

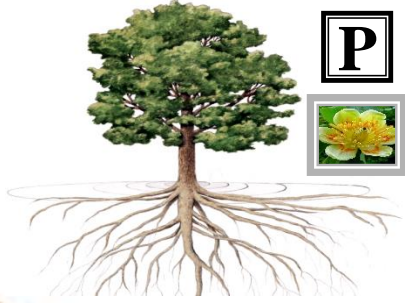
**WOODY TISSUE**

**EXISTS MULTIPLE SEASONS**

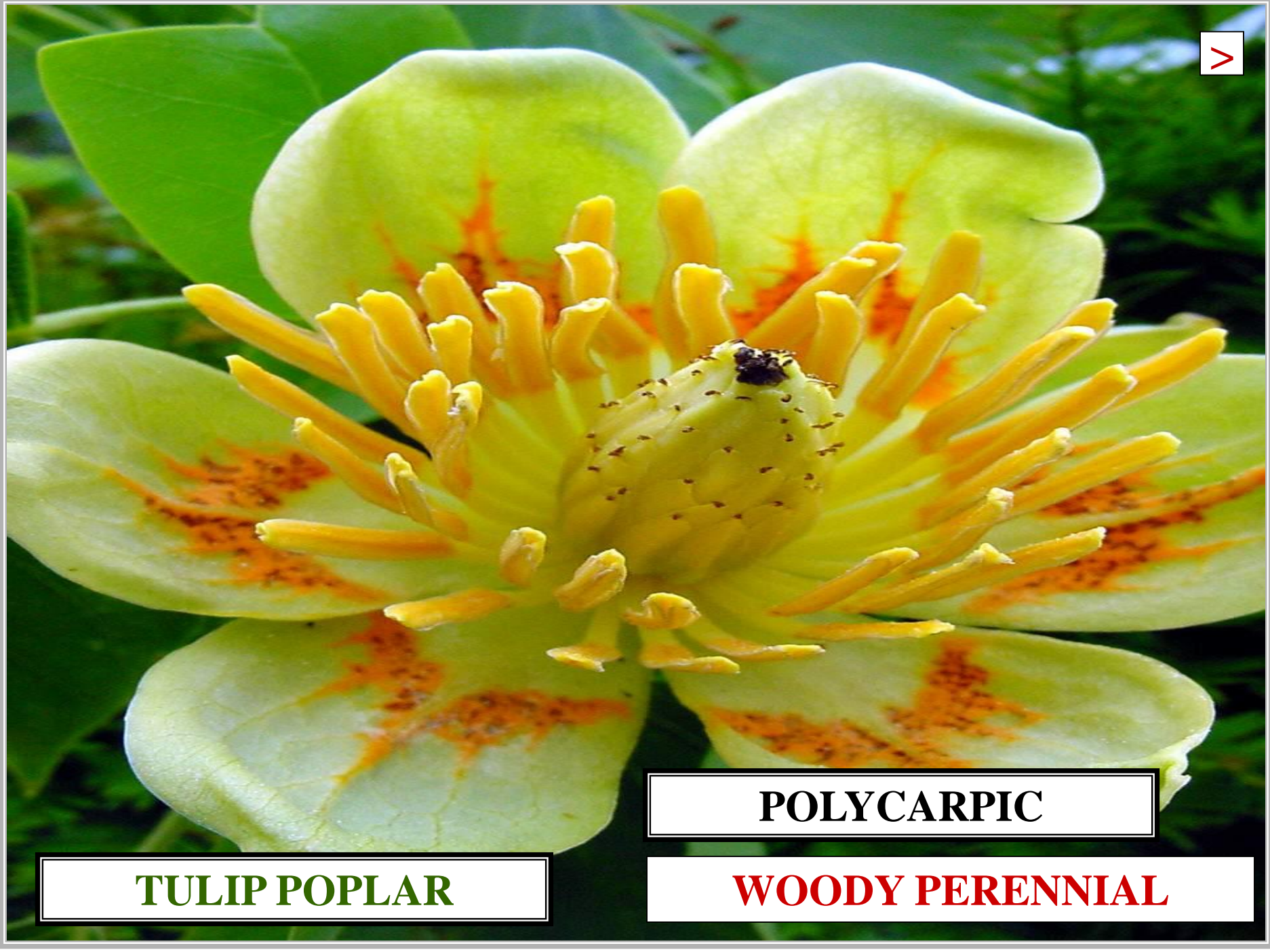
**TULIP POPLAR**

**STEM**

**C.S.**







**TULIP POPLAR**

**POLYCARPIC**

**WOODY PERENNIAL**

A close-up photograph of a large, light-colored magnolia flower with prominent stamens and a central pistil, surrounded by dark green, glossy leaves. The background is dark and out of focus.

