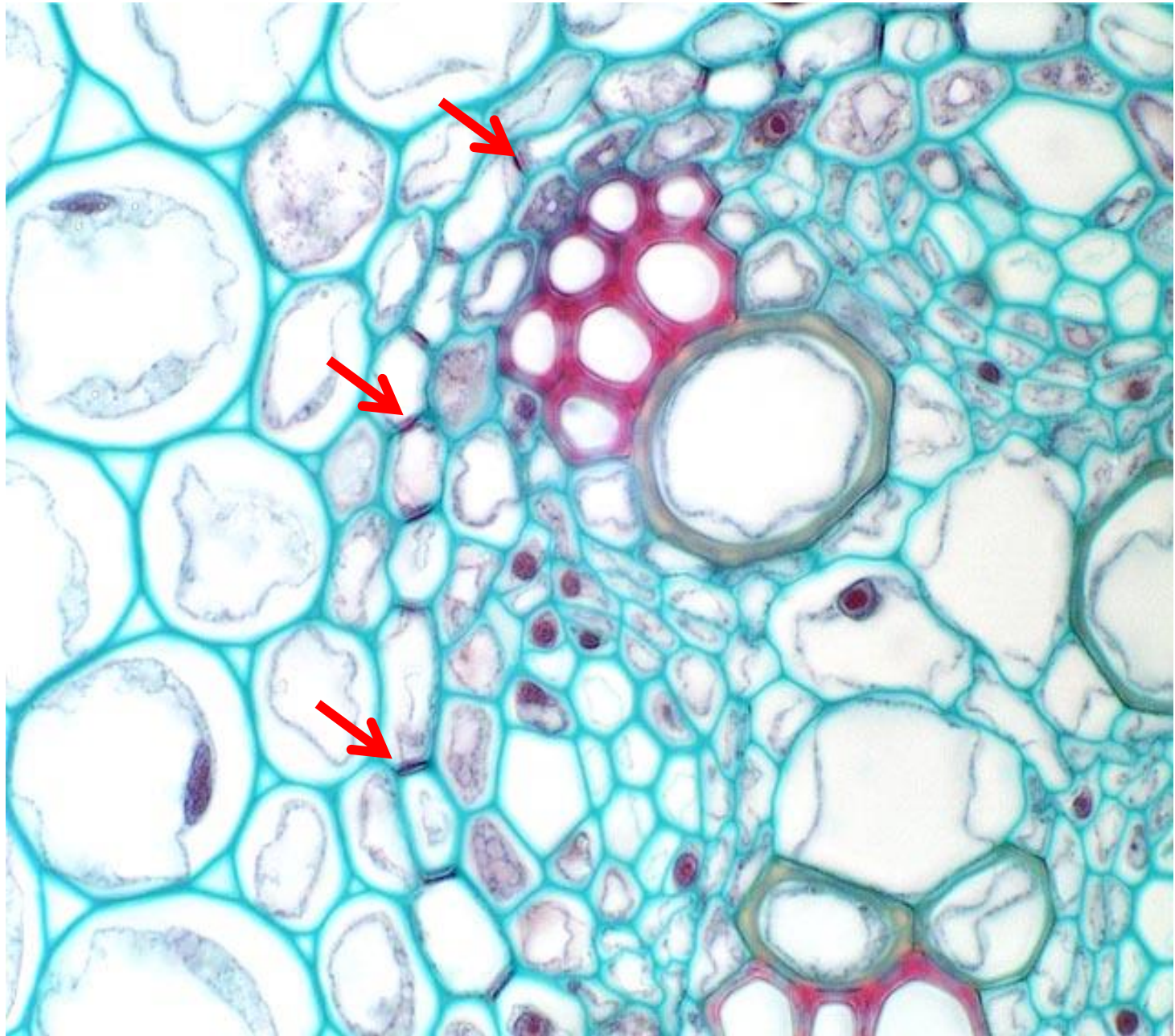


○ Procâmbio

● Tecidos fundamentais (região cortical)

Endoderme: camada mais interna do córtex

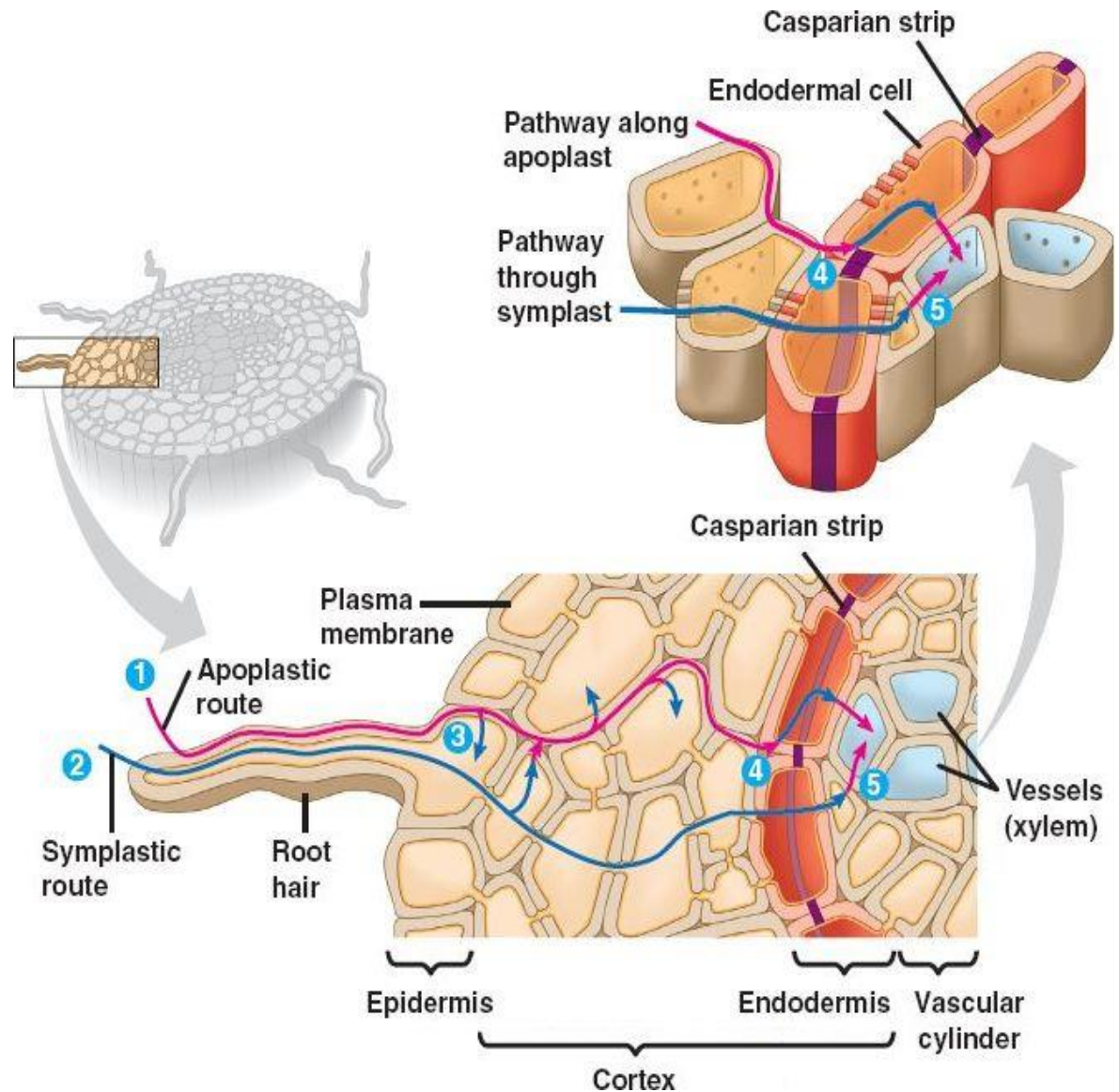




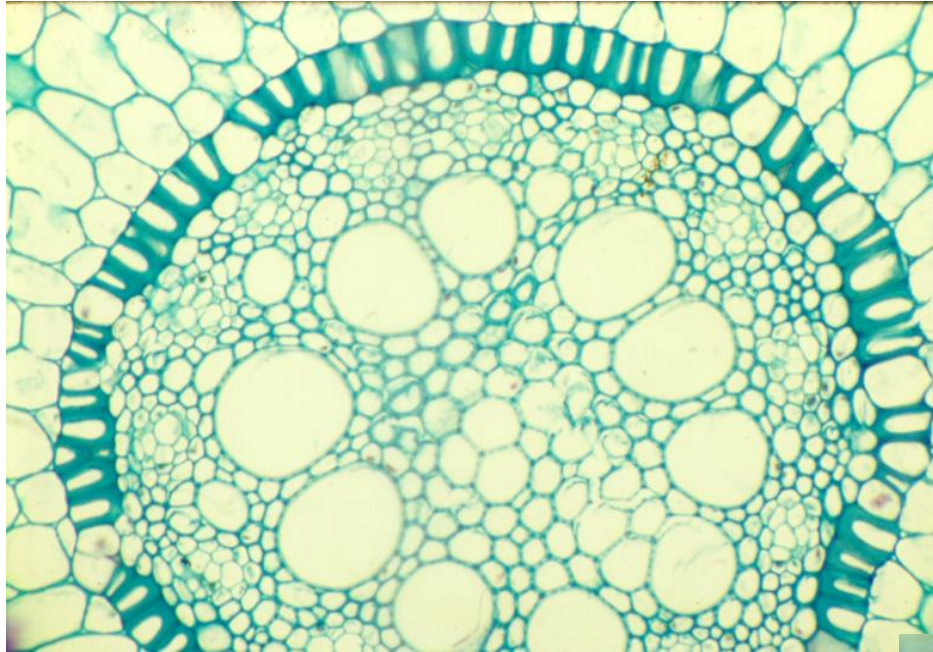
Via simplástica: por meio dos plasmodesmas

Via apoplástica: por meio do apoplasto e espaços intercelulares

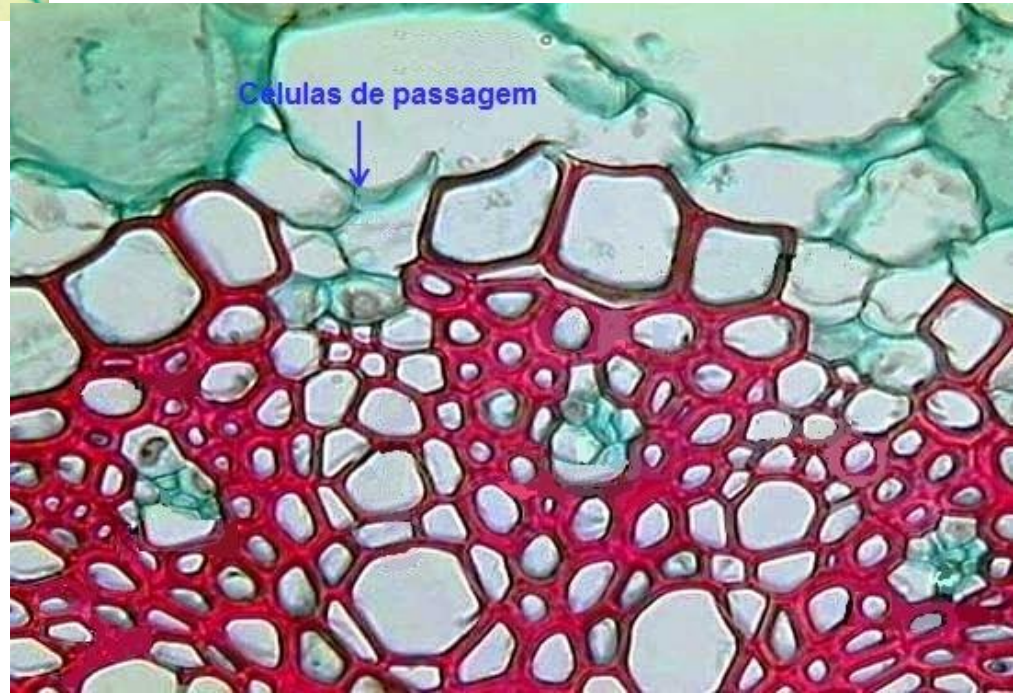
Endoderme: camada seletiva!!!