**ANGIOSPERMS  
PLANT GROWTH  
CONFIND  
MERISTEM REGION**

# MERISTEM



**MERISTEM**



**MERISTEM**

**GROWTH REGION**

**MERISTEM**



# MERISTEMS TYPES

# **ANGIOSPERM MERISTEM TYPES**

**APICAL MERISTEM**

# **ANGIOSPERM MERISTEM TYPES**





# **ANGIOSPERM MERISTEM TYPES**

**APICAL MERISTEM  
LATERAL MERISTEM**

**ANGIOSPERM  
MERISTEM TYPES**

# APICAL MERISTEM



# **APICAL MERISTEM**

# **APICAL MERISTEM**



**OCCUPIES  
STEM & ROOT  
APEX**

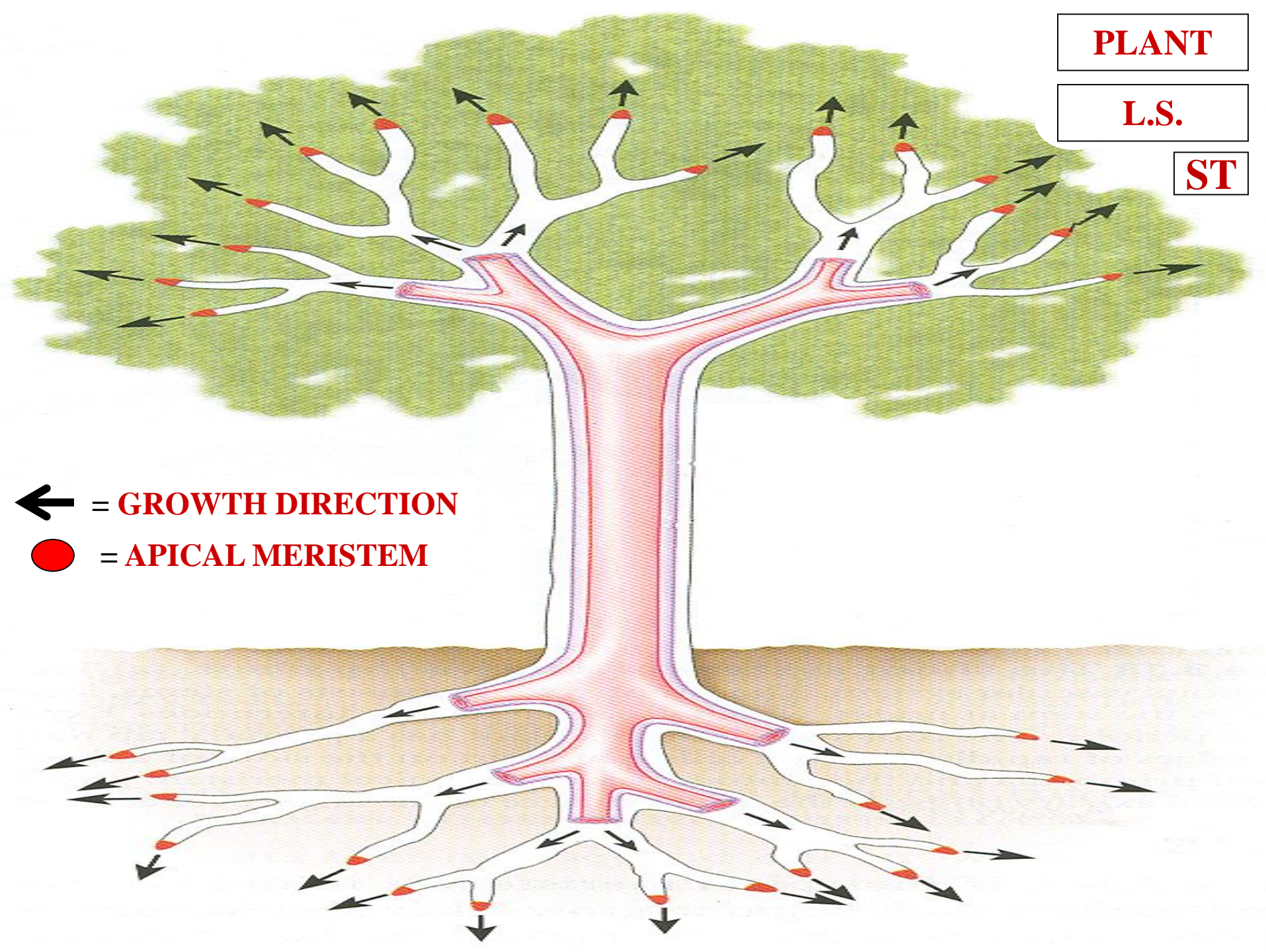
**APICAL  
MERISTEM**



**PLANT**

**L.S.**

**ST**



**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**



**PLANT**

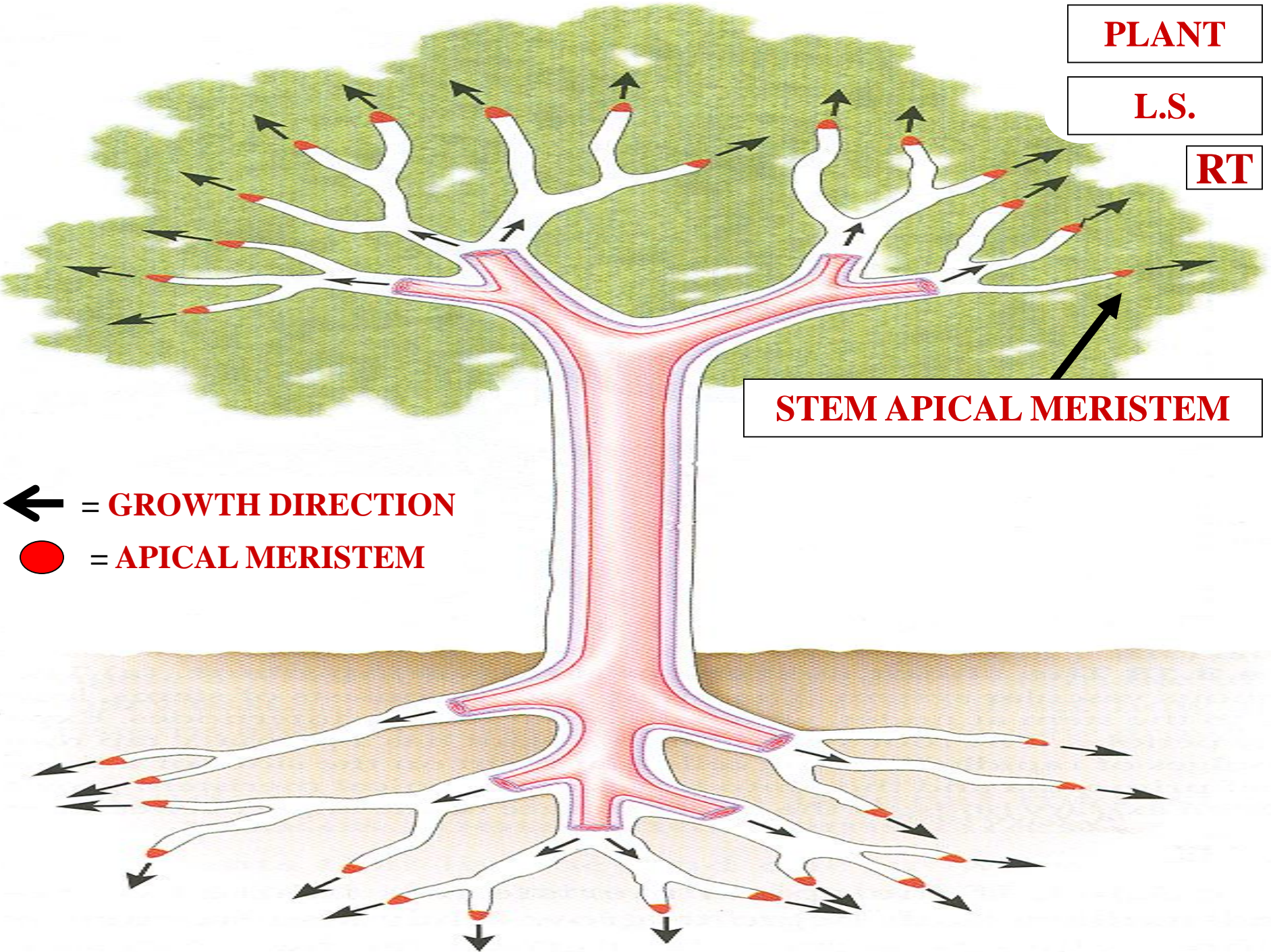
**L.S.**

**RT**

**STEM APICAL MERISTEM**

**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**





**PLANT**

**L.S.**

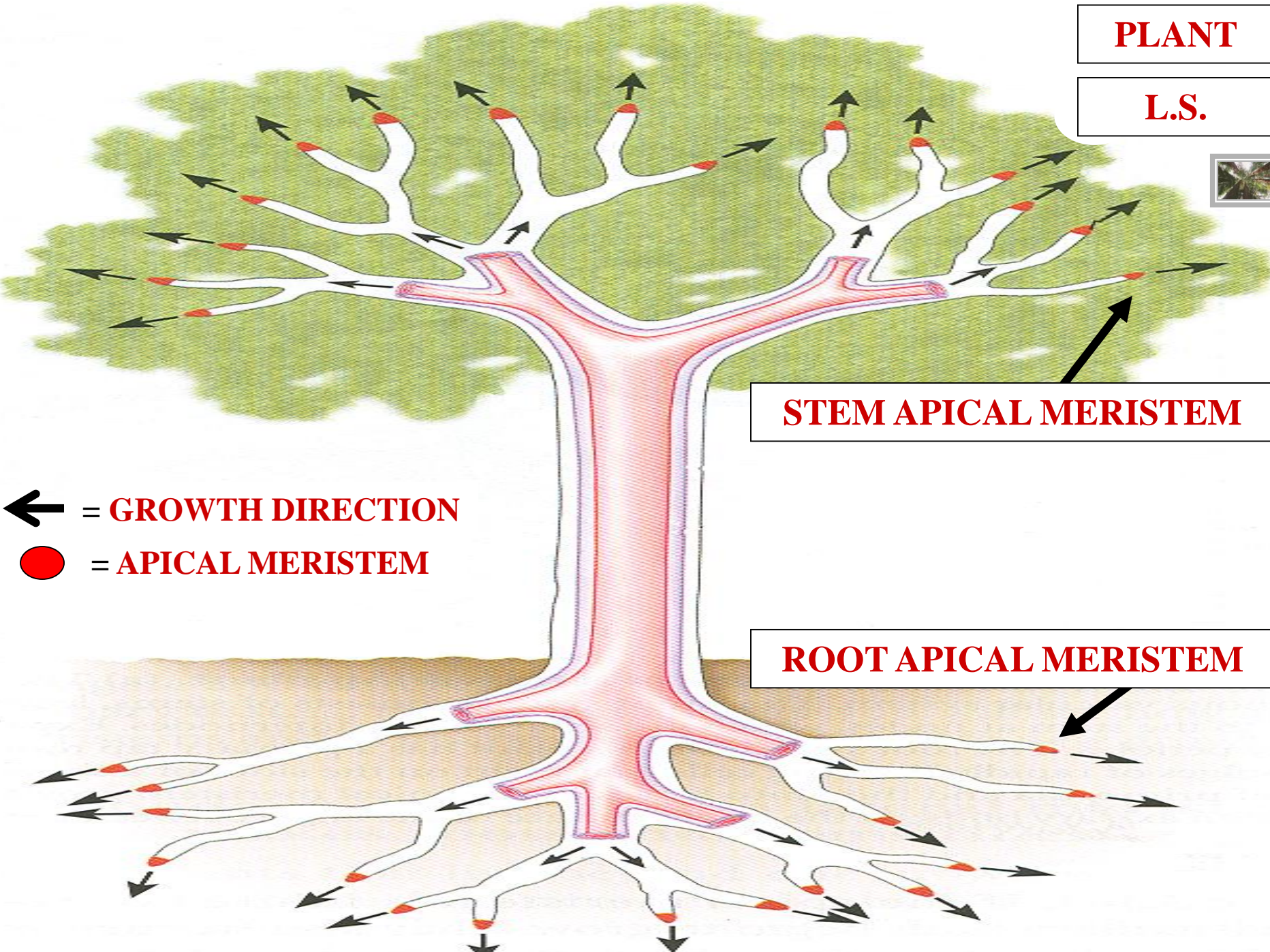


**STEM APICAL MERISTEM**

**ROOT APICAL MERISTEM**

**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**







D

**INCREASES PLANT HEIGHT**





# DICOTS







# MONOCOTS



# LATERAL MERISTEM

# **LATERAL MERISTEM**



# **LATERAL MERISTEM**

**OCCUPIES  
STEM & ROOT**

**LATERAL  
PERIPHERY**

**LATERAL  
MERISTEM**



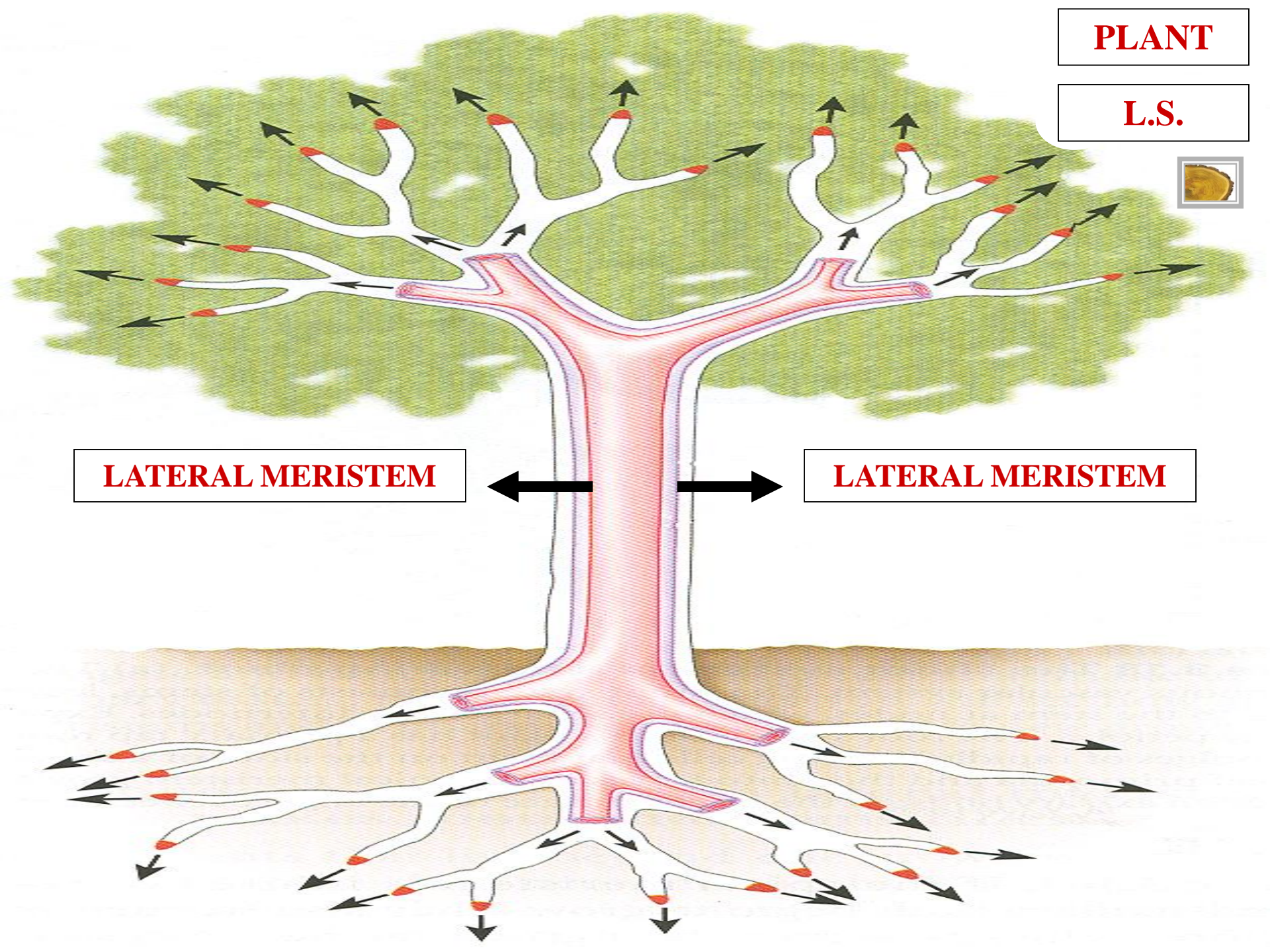
**PLANT**

**L.S.**



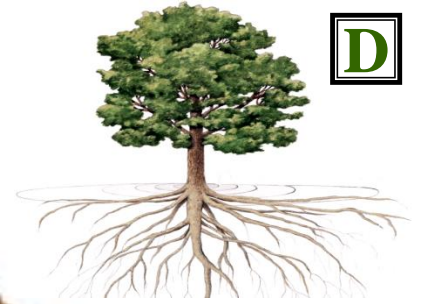
**LATERAL MERISTEM**

**LATERAL MERISTEM**





D



**WOOD TISSUE**

**INCREASE PLANT GIRTH**

**C.S.**

**STEM**





# DICOTS



# ANGIOSPERM GROWTH TYPES

# **ANGIOSPERM GROWTH TYPES**

**PRIMARY GROWTH**

# **ANGIOSPERM GROWTH TYPES**



# ANGIOSPERM GROWTH TYPES

PRIMARY GROWTH  
SECONDARY GROWTH

# ANGIOSPERM GROWTH TYPES

# ANGIOSPERM PRIMARY GROWTH



# **PRIMARY GROWTH**

# PRIMARY GROWTH



APICAL MERISTEM  
DERIVED

PRIMARY  
GROWTH

**PLANT**

**L.S.**

+

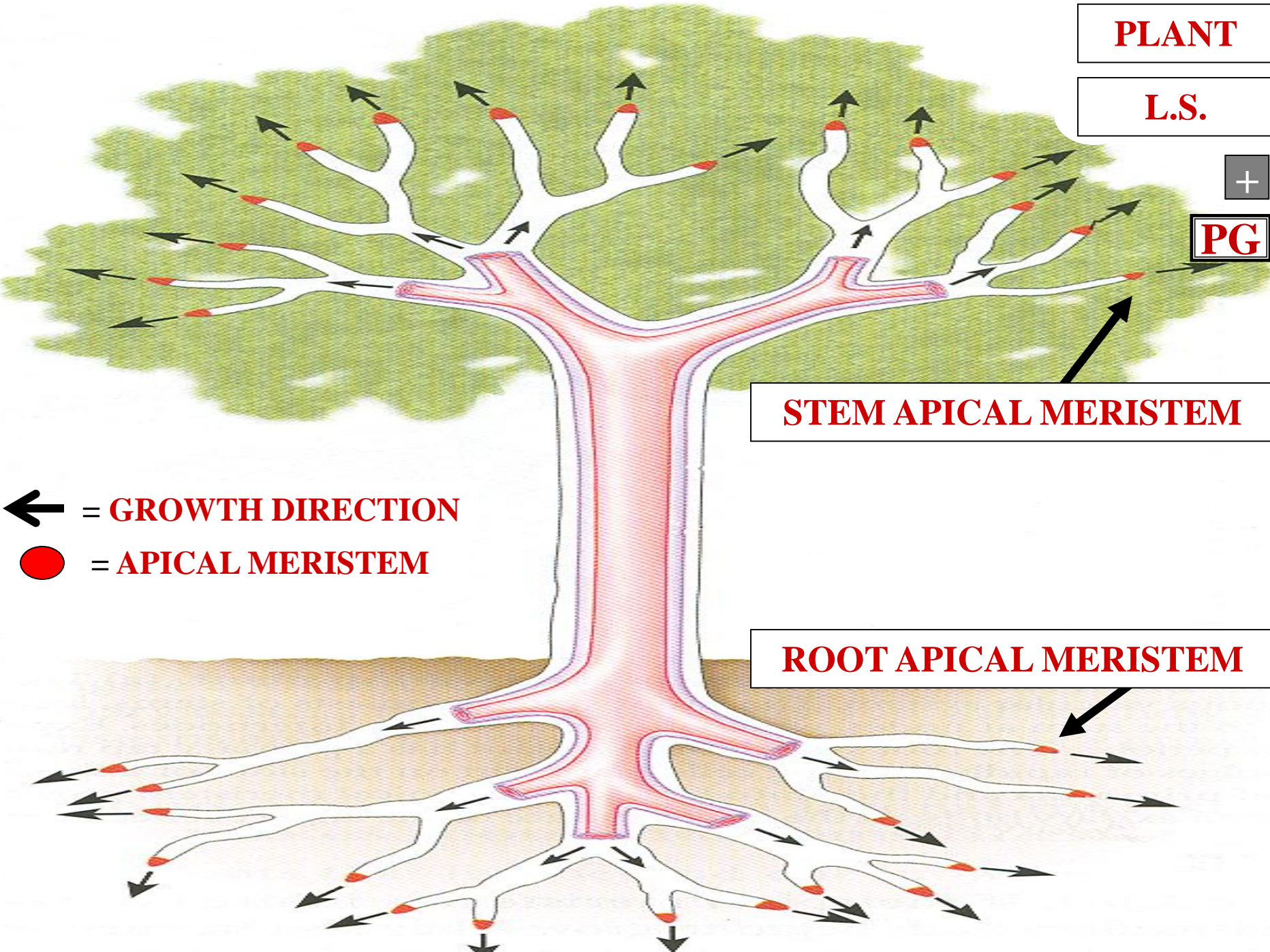
**PG**

**STEM APICAL MERISTEM**

**ROOT APICAL MERISTEM**

**↑ = GROWTH DIRECTION**

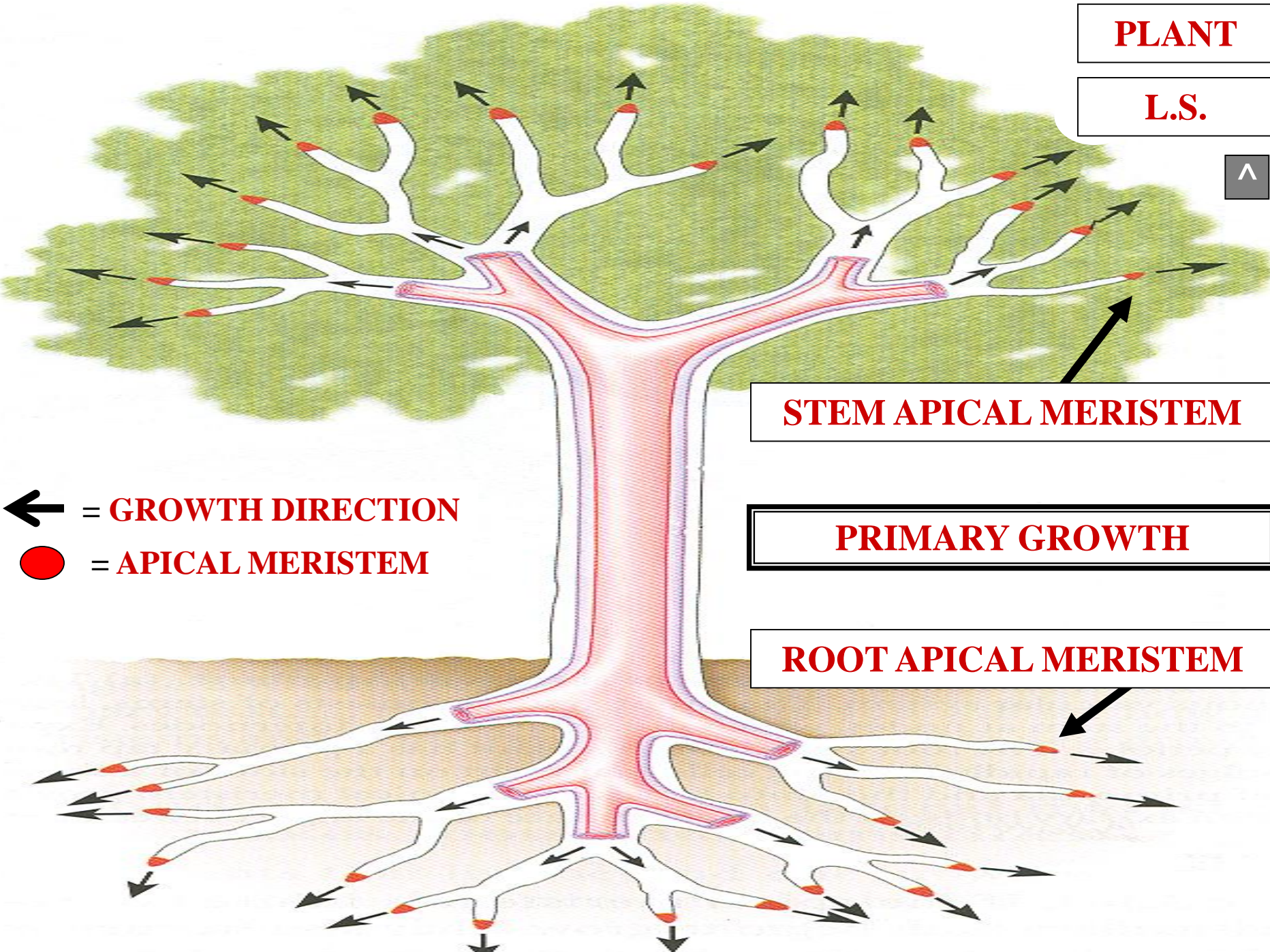
**● = APICAL MERISTEM**





**PLANT**

**L.S.**



**STEM APICAL MERISTEM**

**PRIMARY GROWTH**

**ROOT APICAL MERISTEM**

**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**

# APICAL MERISTEM

# **APICAL MERISTEM**



# **APICAL MERISTEM**

**OCCUPIES STEM & ROOT APEX**

# **APICAL MERISTEM**





# **APICAL MERISTEM**

**OCCUPIES STEM & ROOT APEX**

**---**

**INCREASES PLANT HEIGHT**

# **APICAL MERISTEM**

# **APICAL MERISTEM**



**PG**

**OCCUPIES STEM & ROOT APEX**

---