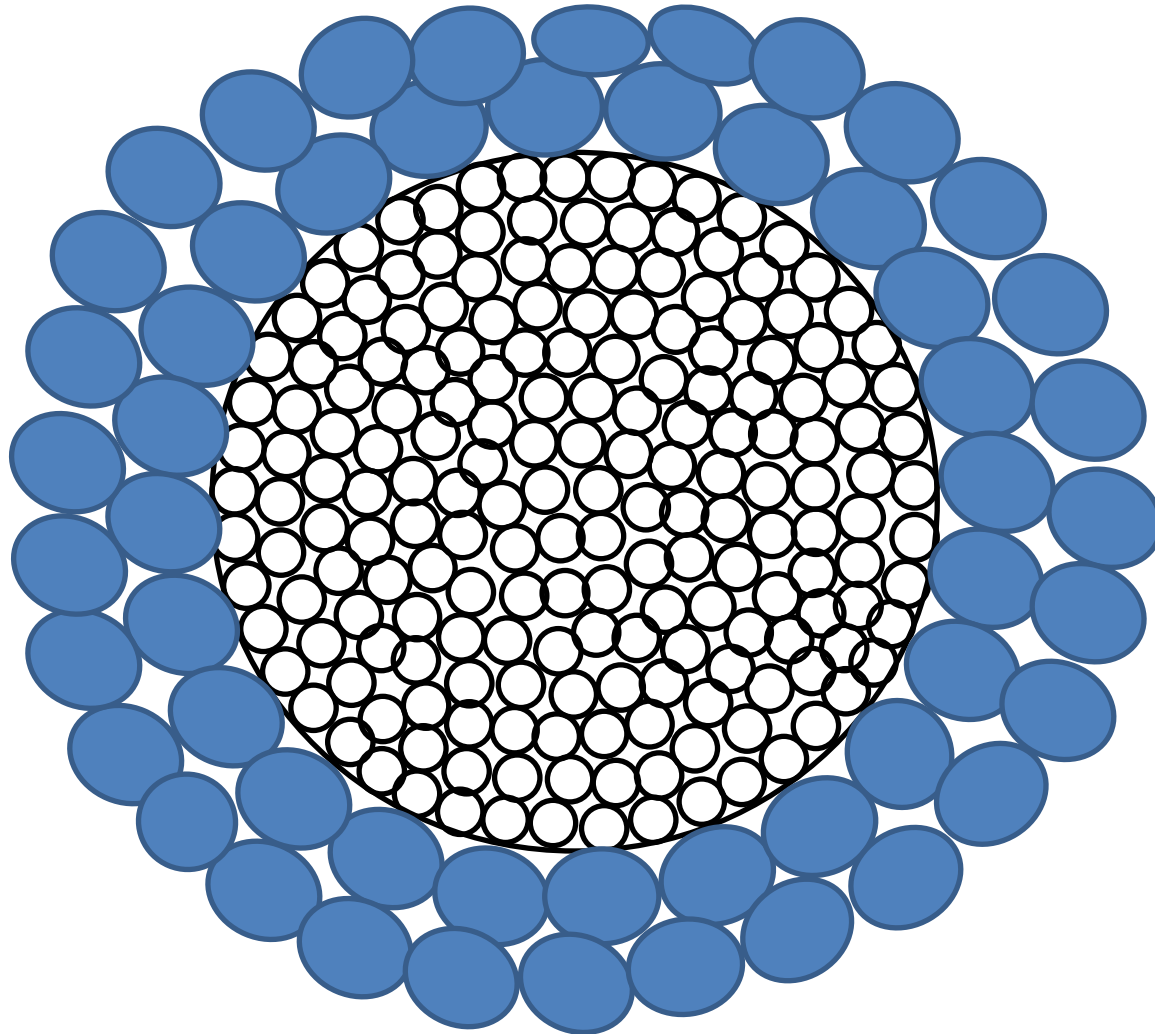
Espessamento em **U** nas células da endoderme



Espessamento em **O** nas células da endoderme

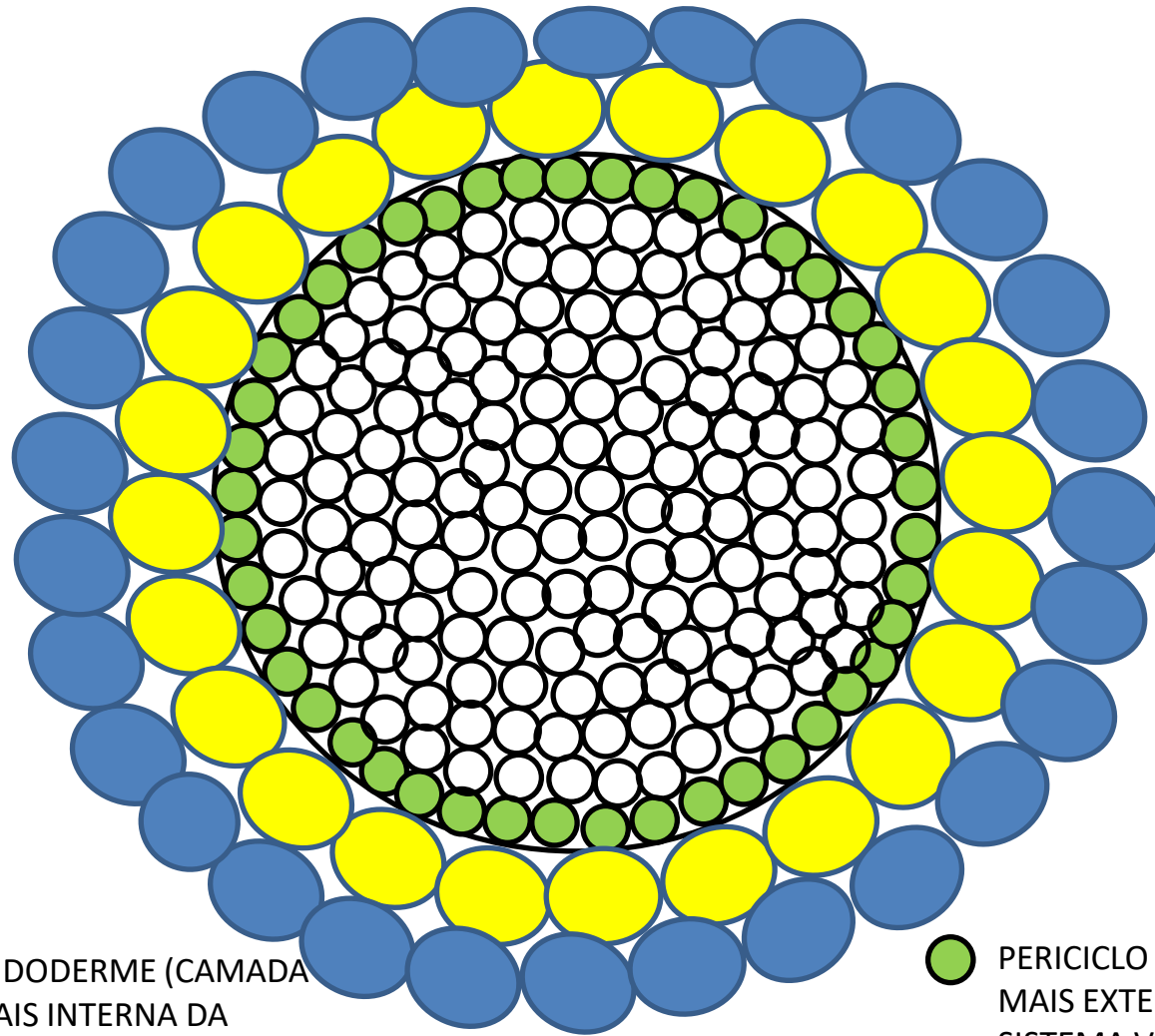


Células de passagem
não há espessamento de parede



ENDODERME (CAMADA MAIS INTERNA DA REGIÃO CORTICAL)

PERICICLO (CAMADA MAIS EXTERNA DO SISTEMA VASCULAR)



ENDODERME (CAMADA
MAIS INTERNA DA
REGIÃO CORTICAL)

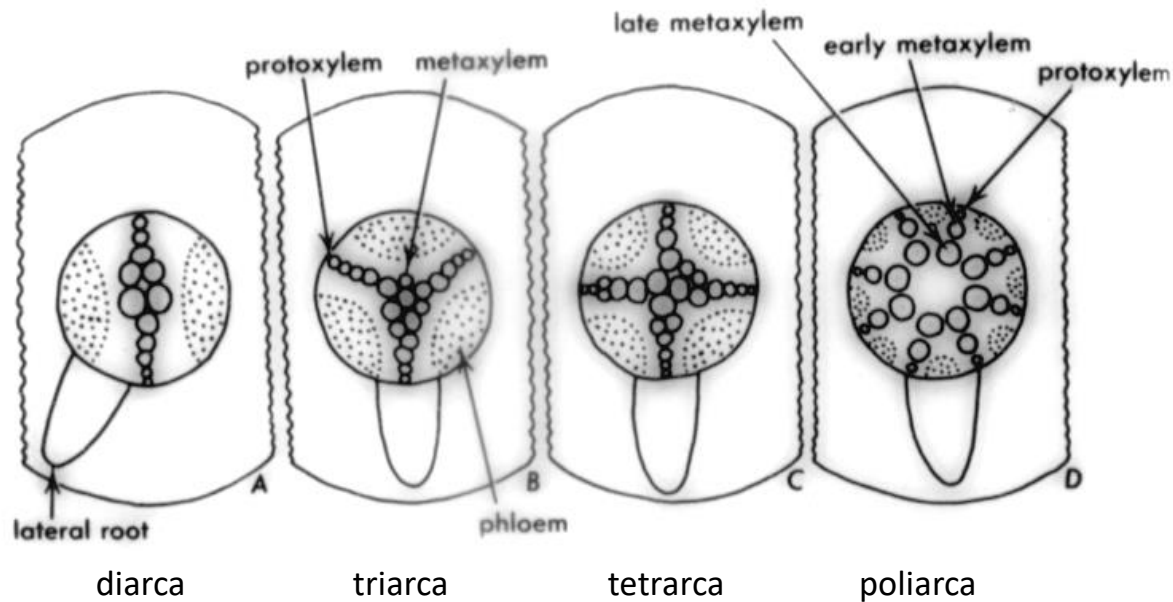


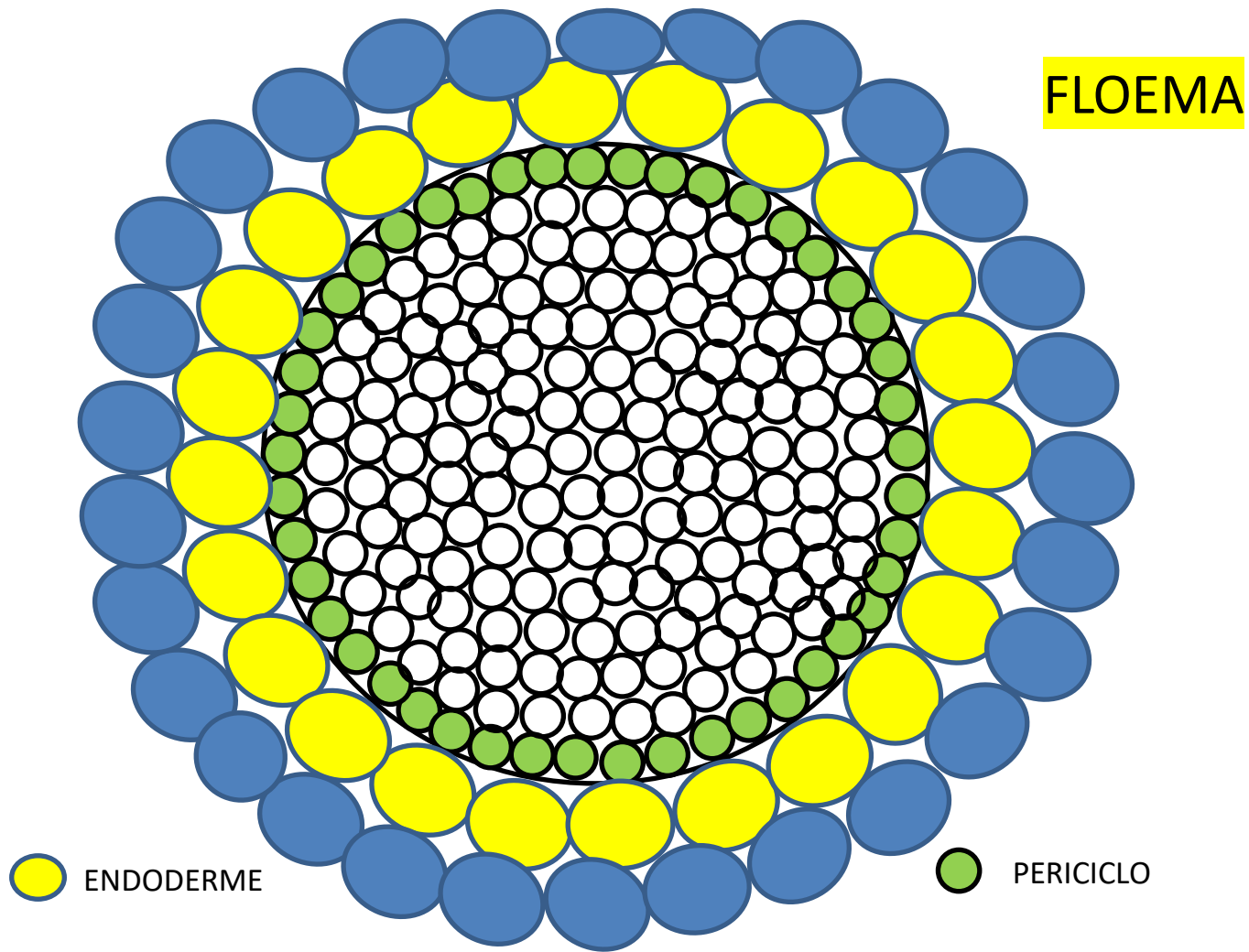
PERICICLO (CAMADA
MAIS EXTERNA DO
SISTEMA VASCULAR)