**INCREASES PLANT HEIGHT**

---

**NOT GIRTH**

# **APICAL MERISTEM**

**PLANT**

**L.S.**



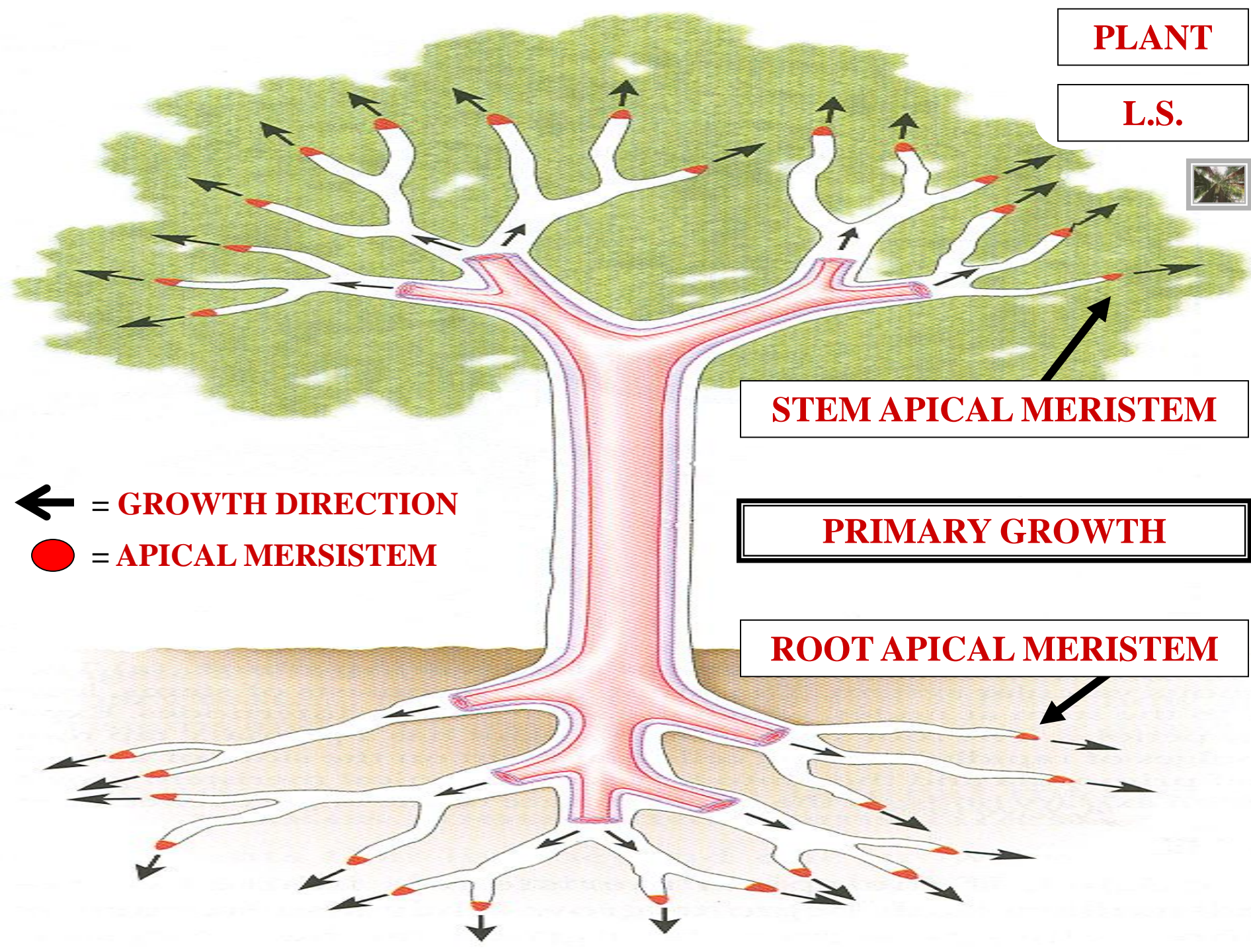
**STEM APICAL MERISTEM**

**PRIMARY GROWTH**

**ROOT APICAL MERISTEM**

**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**





**INCREASES PLANT HEIGHT**





***NOT GIRTH***



**PLANT**

**L.S.**

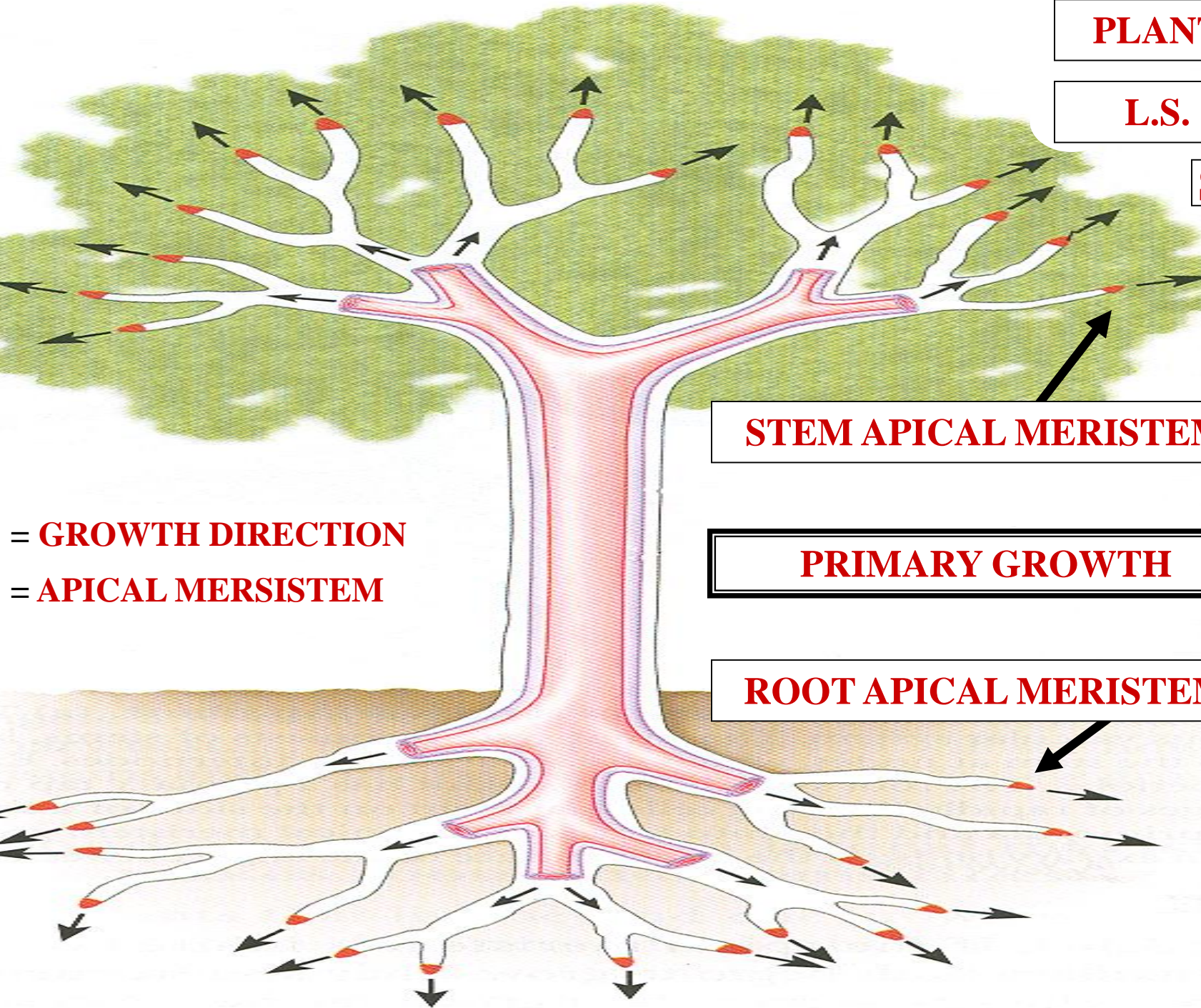
**ST**

**+**

**STEM APICAL MERISTEM**

**PRIMARY GROWTH**

**ROOT APICAL MERISTEM**



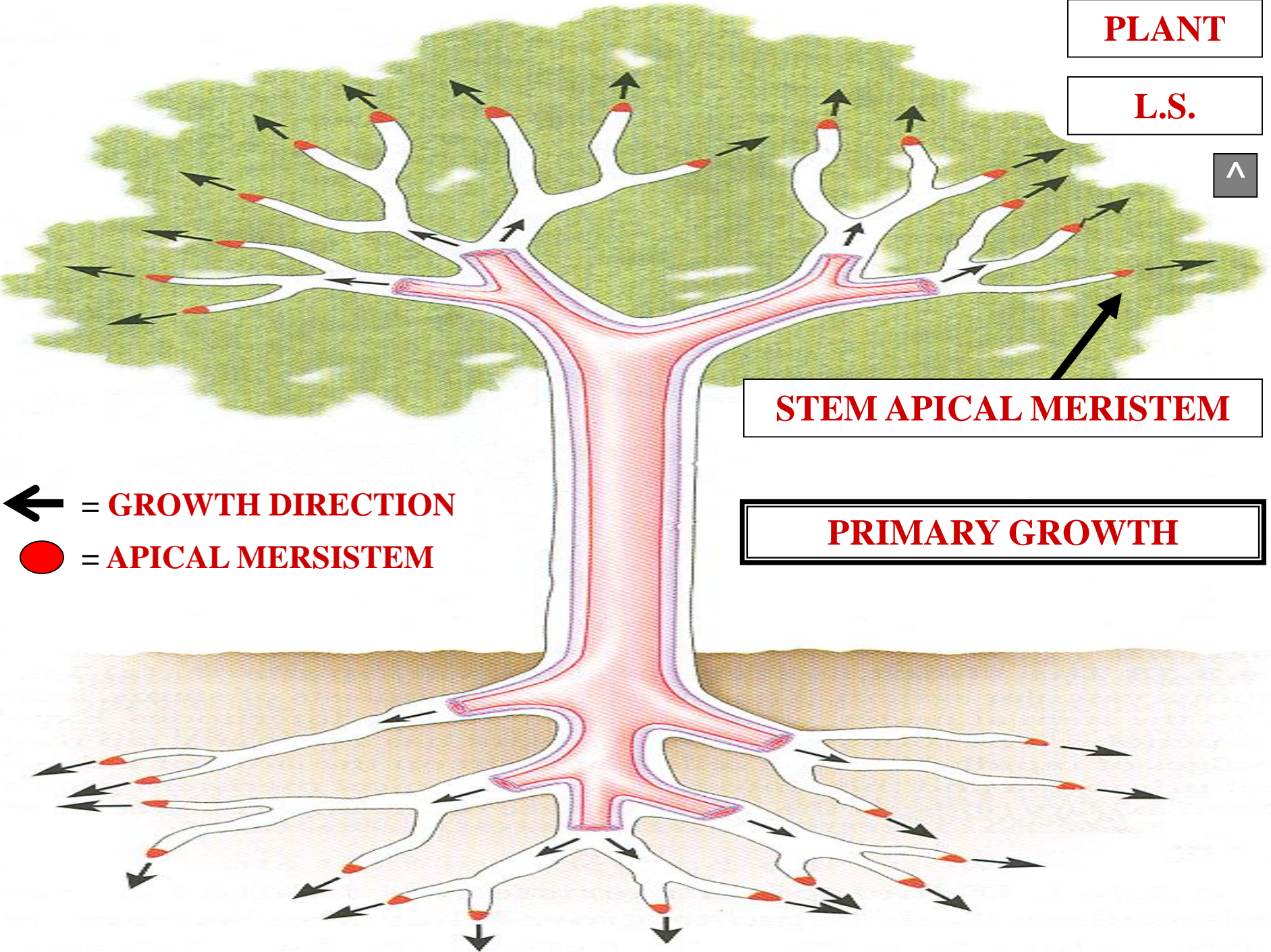
**↑ = GROWTH DIRECTION**

**● = APICAL MERISTEM**



**PLANT**

**L.S.**



**STEM APICAL MERISTEM**

**PRIMARY GROWTH**

**↑ = GROWTH DIRECTION**

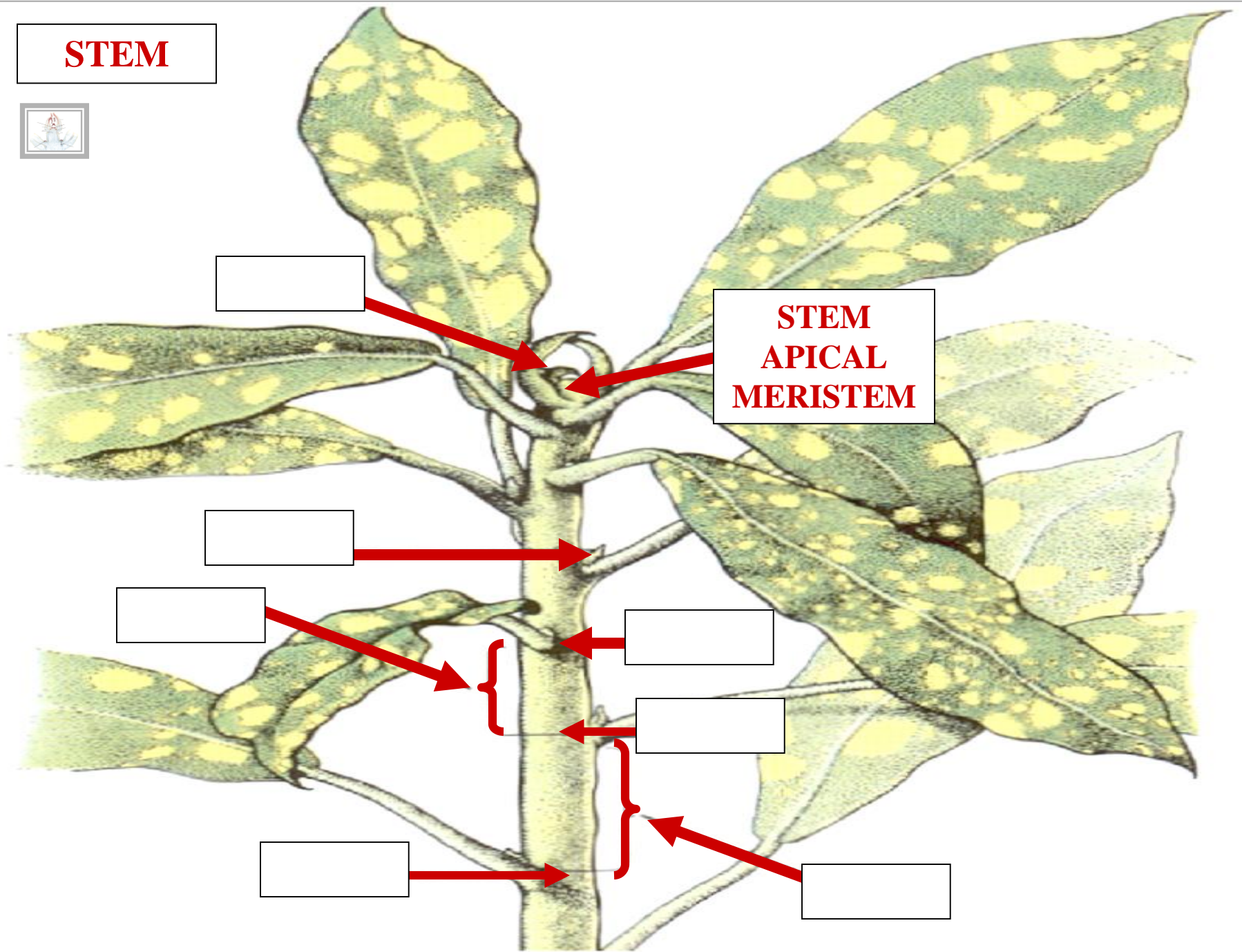
**● = APICAL MERISTEM**



# **STEM APICAL MERISTEM**

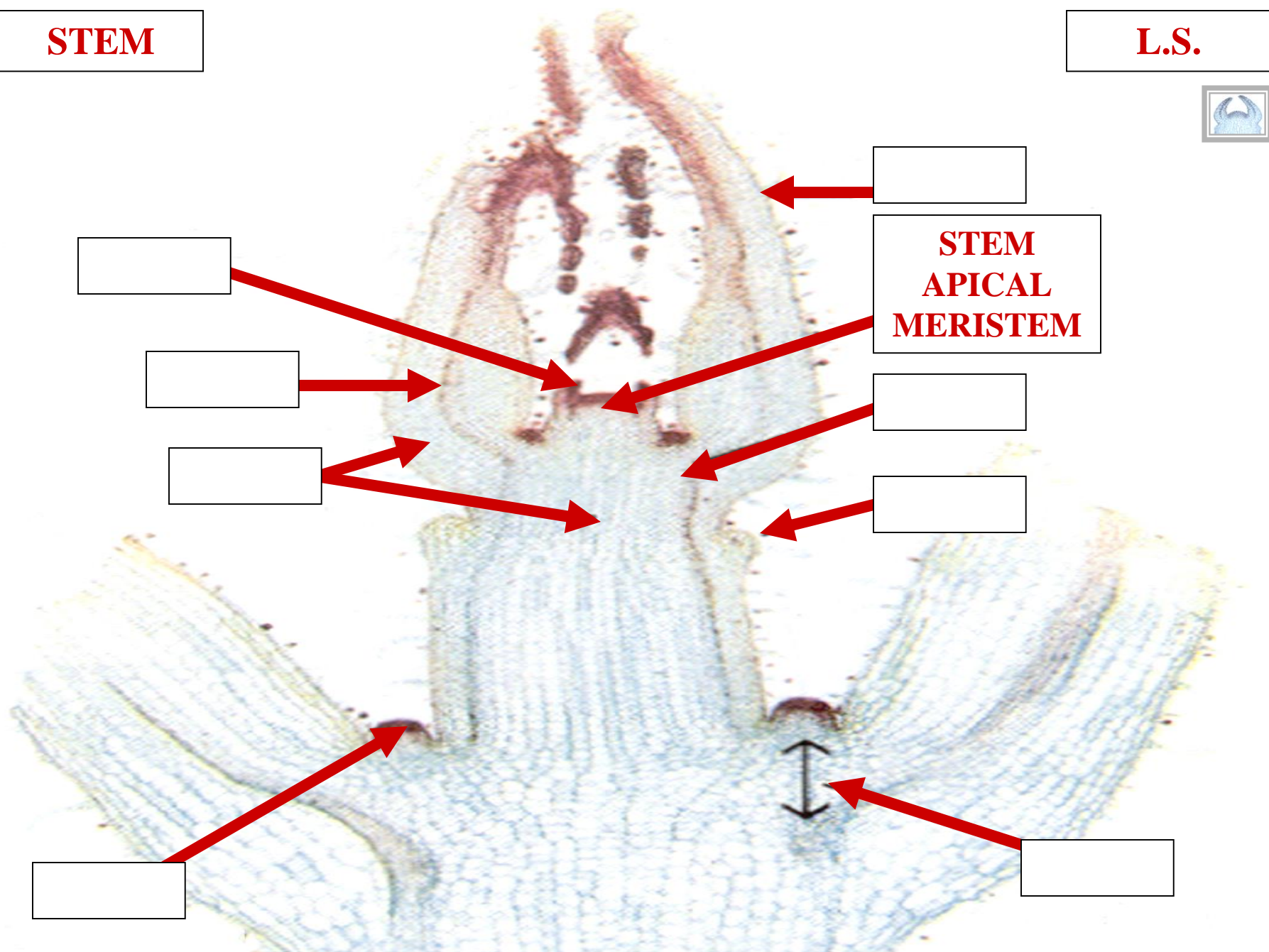


# STEM



**STEM**

**L.S.**



**STEM  
APICAL  
MERISTEM**

[ ]

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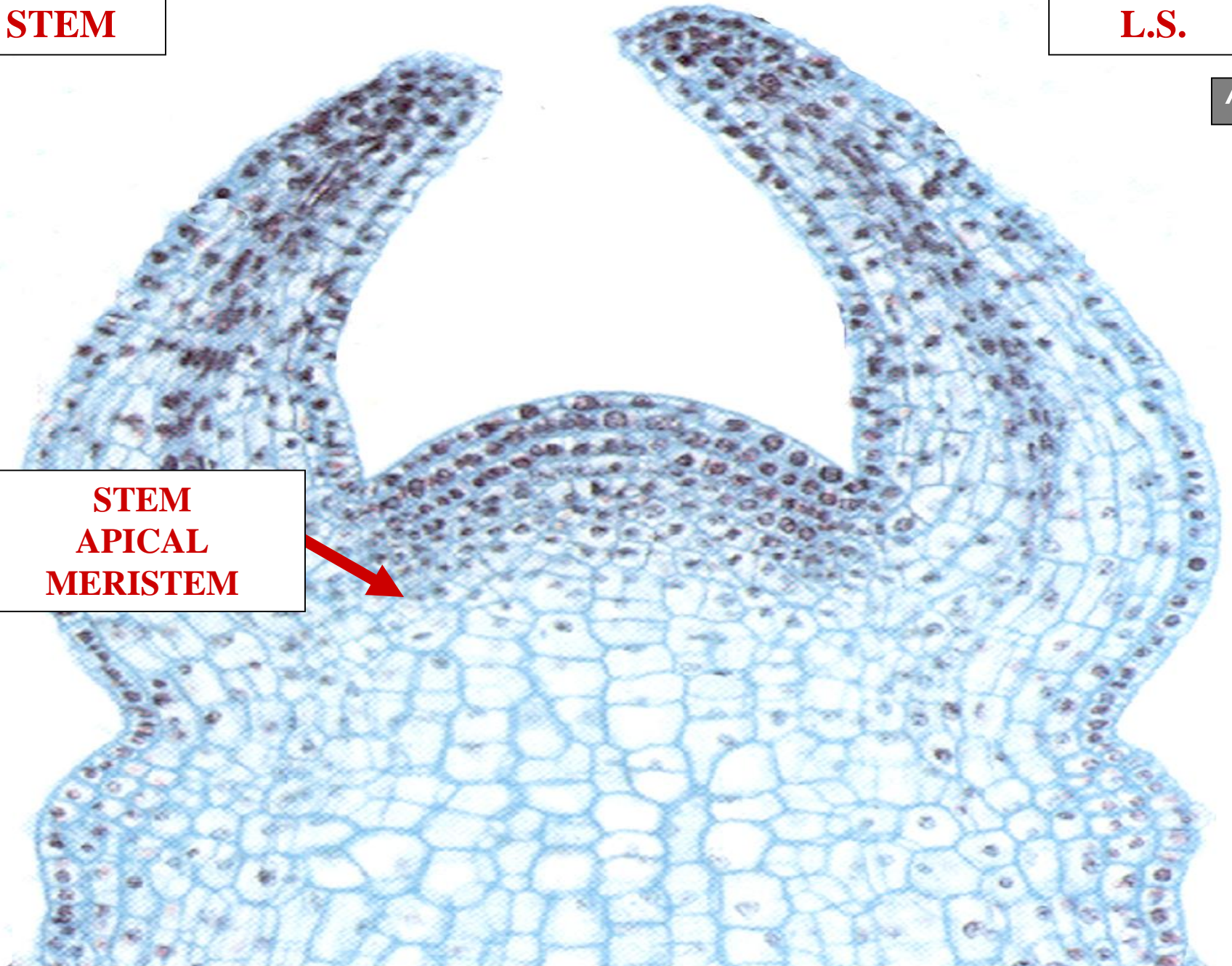


**STEM**

**L.S.**



**STEM  
APICAL  
MERISTEM**



**STEM**  
**APICAL MERISTEM**  
**CELL TYPES**



**STEM  
APICAL MERISTEM  
CELL TYPES**

**INITIALS**

**STEM  
APICAL MERISTEM  
CELL TYPES**

**STEM  
APICAL MERISTEM  
CELL TYPES**

**INITIALS  
DERIVATIVES**

**STEM  
APICAL MERISTEM  
CELL TYPES**

# **MERISTEM INITIALS**



**MERISTEM  
INITIALS**

**UNDERGO  
CONTINUOUS  
MITOSIS**

**MERISTEM  
INITIALS**



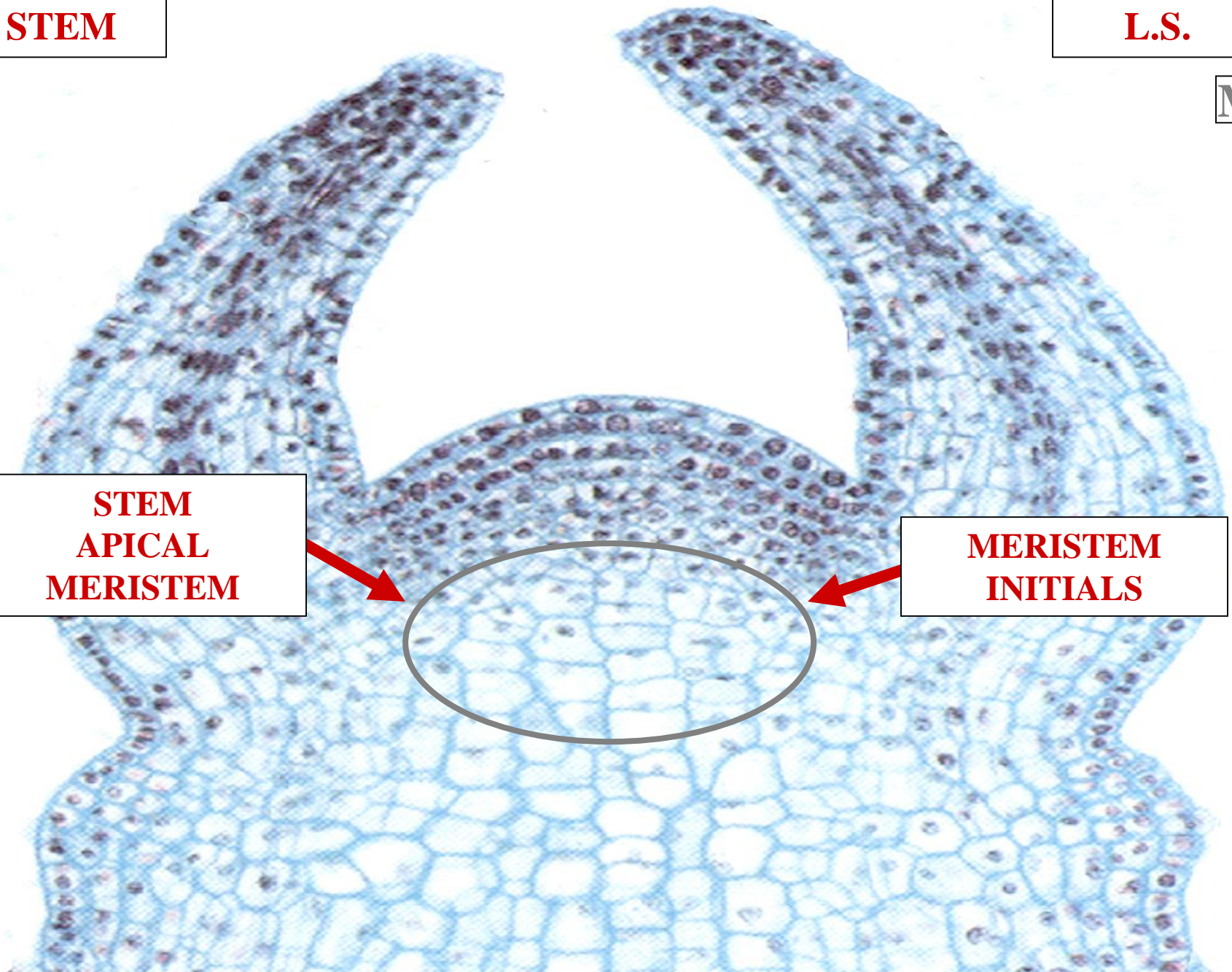
**STEM**

**L.S.**

**M**

**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**





**STEM**

**L.S.**

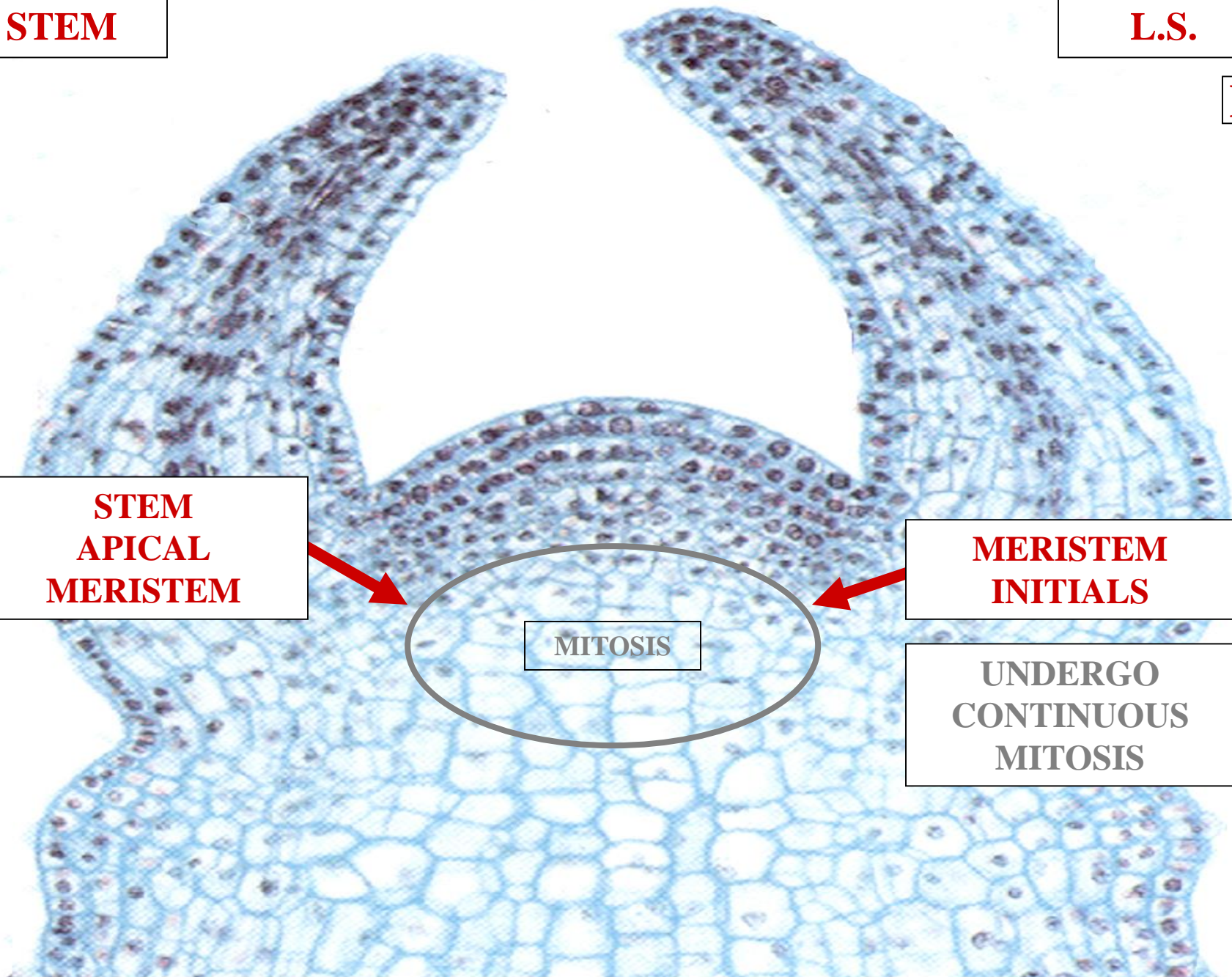
**D**

**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**

**MITOSIS**

**UNDERGO  
CONTINUOUS  
MITOSIS**





**STEM**

**L.S.**

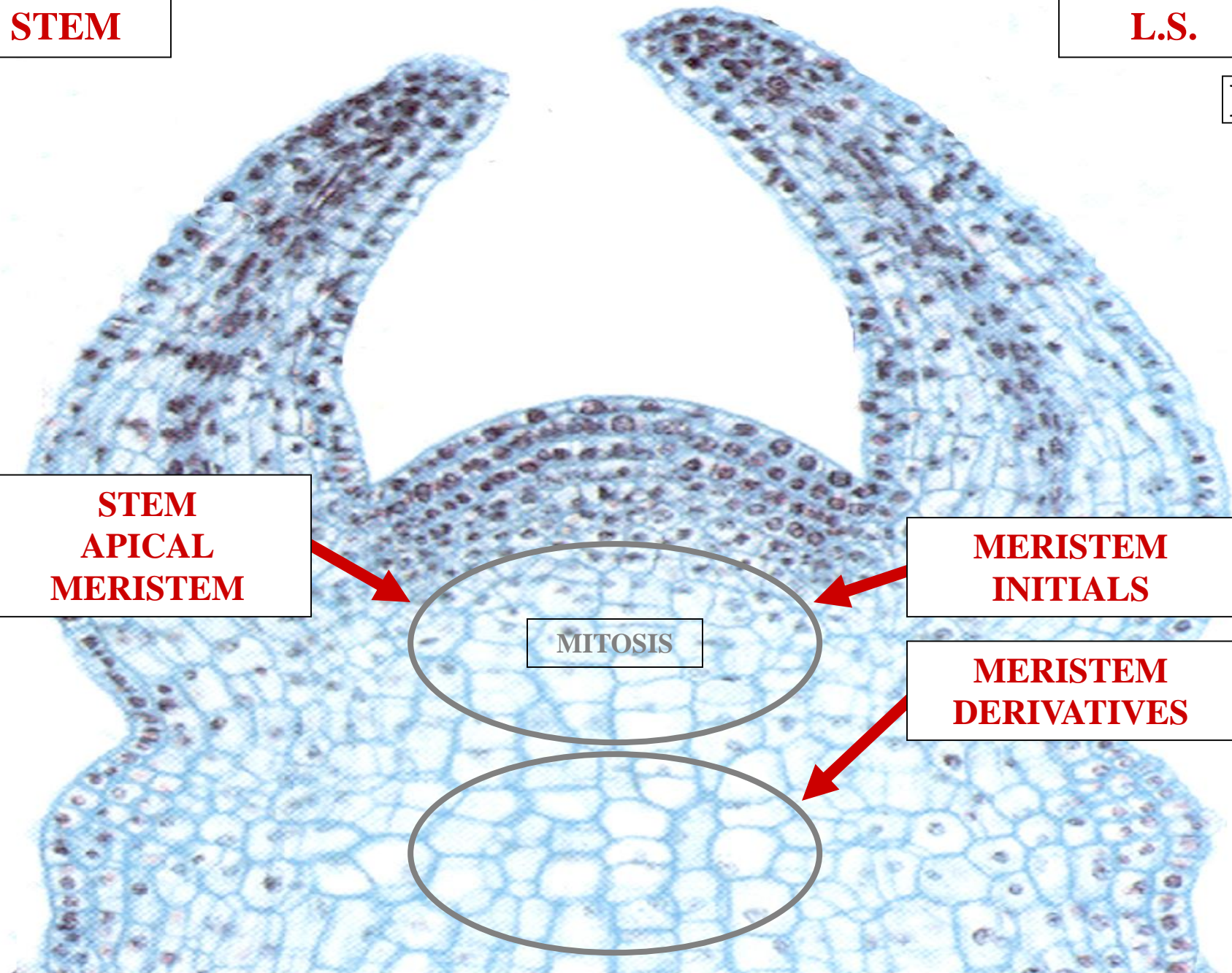
**D**

**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**

**MERISTEM  
DERIVATIVES**

**MITOSIS**



# **MERISTEM DERIVATIVES**

# **MERISTEM DERIVATIVES**



**UNDERGO  
DIFFERENTIATION**

**MERISTEM  
DERIVATIVES**



**STEM**

**L.S.**

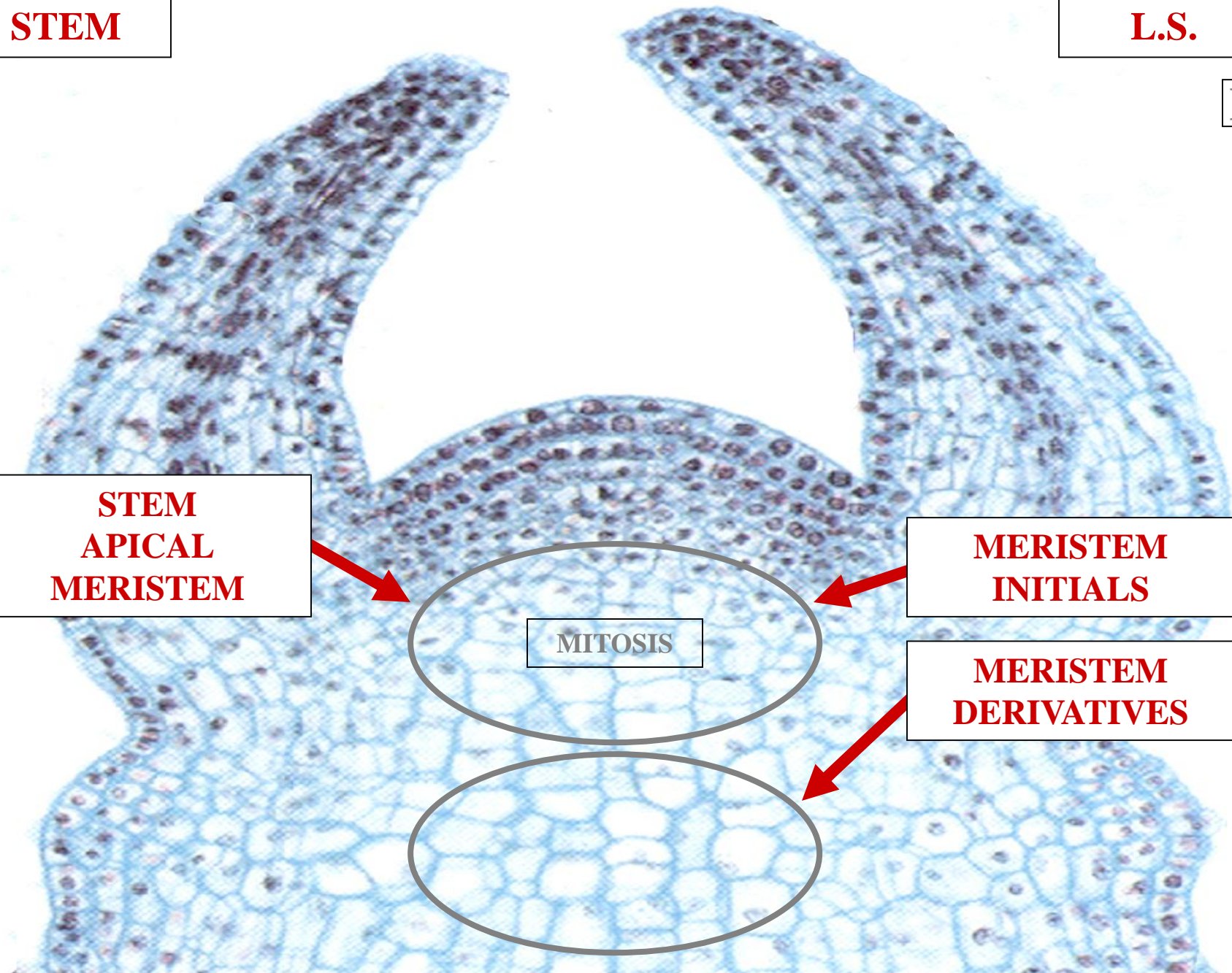
**D**

**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**

**MERISTEM  
DERIVATIVES**

**MITOSIS**





**STEM**

**L.S.**

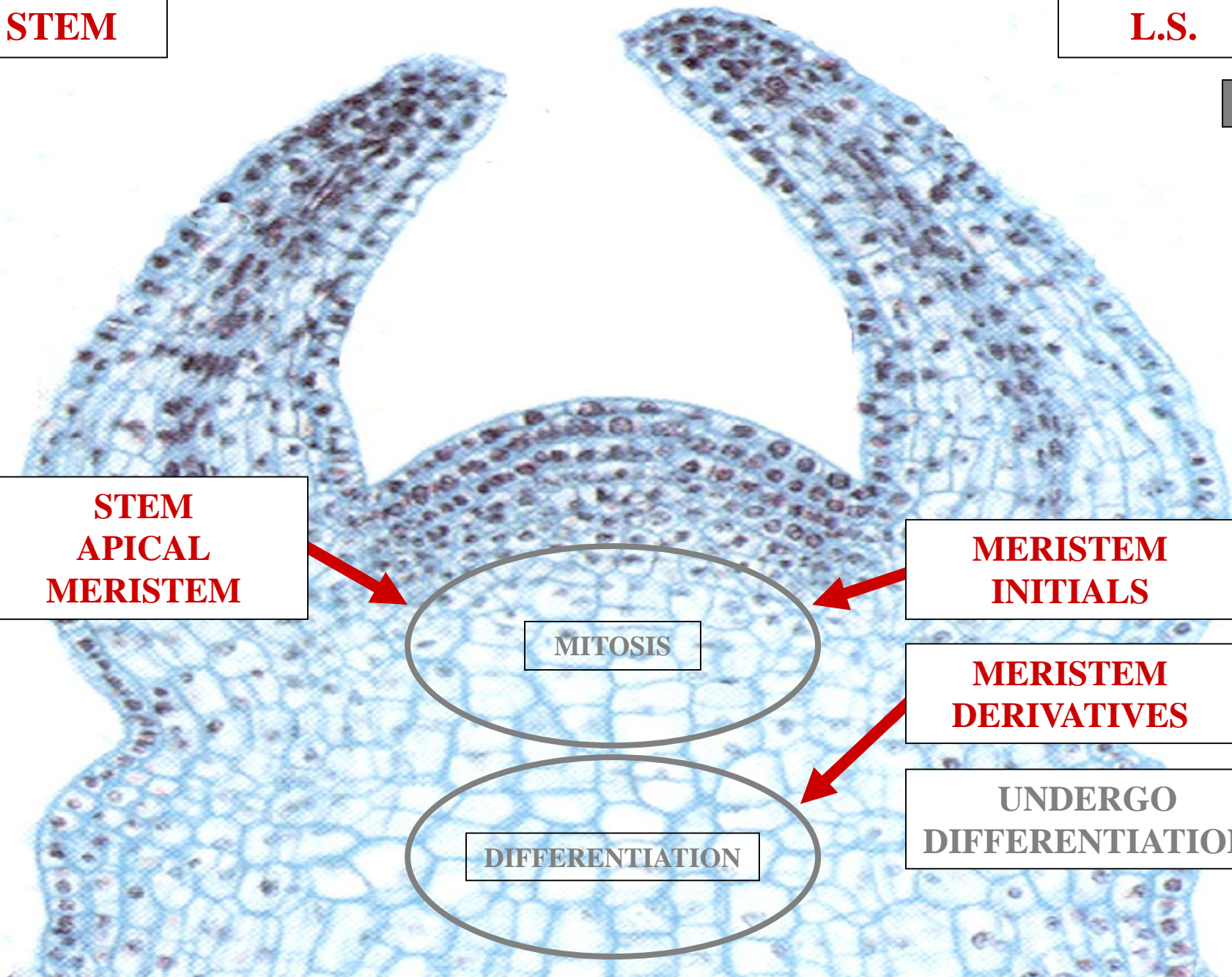


**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**

**MERISTEM  
DERIVATIVES**

**UNDERGO  
DIFFERENTIATION**



# **DIFFERENTIATION**

# **DIFFERENTIATION**





# **DIFFERENTIATION**

**MERISTEM**

**DERIVATIVE UNDERGOES**

**MATURATION**

**INTO SPECIALIZED**

**PLANT CELL**

**DIFFERENTIATION**

**STEM**

**L.S.**

**T**

**STEM  
APICAL  
MERISTEM**

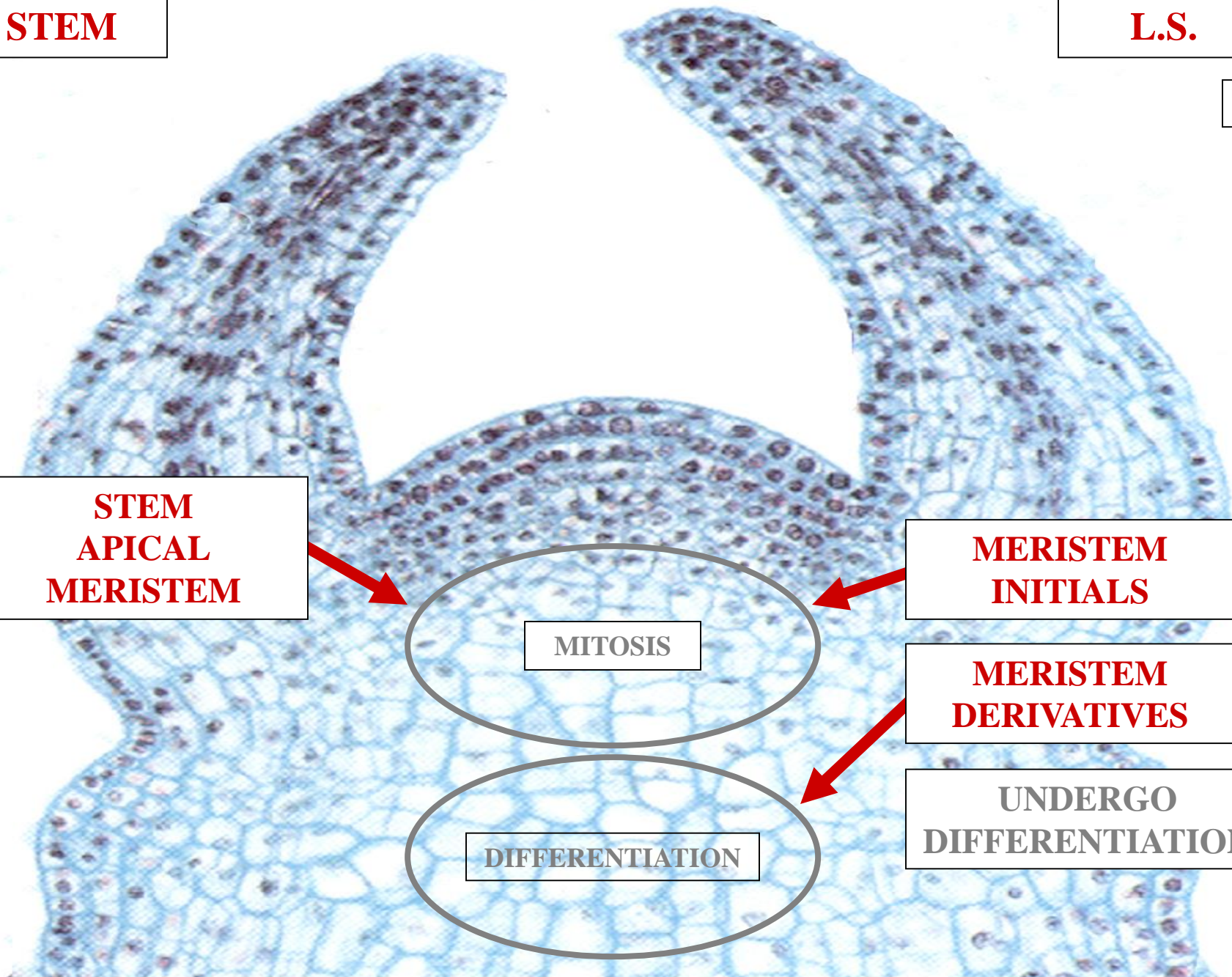
**MERISTEM  
INITIALS**

**MITOSIS**

**MERISTEM  
DERIVATIVES**

**DIFFERENTIATION**

**UNDERGO  
DIFFERENTIATION**