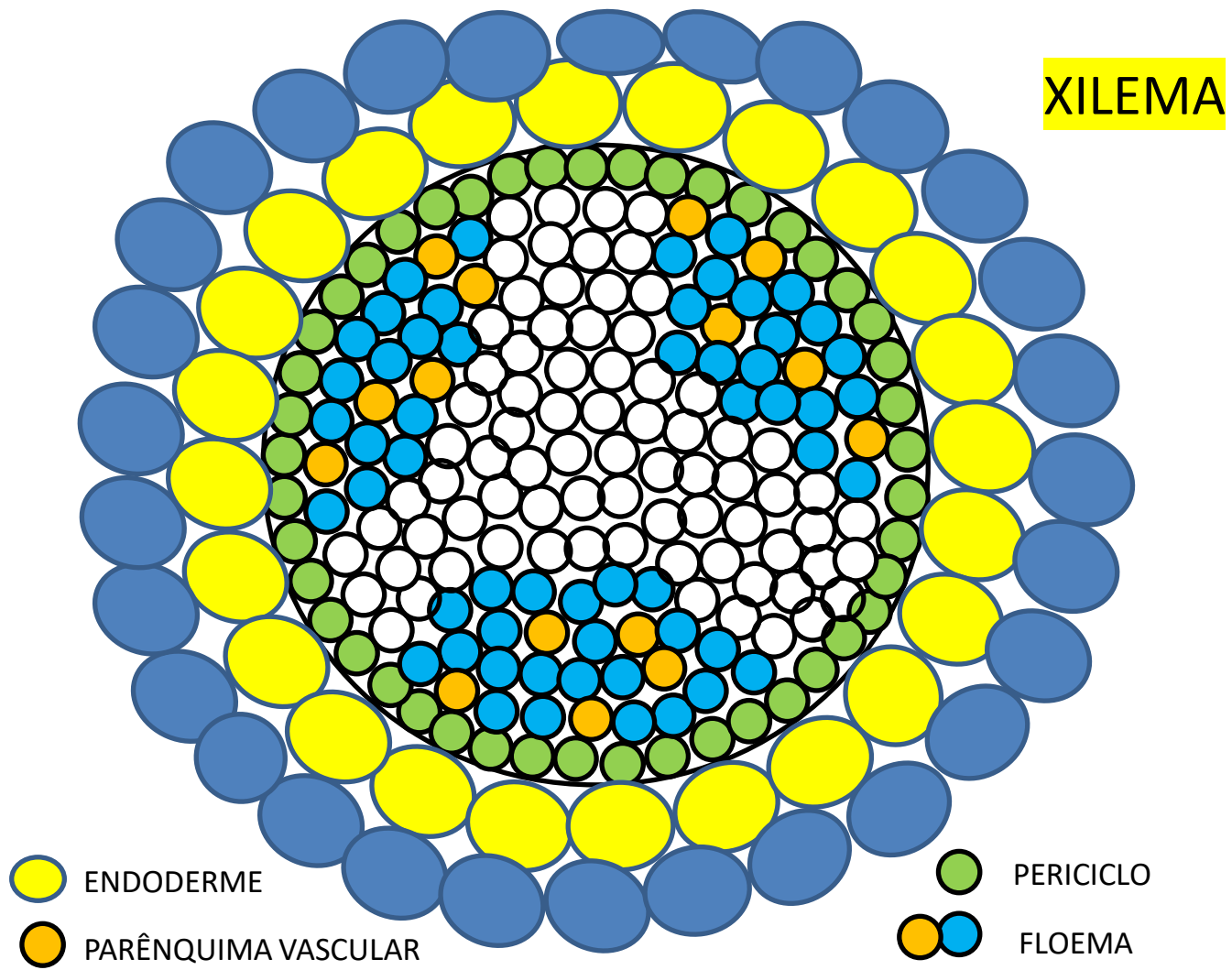
Chegamos no sistema vascular.....

Estelo do tipo PROTOSTELO

Diferenciação das células condutoras de xilema e floema primários: raiz em espermatófitas é **EXARCA**







XILEMA

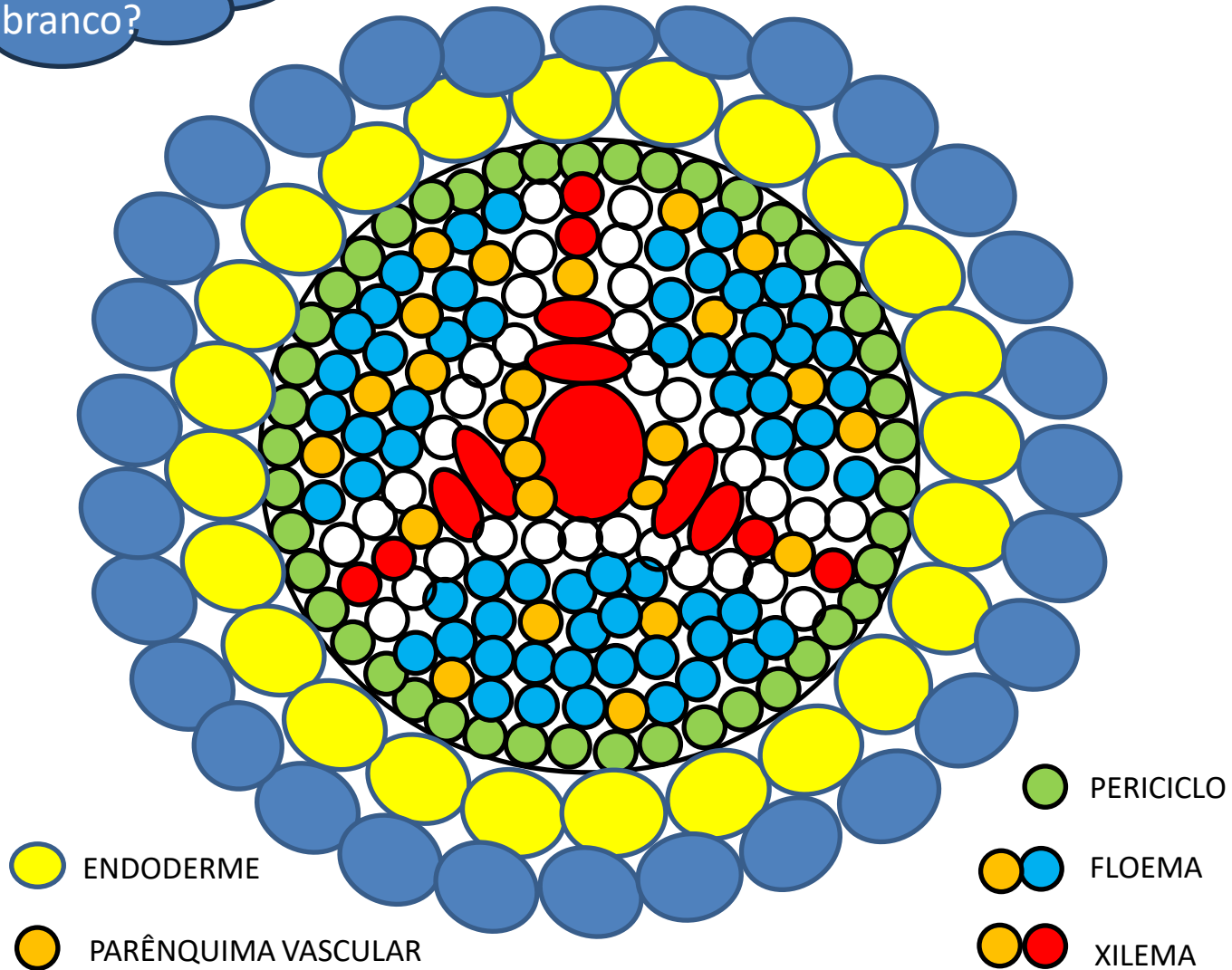
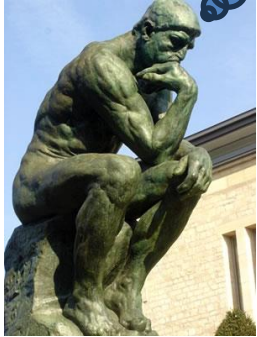
ENDODERME