**STEM**

**L.S.**

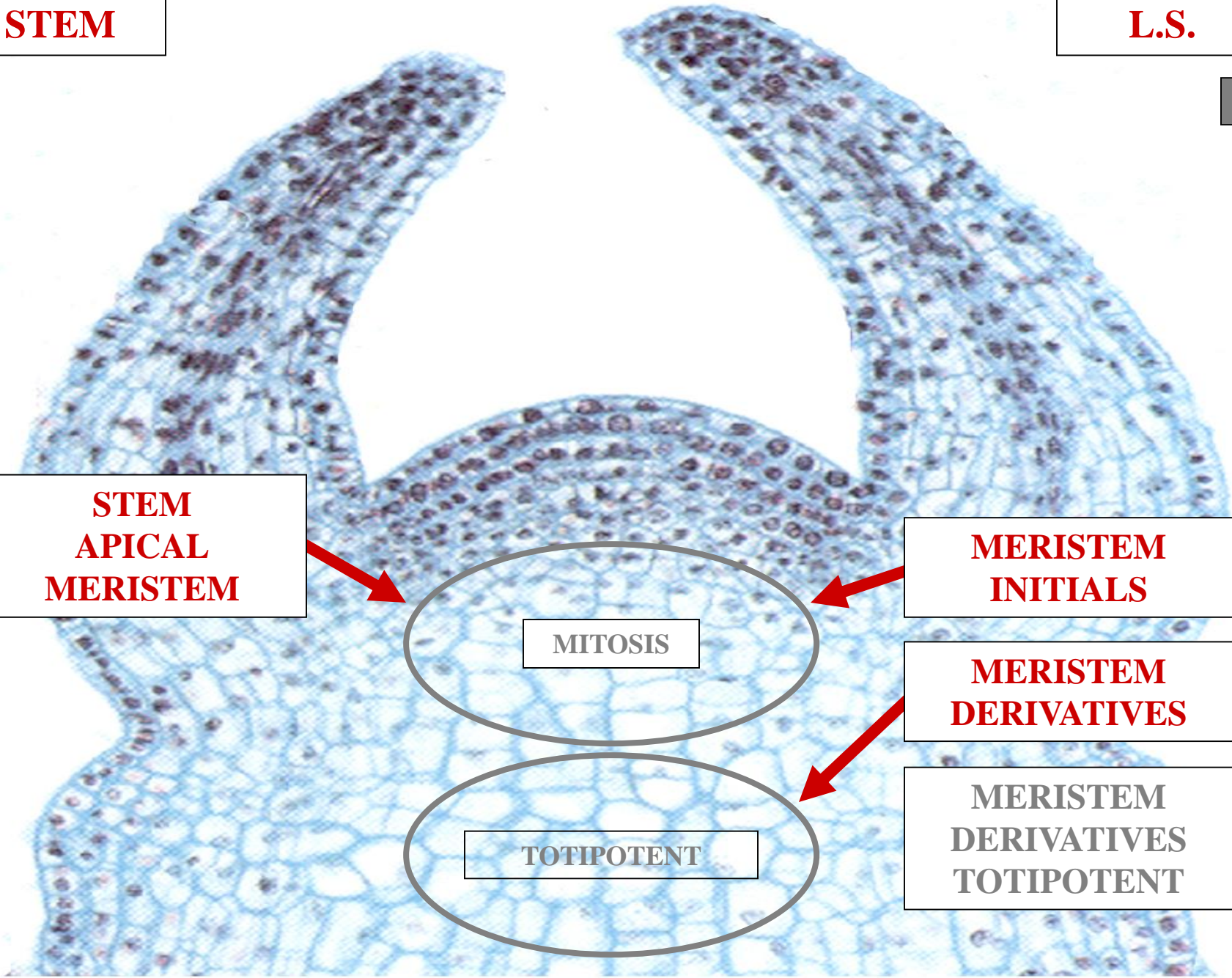


**STEM  
APICAL  
MERISTEM**

**MERISTEM  
INITIALS**

**MERISTEM  
DERIVATIVES**

**MERISTEM  
DERIVATIVES  
TOTIPOTENT**





# TOTIPOTENCY

**TOTIPOPOTENCY**



# TOTIPOTENCY

MERISTEM DERIVATIVE

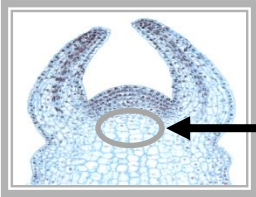
POTENTIAL TO DIFFERENTIATE

INTO ANY PLANT CELL TYPE

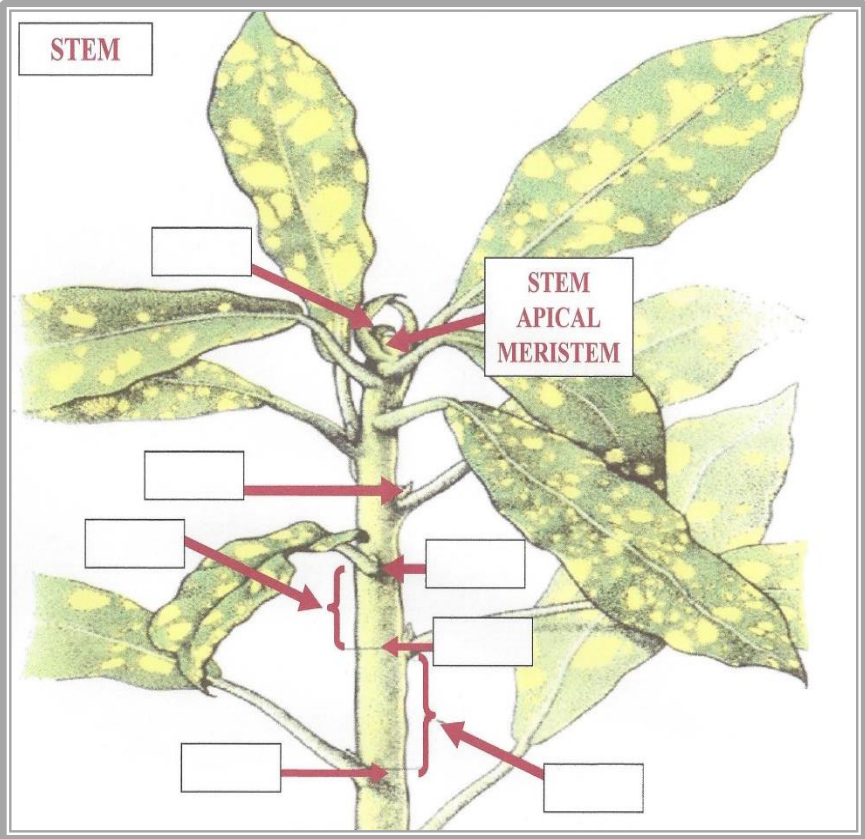
# TOTIPOTENCY



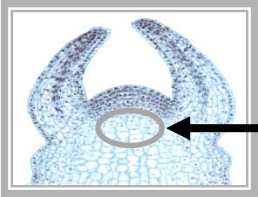
# STEM APICAL MERISTEM



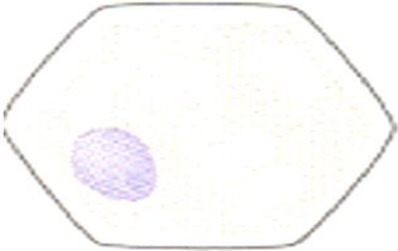
STEM APICAL MERISTEM



# STEM APICAL MERISTEM

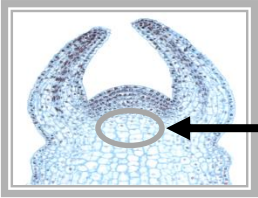


STEM APICAL MERISTEM



MERISTEM  
CELL INITIAL

# STEM APICAL MERISTEM



STEM APICAL MERISTEM

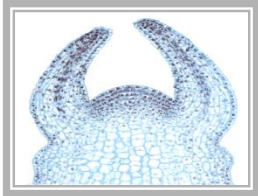


MITOSIS

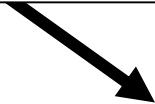
MERISTEM CELL INITIAL



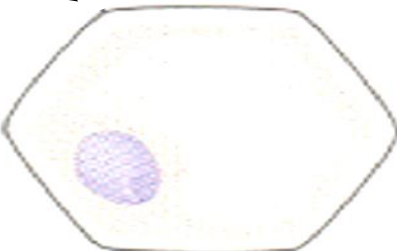
# STEM APICAL MERISTEM



MERISTEM CELL DERIVATIVE



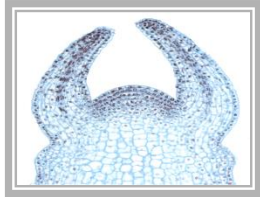
MITOSIS



MERISTEM CELL INITIAL



# STEM APICAL MERISTEM



MERISTEM CELL DERIVATIVE



MITOSIS

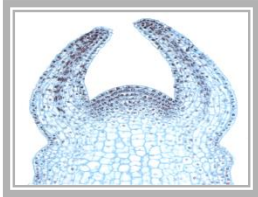


MERISTEM DERIVATIVE CAN POTENTIALLY DIFFERENTIATE INTO ANY PLANT CELL TYPE

MERISTEM CELL INITIAL

# MERISTEM DERIVATIVE CELLS TOTIPOTENT

**STEM APICAL  
MERISTEM**



**MERISTEM  
CELL DERIVATIVE**



**MITOSIS**



**MERISTEM DERIVATIVE  
CAN POTENTIALLY  
DIFFERENTIATE  
INTO ANY PLANT CELL TYPE**

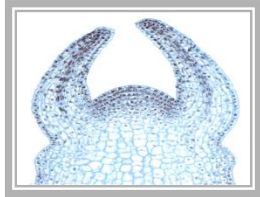
**DIFFERENTIATION SPECIFICS  
DEPENDS ON:**

**MERISTEM  
CELL INITIAL**

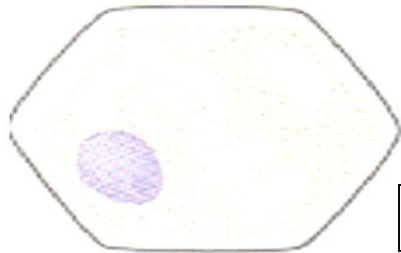
**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**



**STEM APICAL  
MERISTEM**



**MERISTEM  
CELL DERIVATIVE**



**MITOSIS**



**MERISTEM DERIVATIVE  
CAN POTENTIALLY  
DIFFERENTIATE  