PARÊNQUIMA VASCULAR

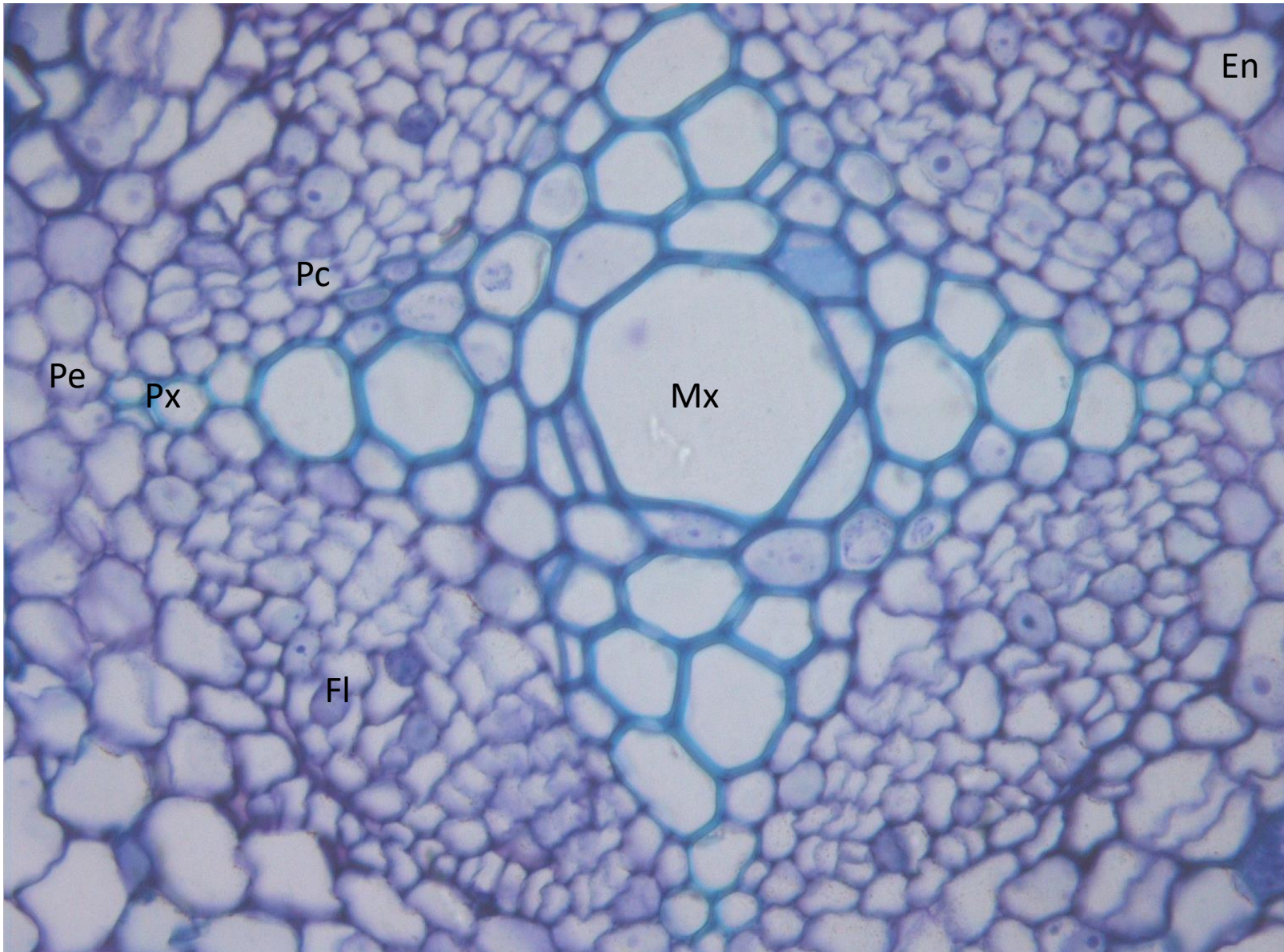
PERICICLO

FLOEMA

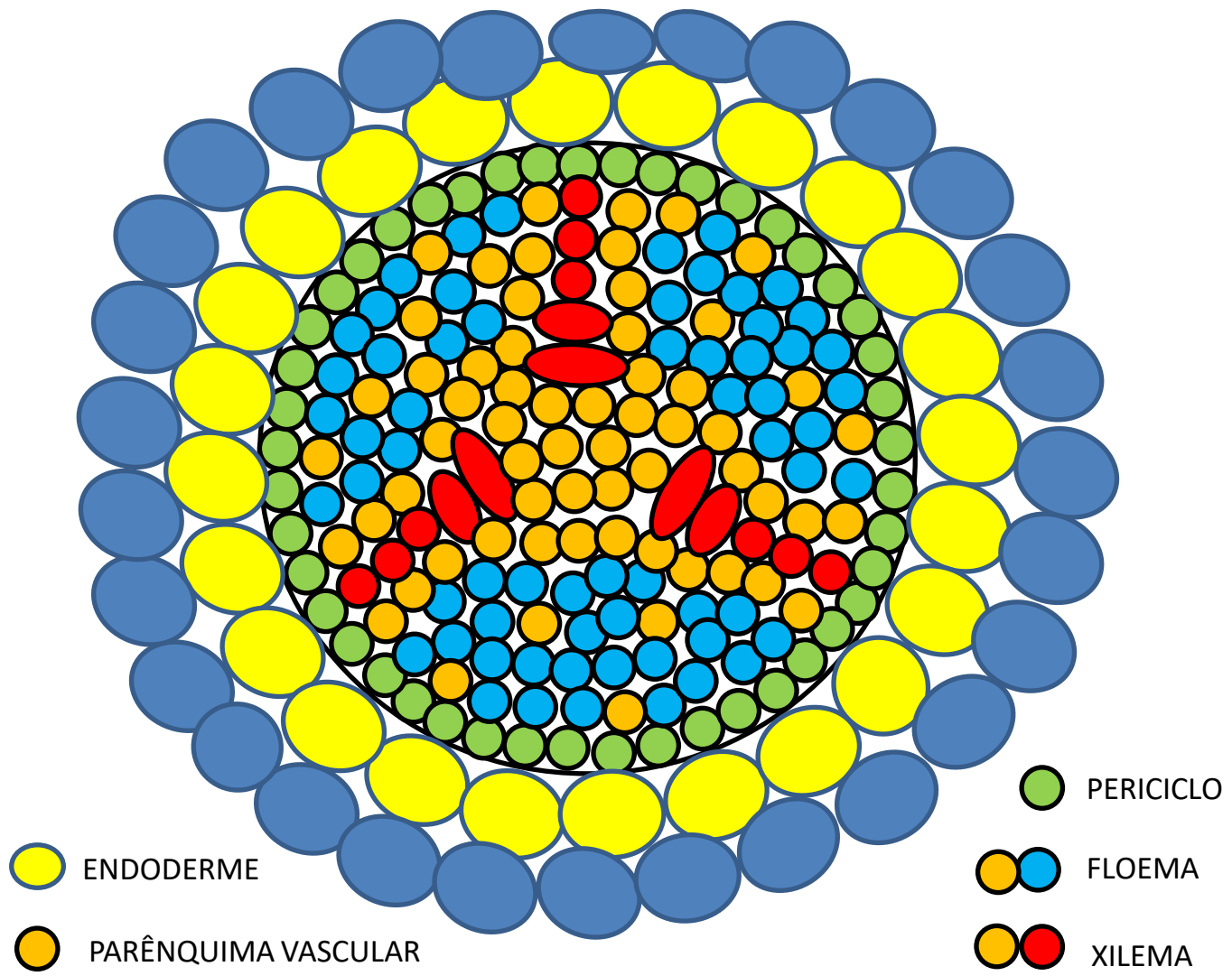
Por que deixar
algumas células
em branco?

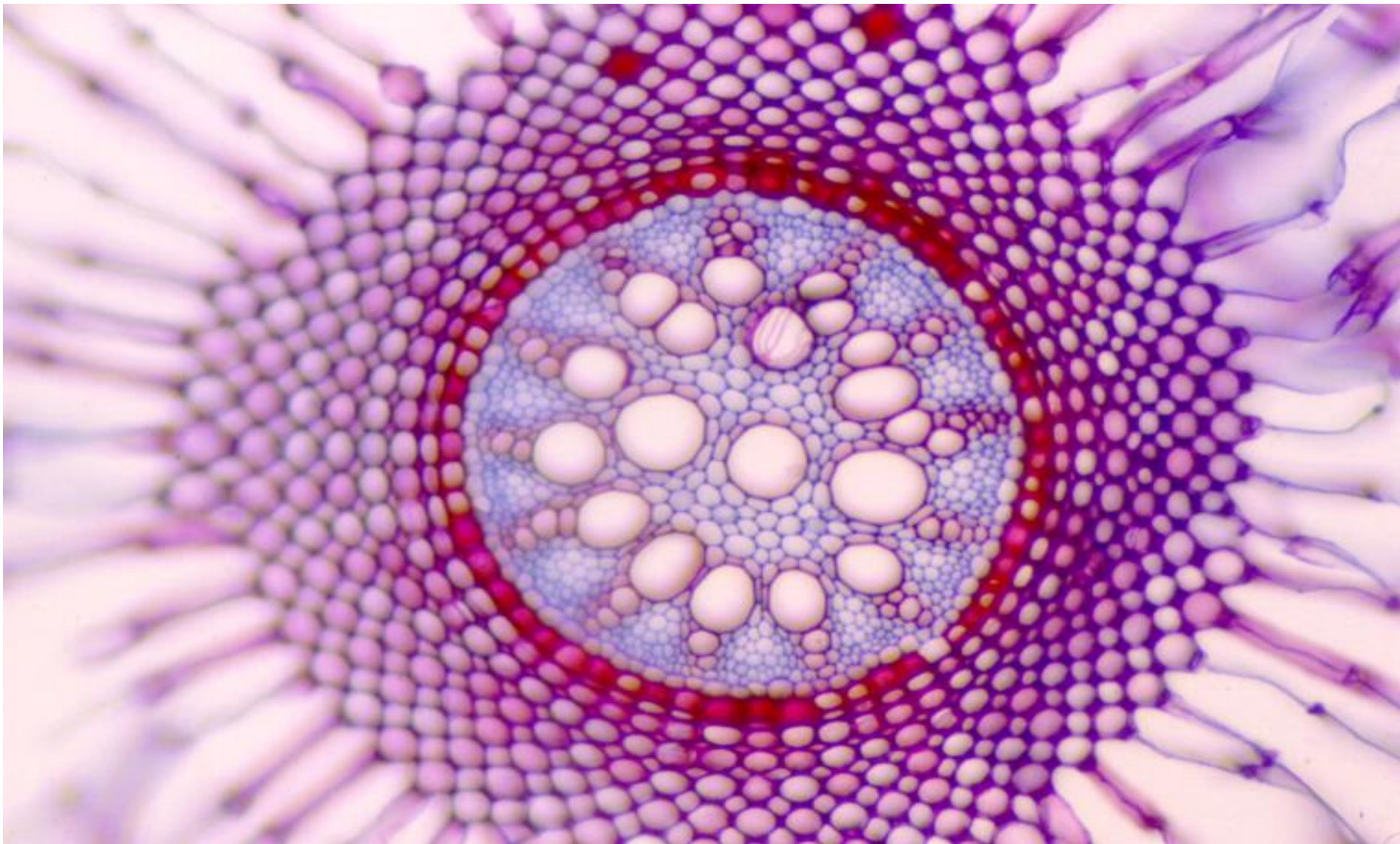


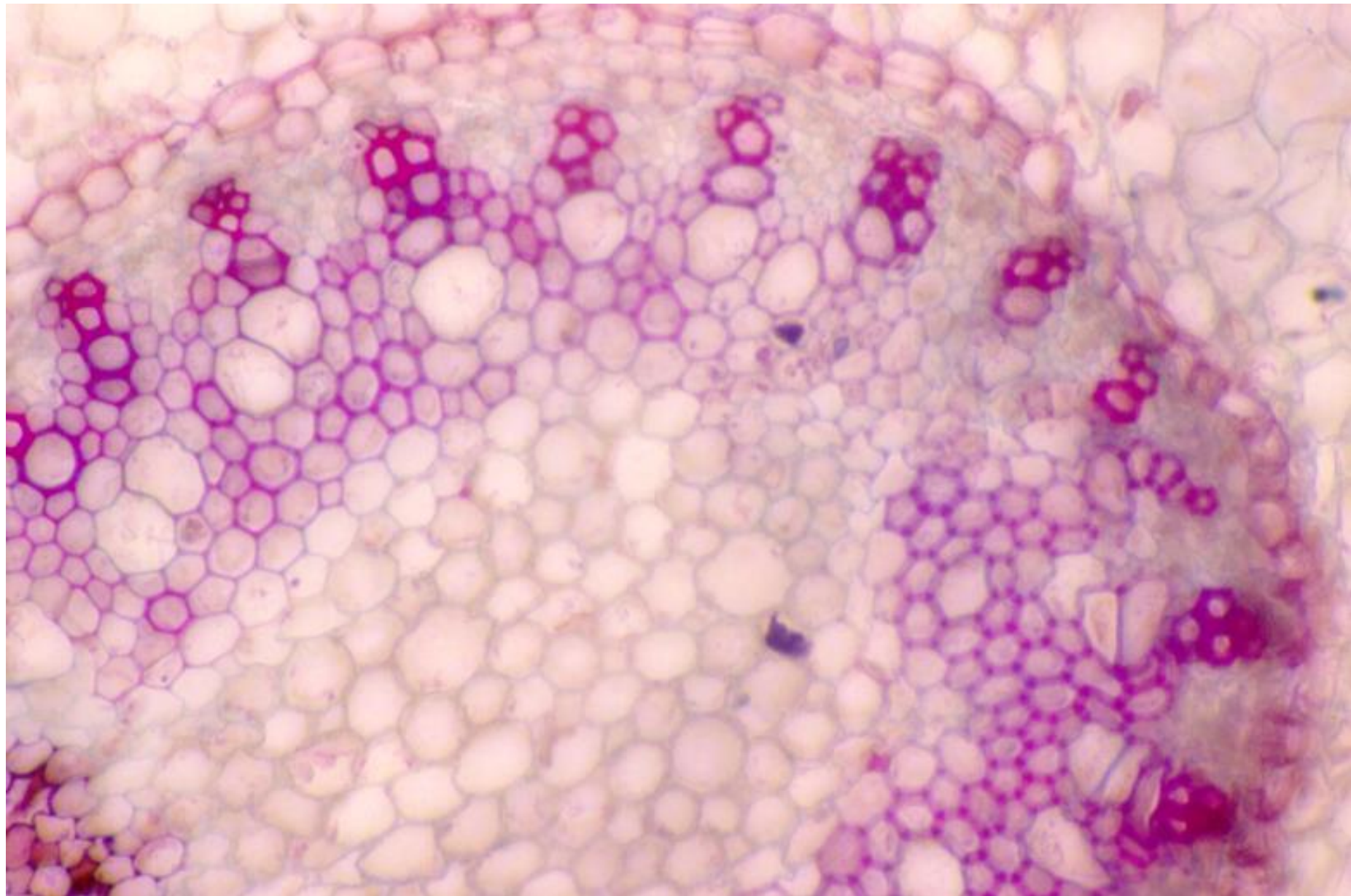
Presença de células procambiais entre xilema e floema primários permite a instalação do câmbio

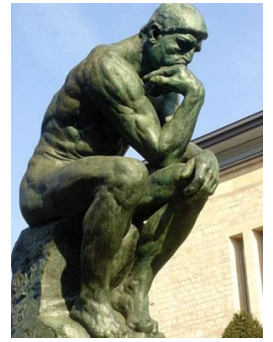


- En = endoderme
- Fl = floema
- Mx = metaxilema
- Pc = procâmbio
- Pe = periciclo
- Px = protoxilema



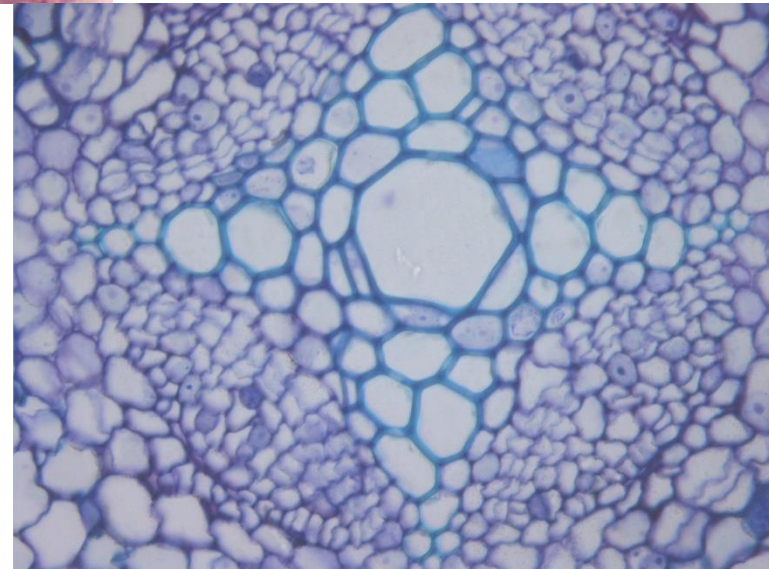
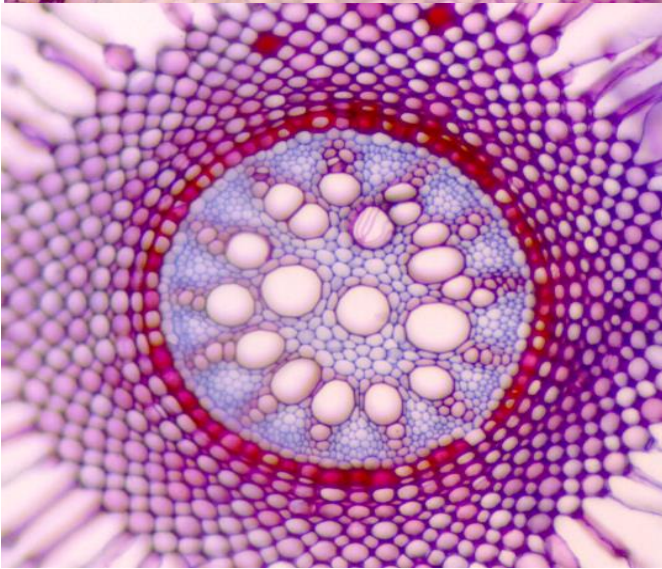
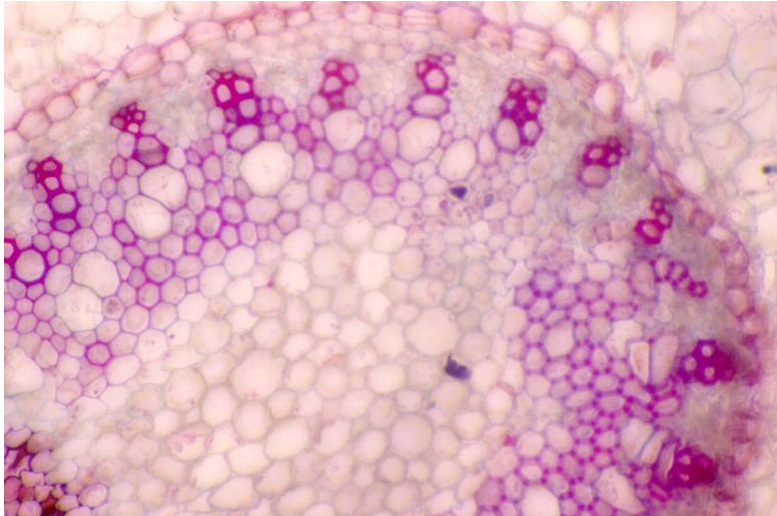


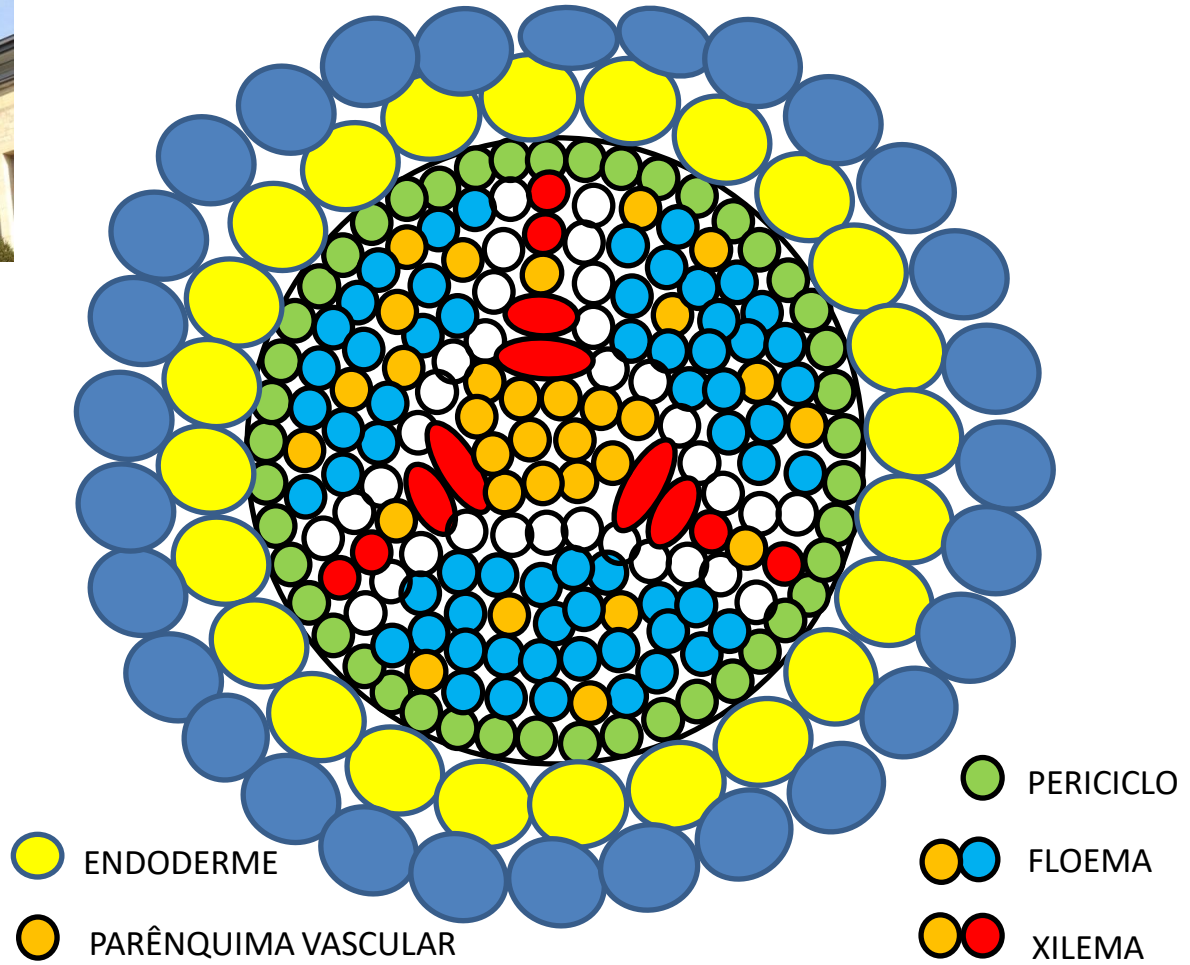
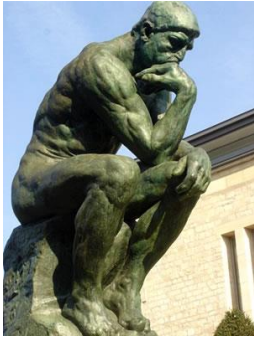


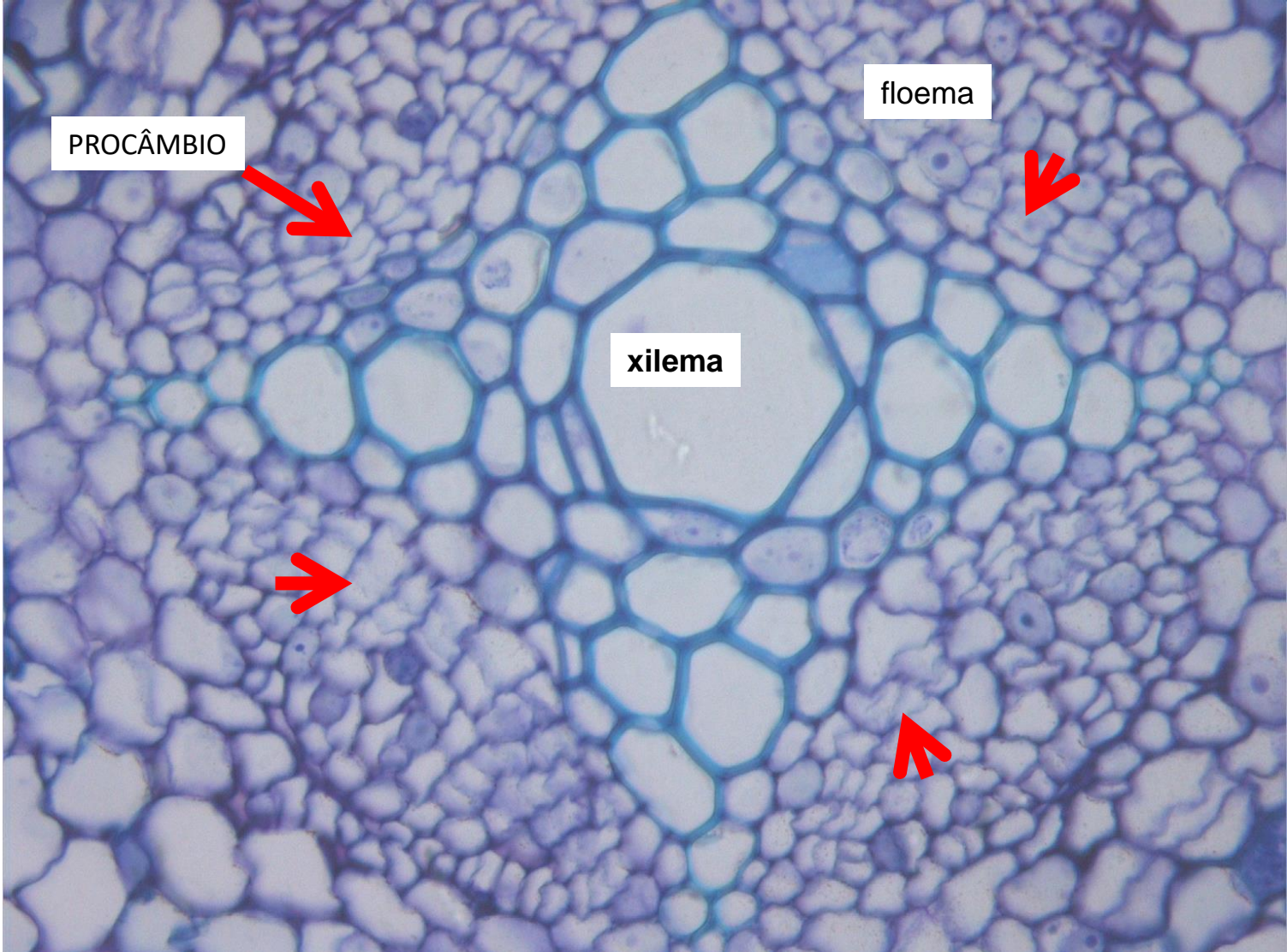


Qual o tipo de estelo encontrado em raízes adventícias e primárias?