INTO ANY PLANT CELL TYPE**

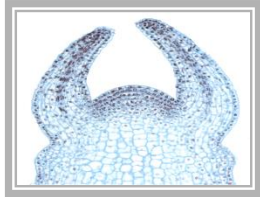
**MERISTEM  
CELL INITIAL**

**DIFFERENTIATION SPECIFICS  
DEPENDS ON:**

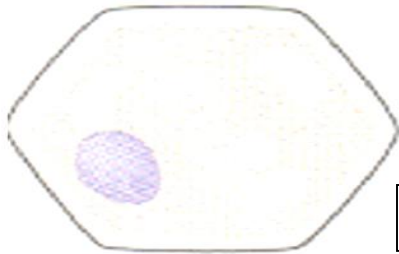
**DERIVATIVE CELL  
LOCATION W/IN PLANT**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**

**STEM APICAL  
MERISTEM**



**MERISTEM  
CELL DERIVATIVE**



**MITOSIS**



**MERISTEM  
DERIVATIVE  
TOTIPOTENT**

**MERISTEM DERIVATIVE  
CAN POTENTIALLY  
DIFFERENTIATE  
INTO ANY PLANT CELL TYPE**

**MERISTEM  
CELL INITIAL**

**DIFFERENTIATION SPECIFICS  
DEPENDS ON:**

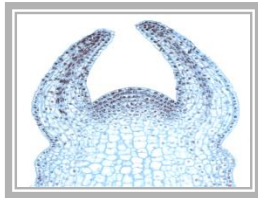
**DERIVATIVE CELL  
LOCATION W/IN PLANT**

**DERIVATIVE CELL  
HORMONE INTERACTION**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**



# STEM APICAL MERISTEM



**MERISTEM CELL DERIVATIVE**



**MITOSIS**



**MERISTEM DERIVATIVE CAN POTENTIALLY DIFFERENTIATE INTO ANY PLANT CELL TYPE**

**MERISTEM CELL INITIAL**

**DIFFERENTIATION SPECIFICS DEPENDS ON:**

**DERIVATIVE CELL LOCATION W/IN PLANT**

**DERIVATIVE CELL HORMONE INTERACTION**

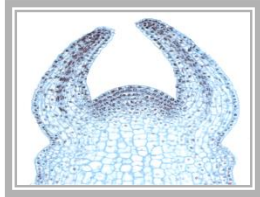
**DERIVATIVE CELL ENVIRONMENT INTERACTION**

**MERISTEM DERIVATIVE CELLS TOTIPOTENT**



**STEM APICAL  
MERISTEM**

**EPIDERMAL CELL**



**MERISTEM  
CELL DERIVATIVE**



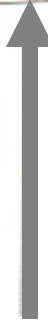
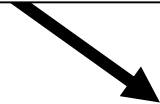
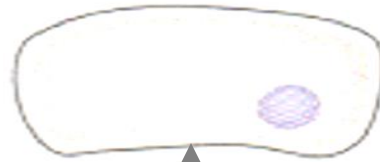
**MITOSIS**



**MERISTEM  
DERIVATIVE  
TOTIPOTENT**

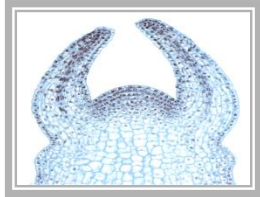
**MERISTEM  
CELL INITIAL**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**



**STEM APICAL  
MERISTEM**

**EPIDERMAL CELL**



**MERISTEM  
CELL DERIVATIVE**



**SCLEREID CELL**

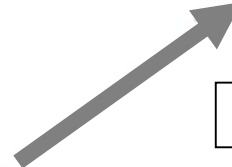
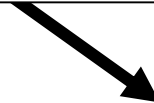
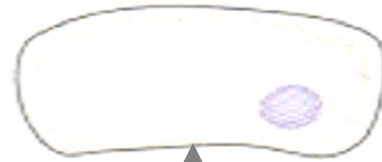