PROTOSTELO







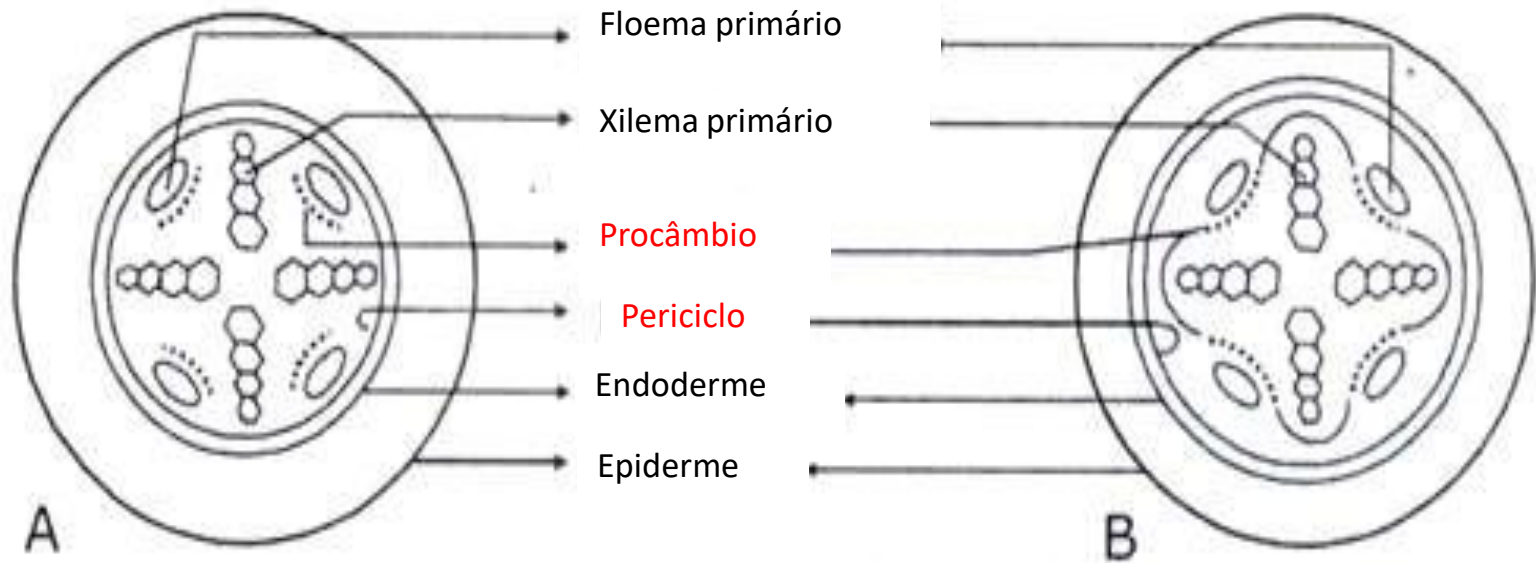
PROCÂMBIO

floema

xilema

CRESCIMENTO SECUNDÁRIO DO SISTEMA VASCULAR

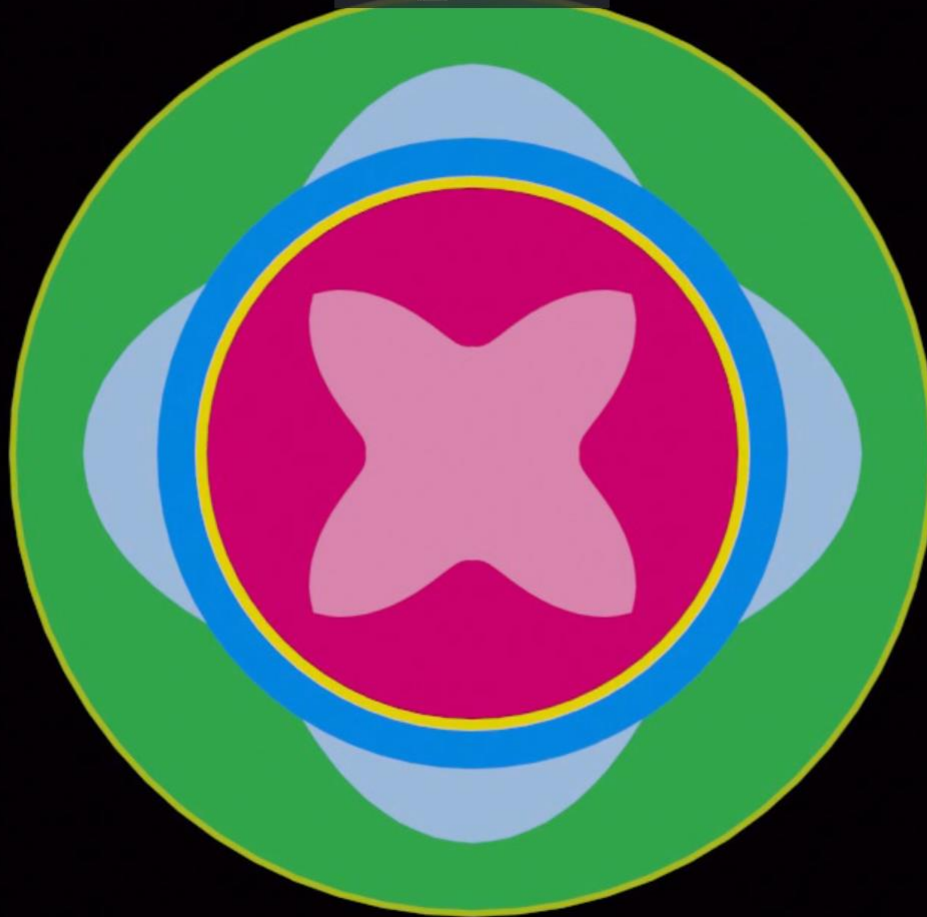
ATIVIDADE CAMBIAL








Câmbio: originado de células procambiais localizadas entre xilema e floema primários + células pericíclicas localizadas próximo à região do protoxilema

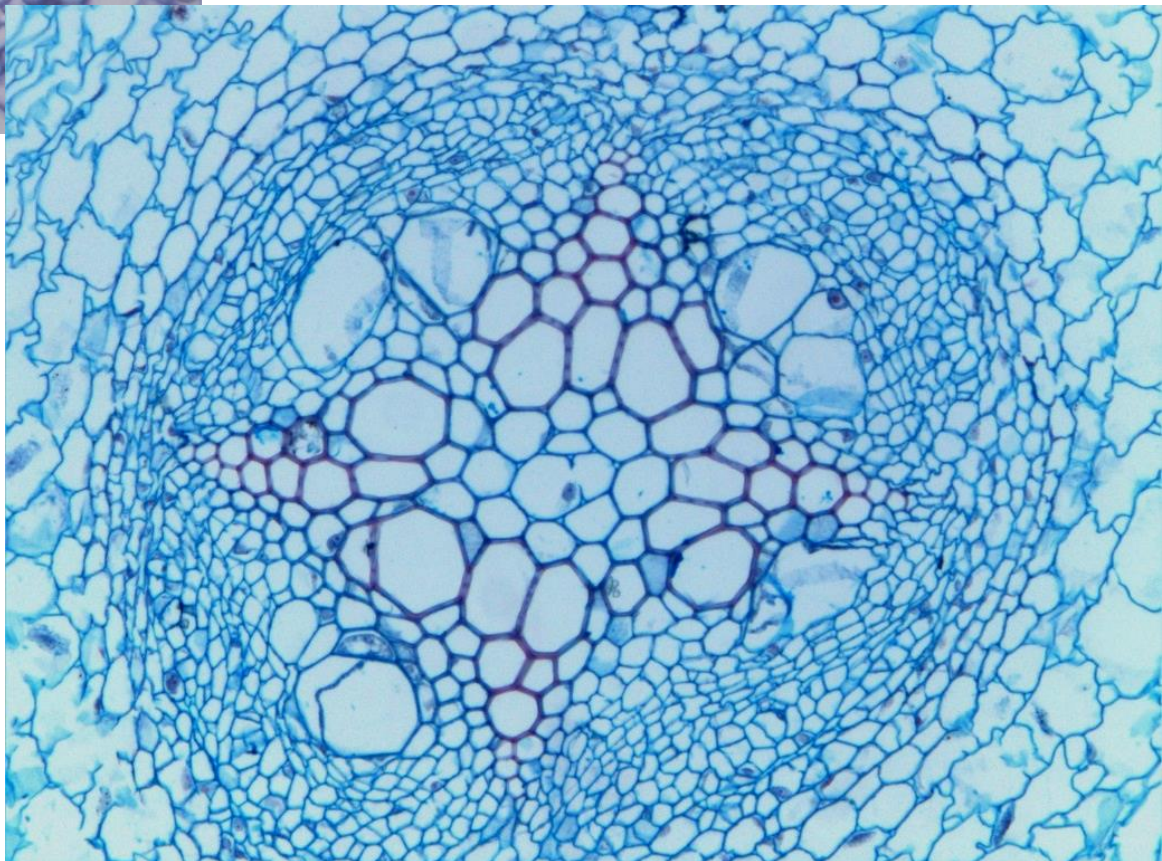
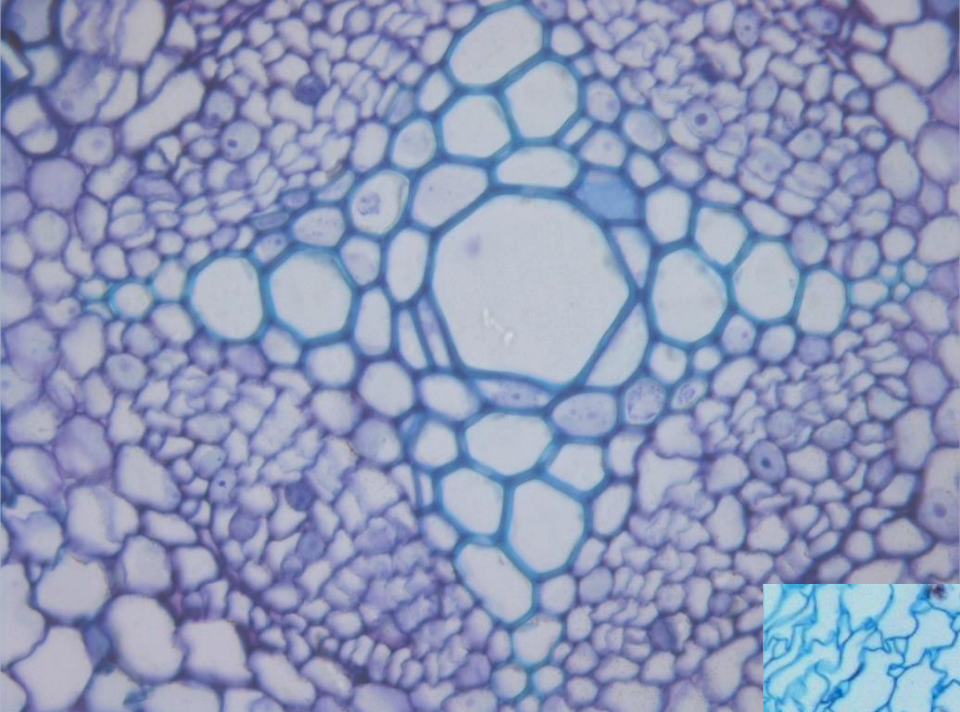
<https://eaulas.usp.br/porta1/video.action?idItem=33209>

Press **Esc** to exit full screen

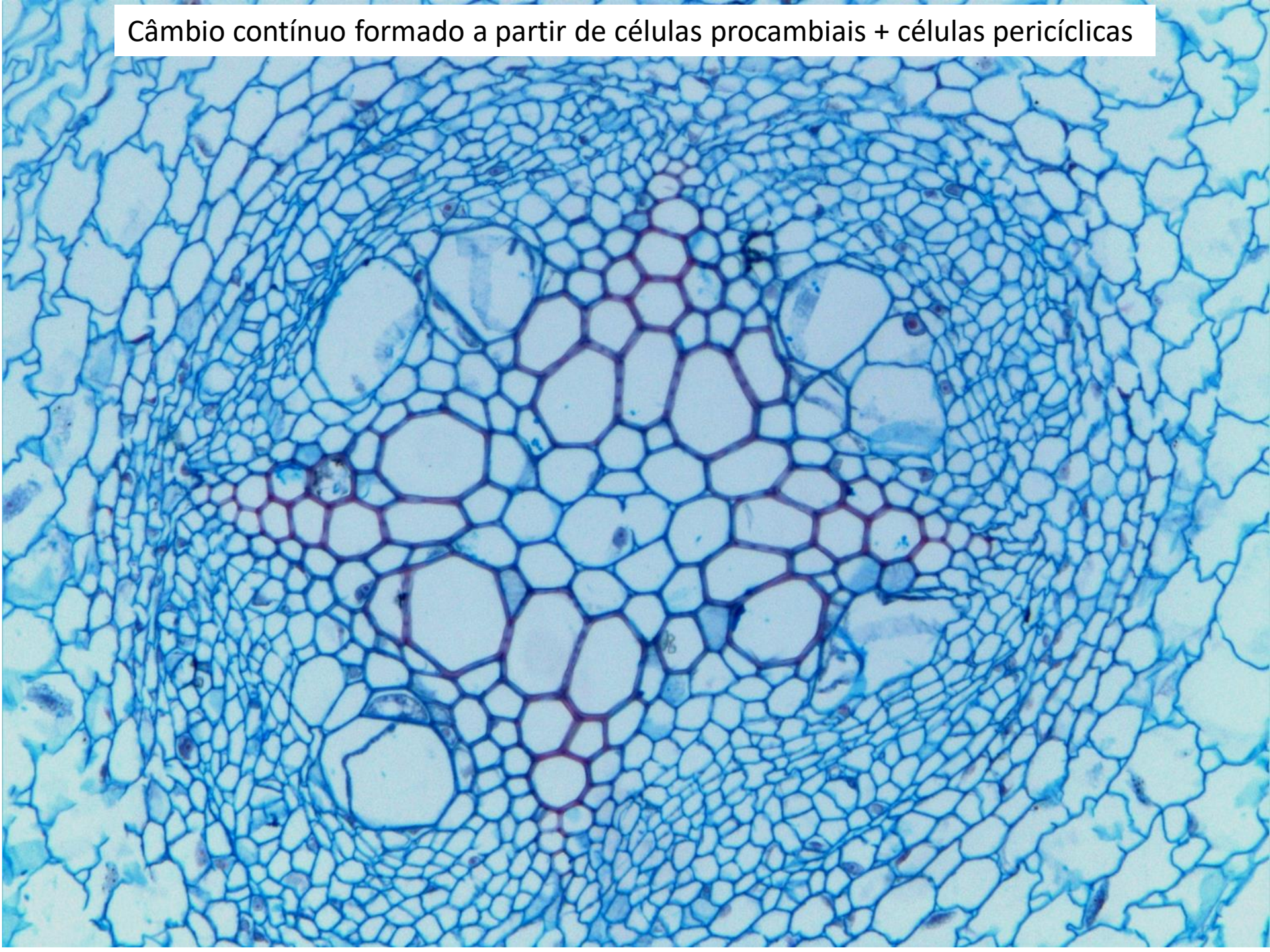


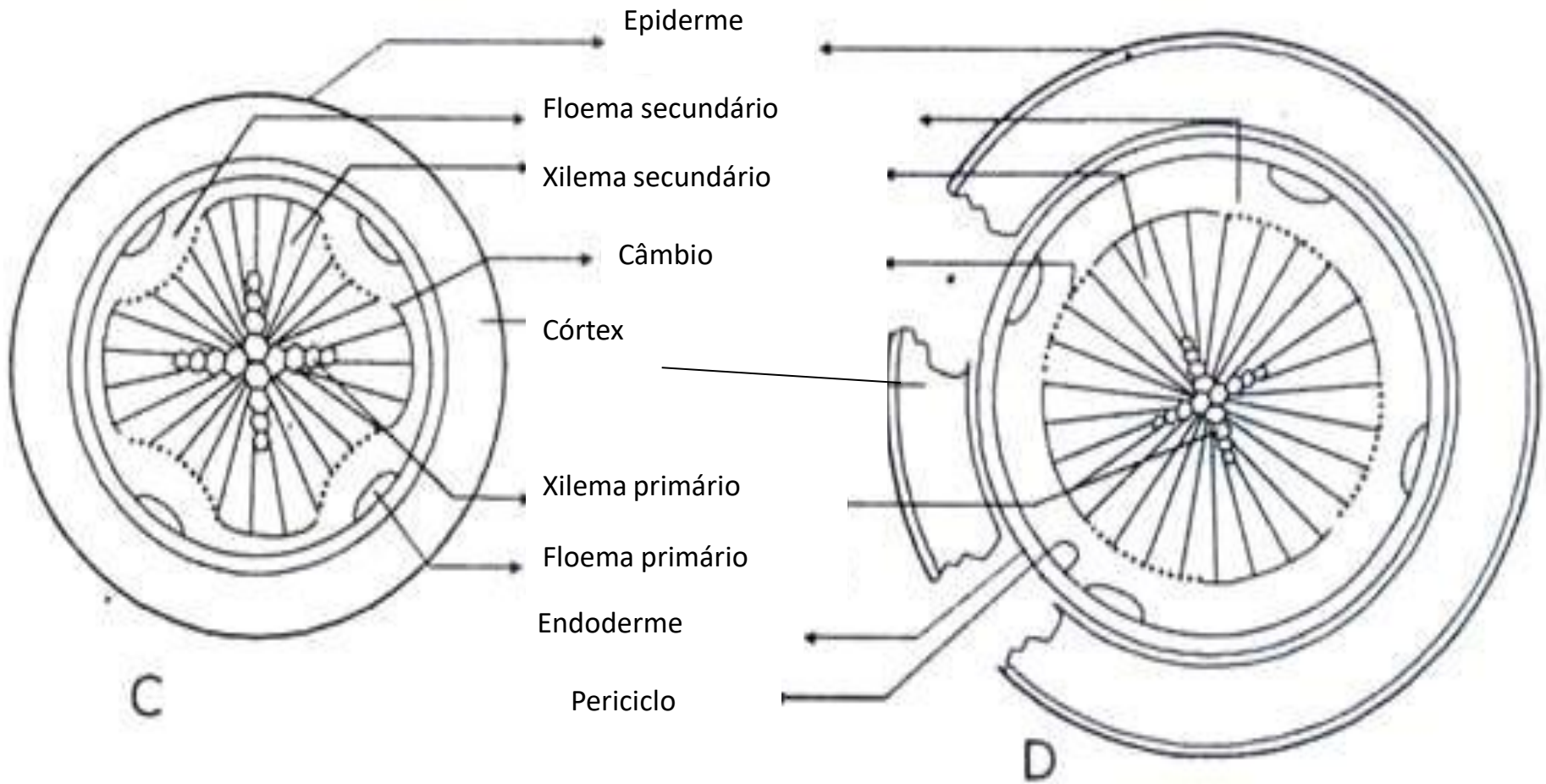
-  Floema secundário
-  Xilema secundário
-  Câmbio vascular
-  Floema primário
-  Xilema primário

-  Súber
-  Felogênio
-  Feloderme
-  Epiderme

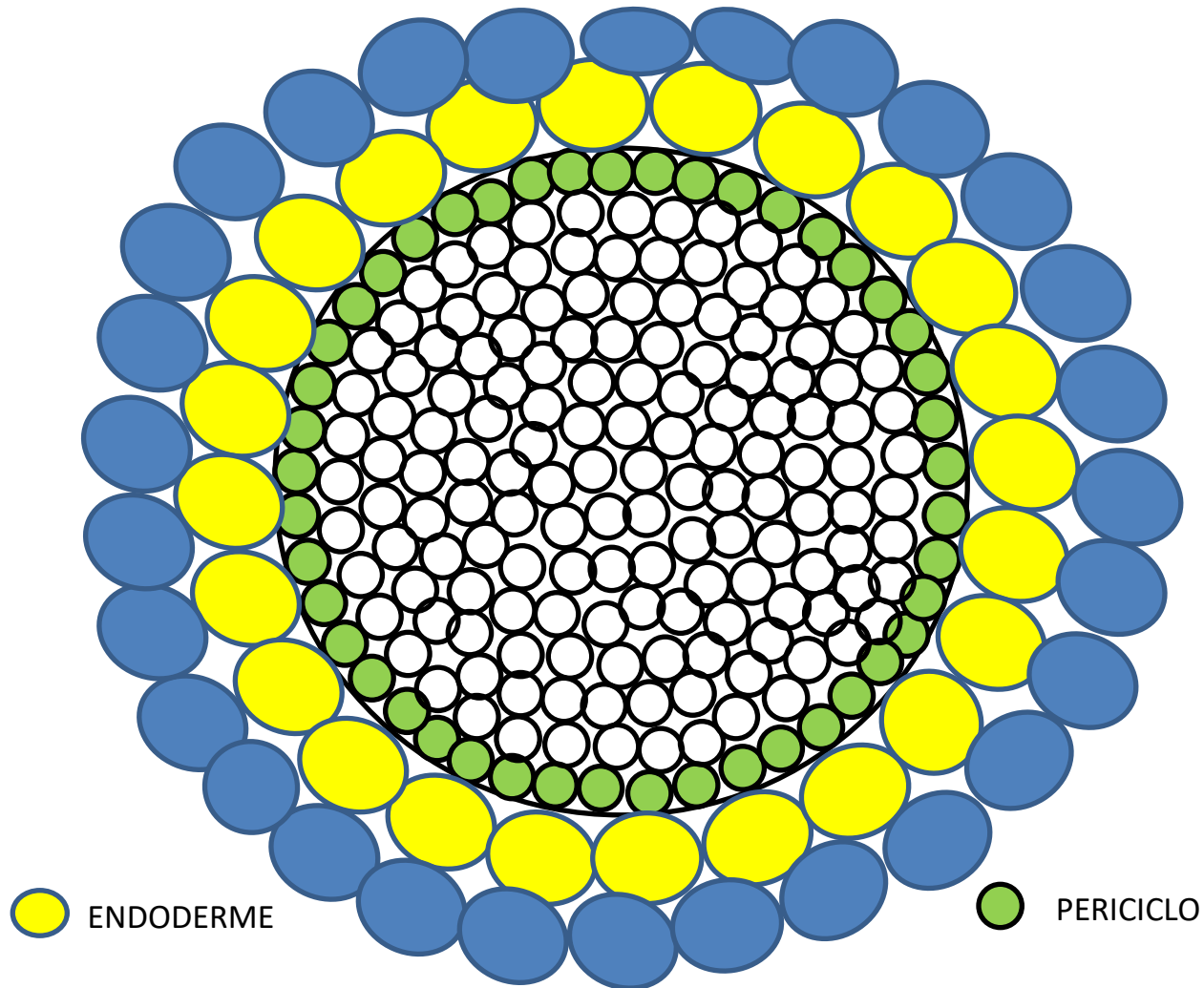


Câmbio contínuo formado a partir de células procambiais + células pericíclicas



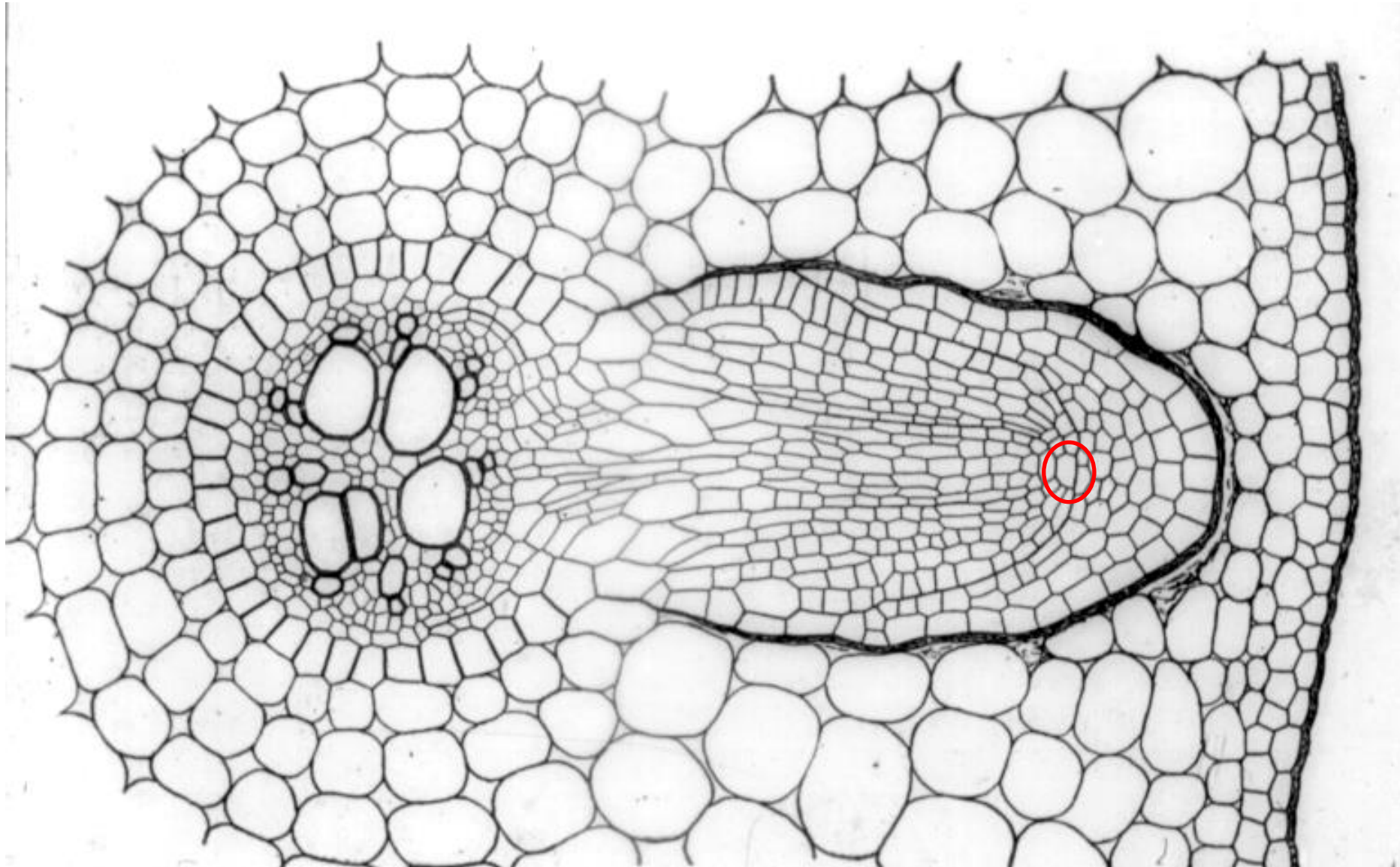


Algumas funções importantes do periciclo



Raiz lateral formada a partir do periciclo da raiz principal

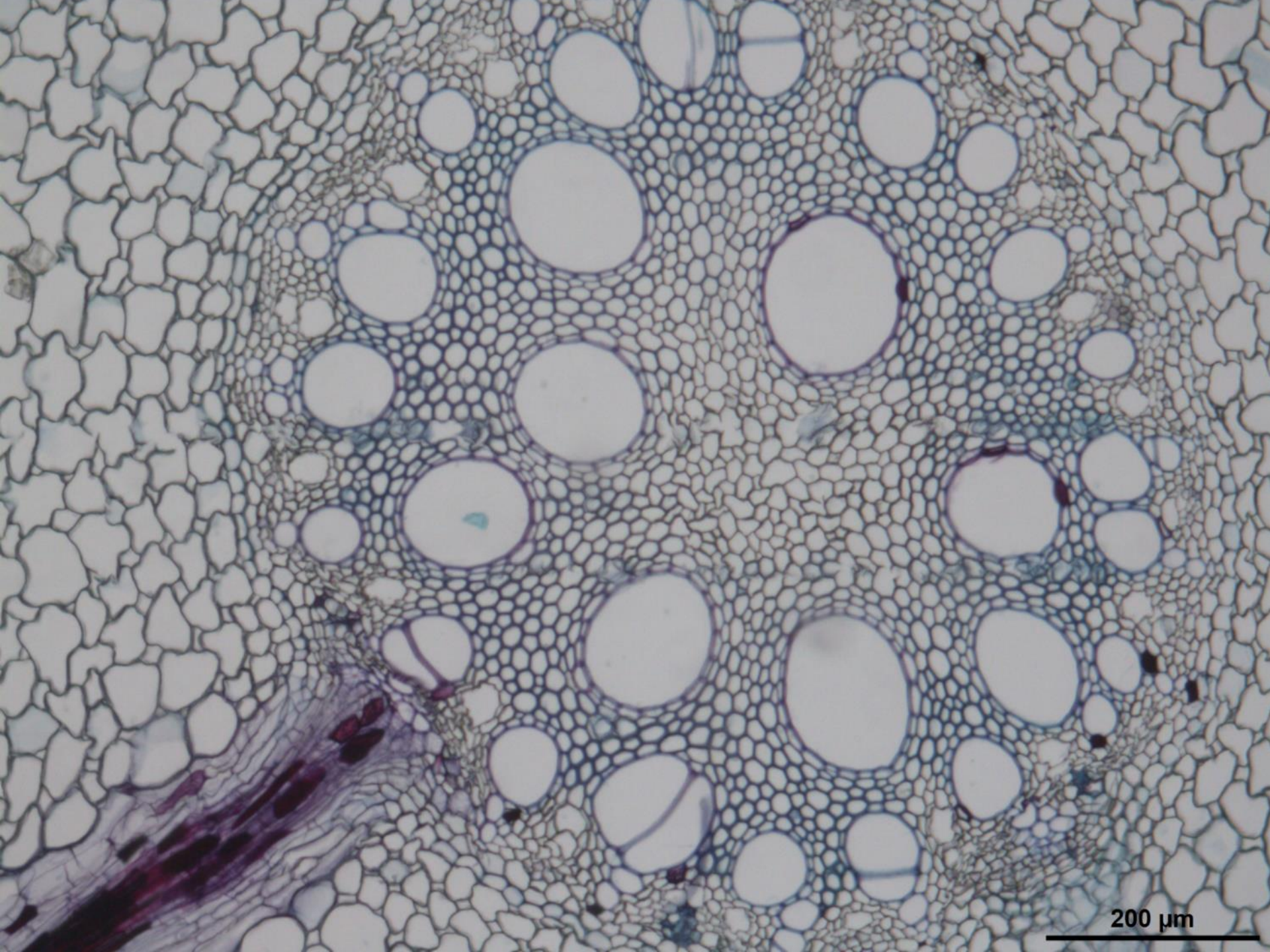
Células diferenciadas em uma organização de meristema apical radicular semelhante a raiz embrionária



Zea mays (milho)

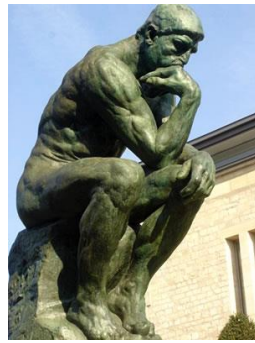


500

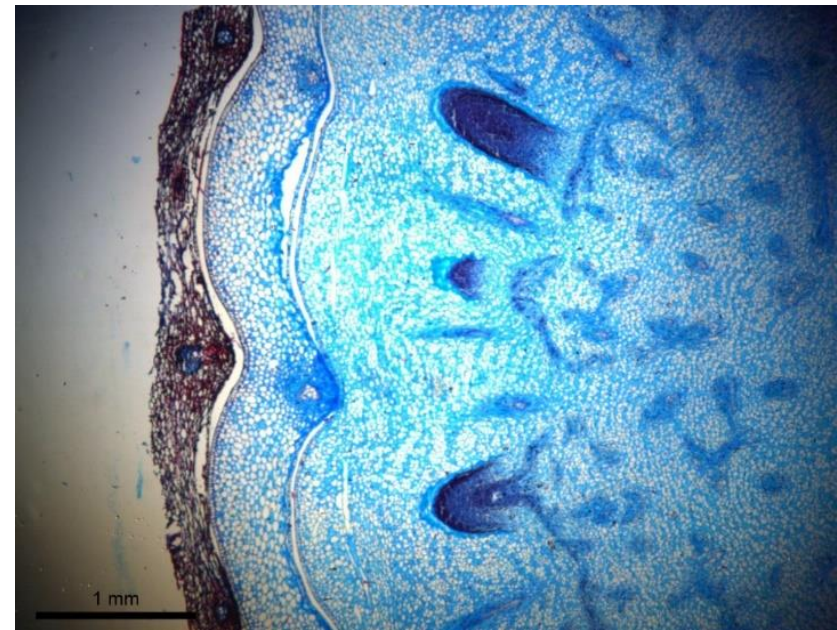


200 μ m

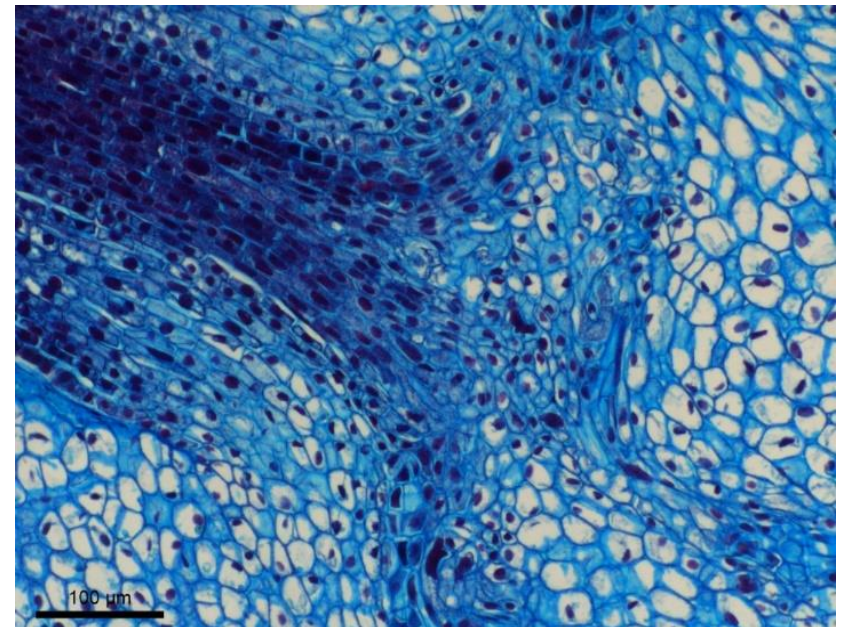
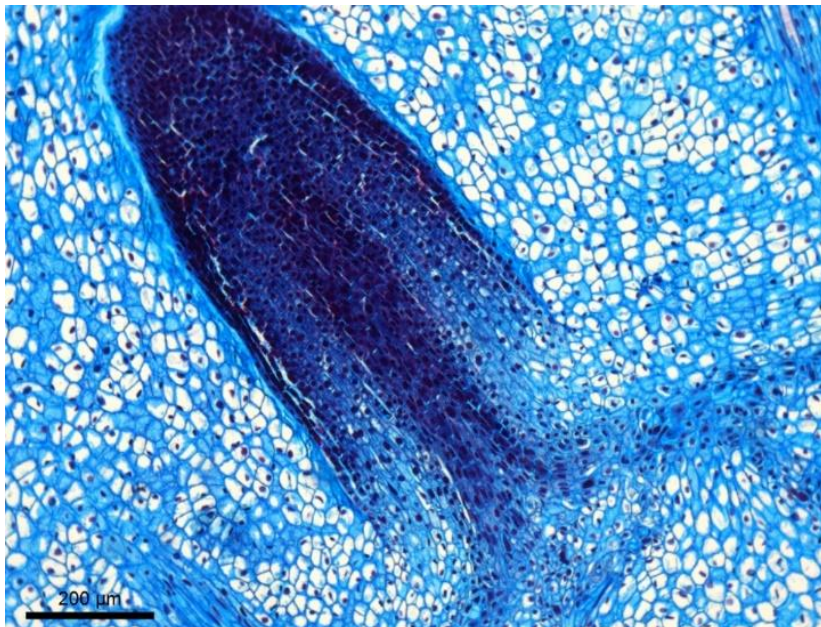
Qual é o tipo de raiz:
lateral, principal ou adventícia?



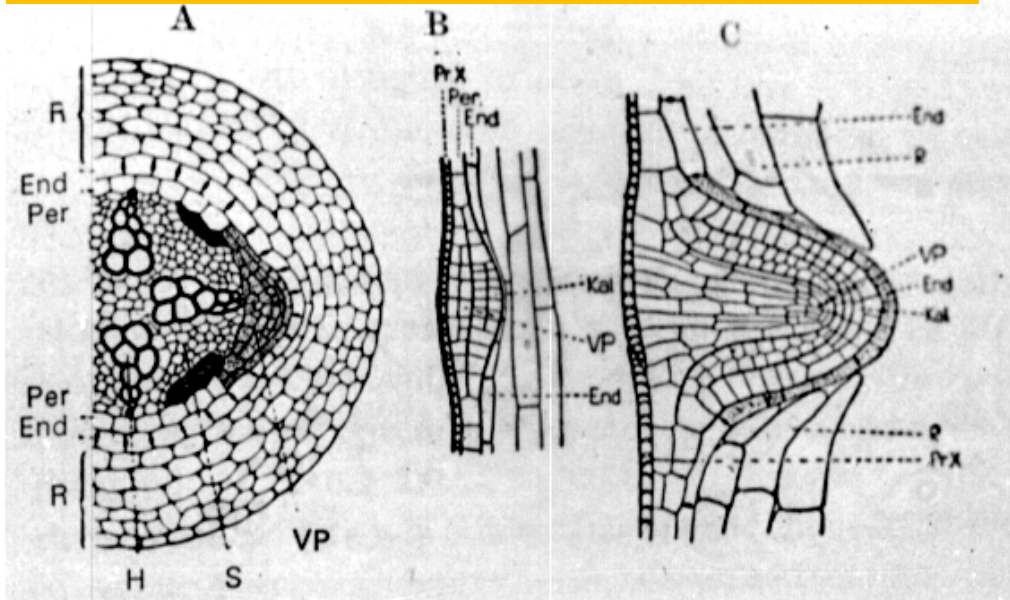
Como são
formadas as
raízes
adventícias?



Formação a partir de células pericíclicas do caule ou da folha!



Raízes laterais e raízes adventícias – origem endógena



Raiz principal - originada da radícula do embrião – origem exógena