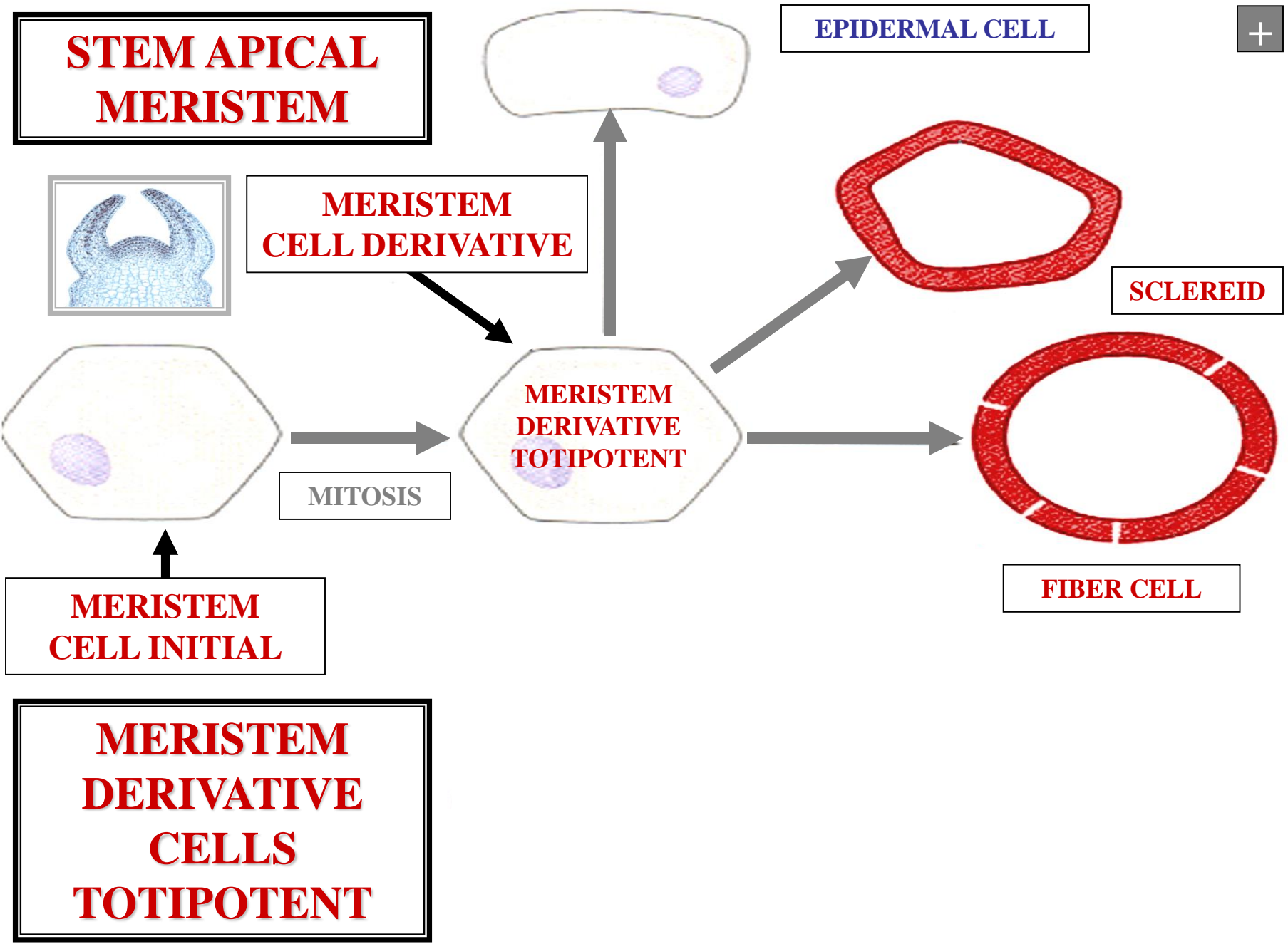
**MITOSIS**

**MERISTEM  
DERIVATIVE  
TOTIPOTENT**

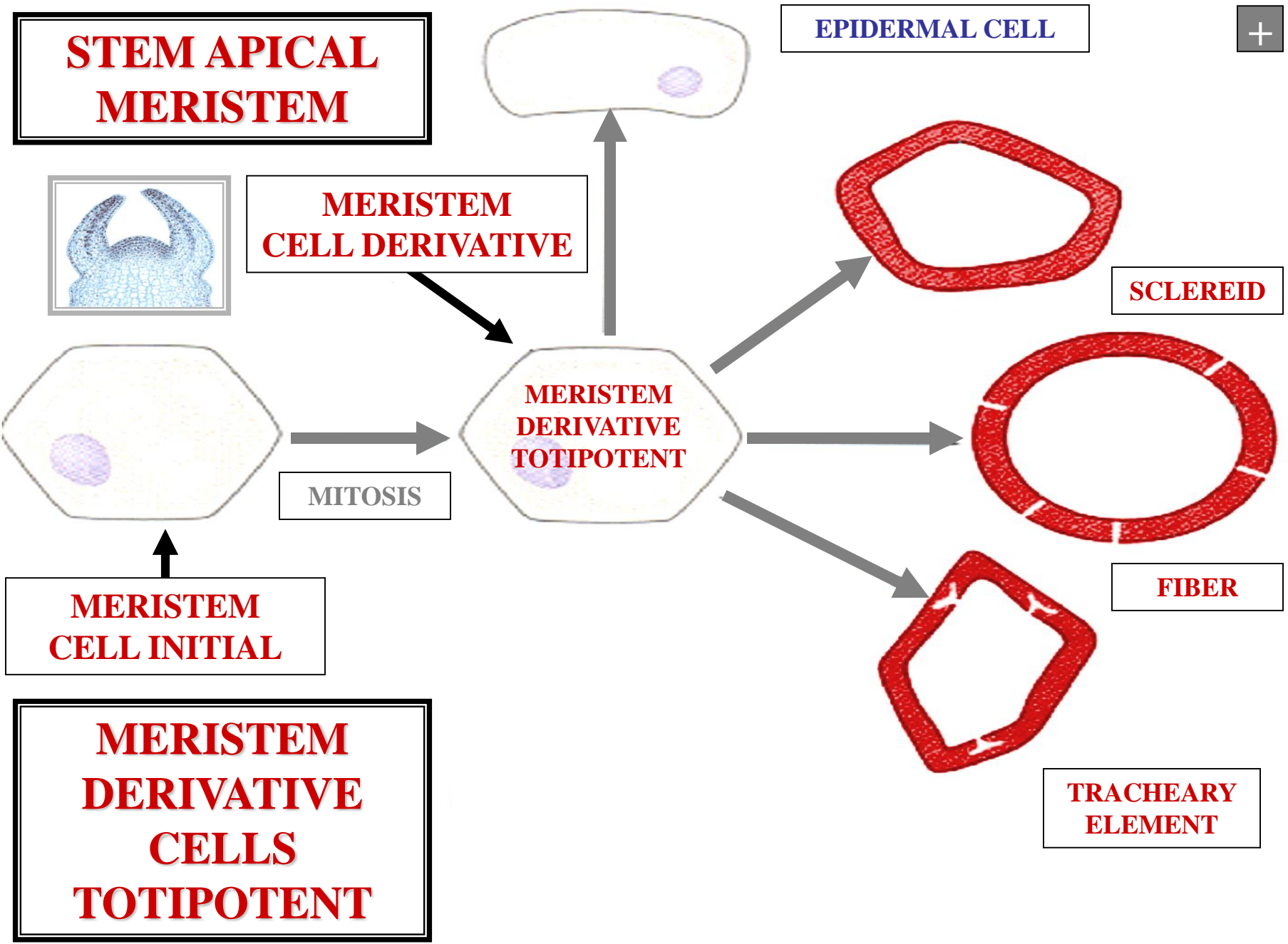
**MERISTEM  
CELL INITIAL**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**







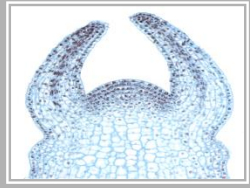


**STEM APICAL MERISTEM**

**EPIDERMAL CELL**



**MERISTEM CELL DERIVATIVE**



**MERISTEM DERIVATIVE TOTIPOTENT**

**MITOSIS**

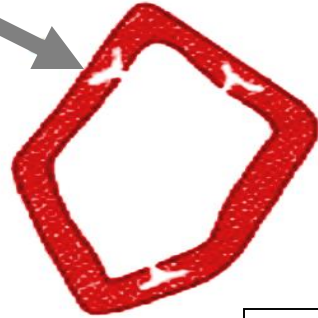
**SCLEREID**



**FIBER**

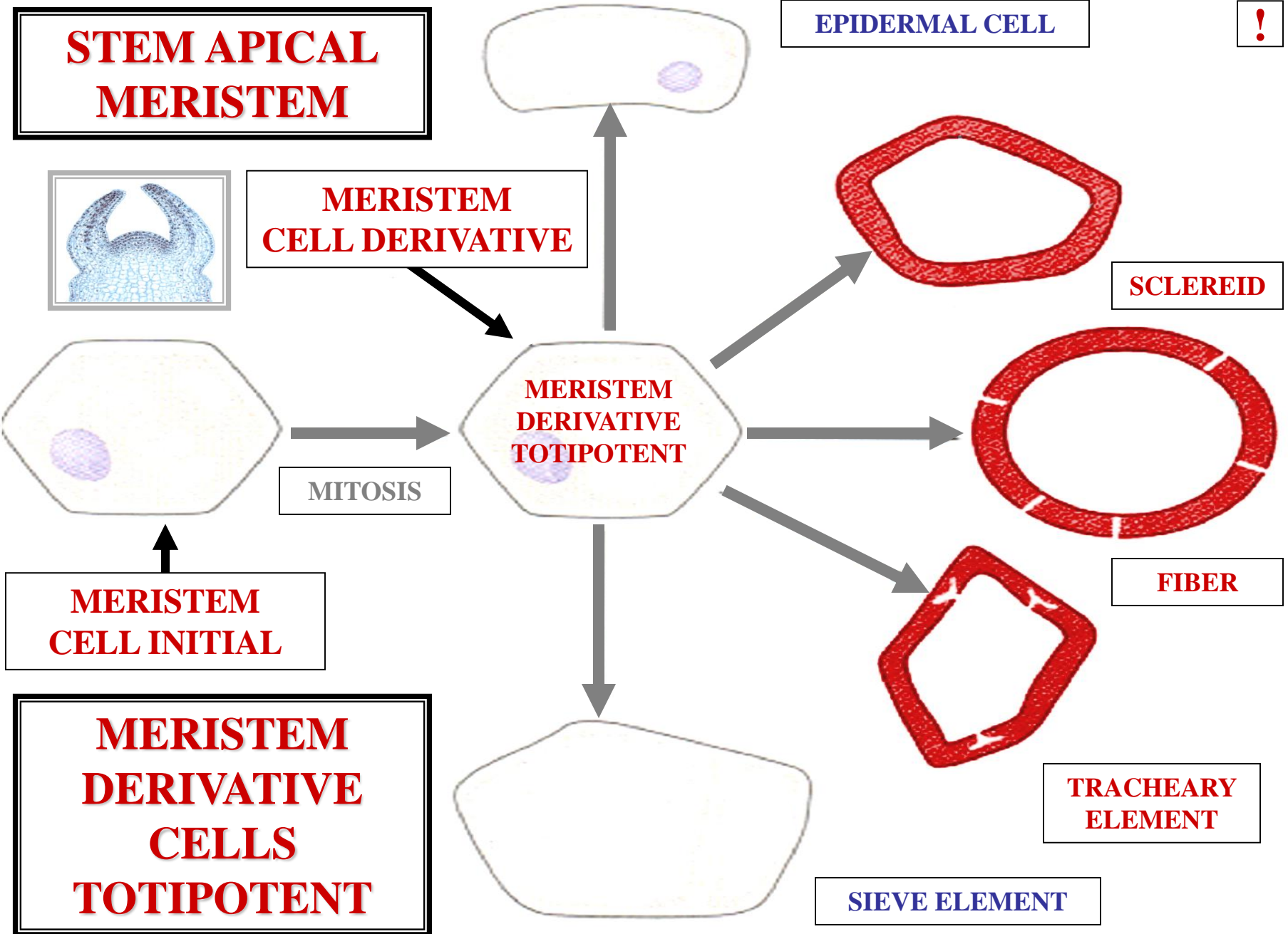


**TRACHEARY ELEMENT**



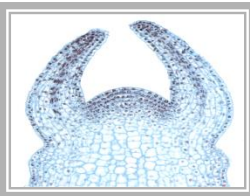
**MERISTEM CELL INITIAL**

**MERISTEM DERIVATIVE CELLS TOTIPOTENT**



**STEM APICAL  
MERISTEM**

**EPIDERMAL CELL**



**MERISTEM  
CELL DERIVATIVE**



**MITOSIS**



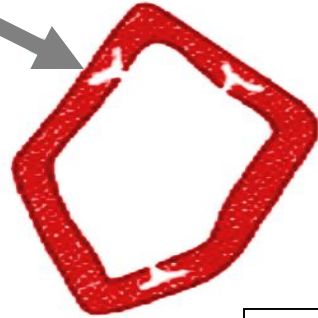
**MERISTEM  
DERIVATIVE  
TOTIPOTENT**



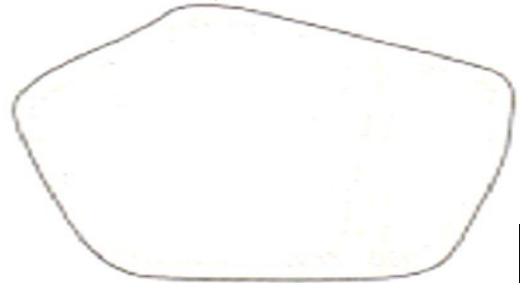
**SCLEREID**



**FIBER**



**TRACHEARY  
ELEMENT**

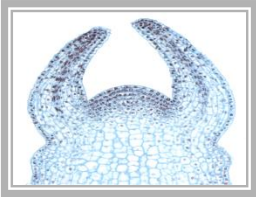


**SIEVE ELEMENT**

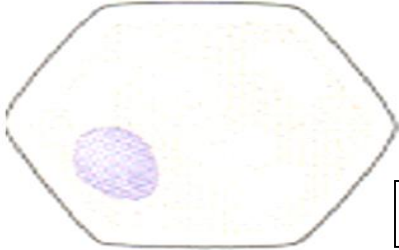
**MERISTEM  
CELL INITIAL**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**

**STEM APICAL  
MERISTEM**



**MERISTEM  
CELL DERIVATIVE**



**MITOSIS**



**MERISTEM  
CELL INITIAL**

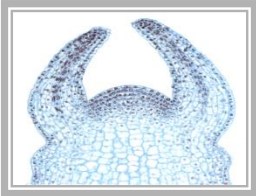


**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**





**STEM APICAL  
MERISTEM**



**MERISTEM  
CELL DERIVATIVE**



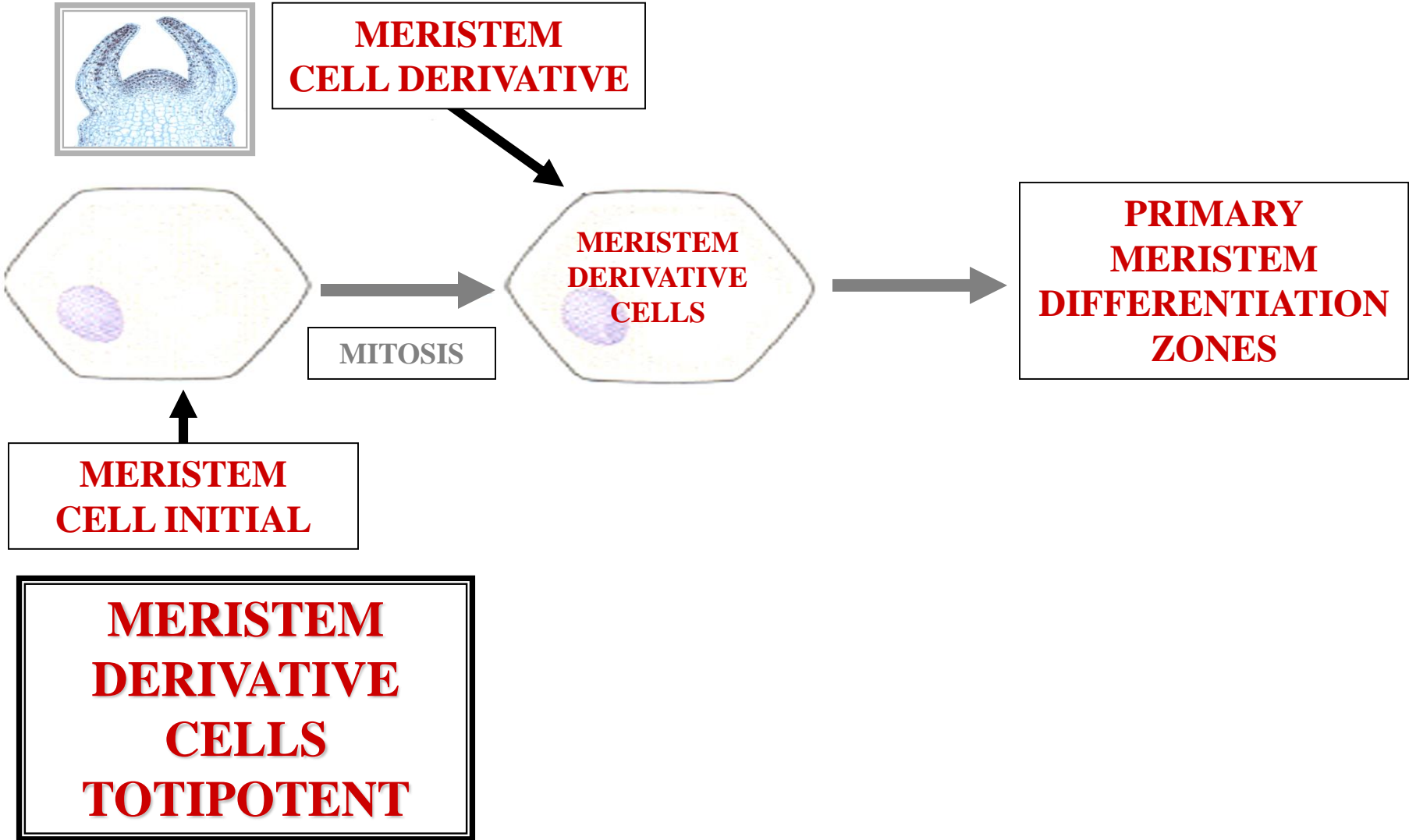
**MITOSIS**



**PRIMARY  
MERISTEM  
DIFFERENTIATION  
ZONES**

**MERISTEM  
CELL INITIAL**

**MERISTEM  
DERIVATIVE  
CELLS  
TOTIPOTENT**



# PRIMARY MERISTEMS

# **PRIMARY MERISTEMS**



**PRIMARY  
MERISTEMS**

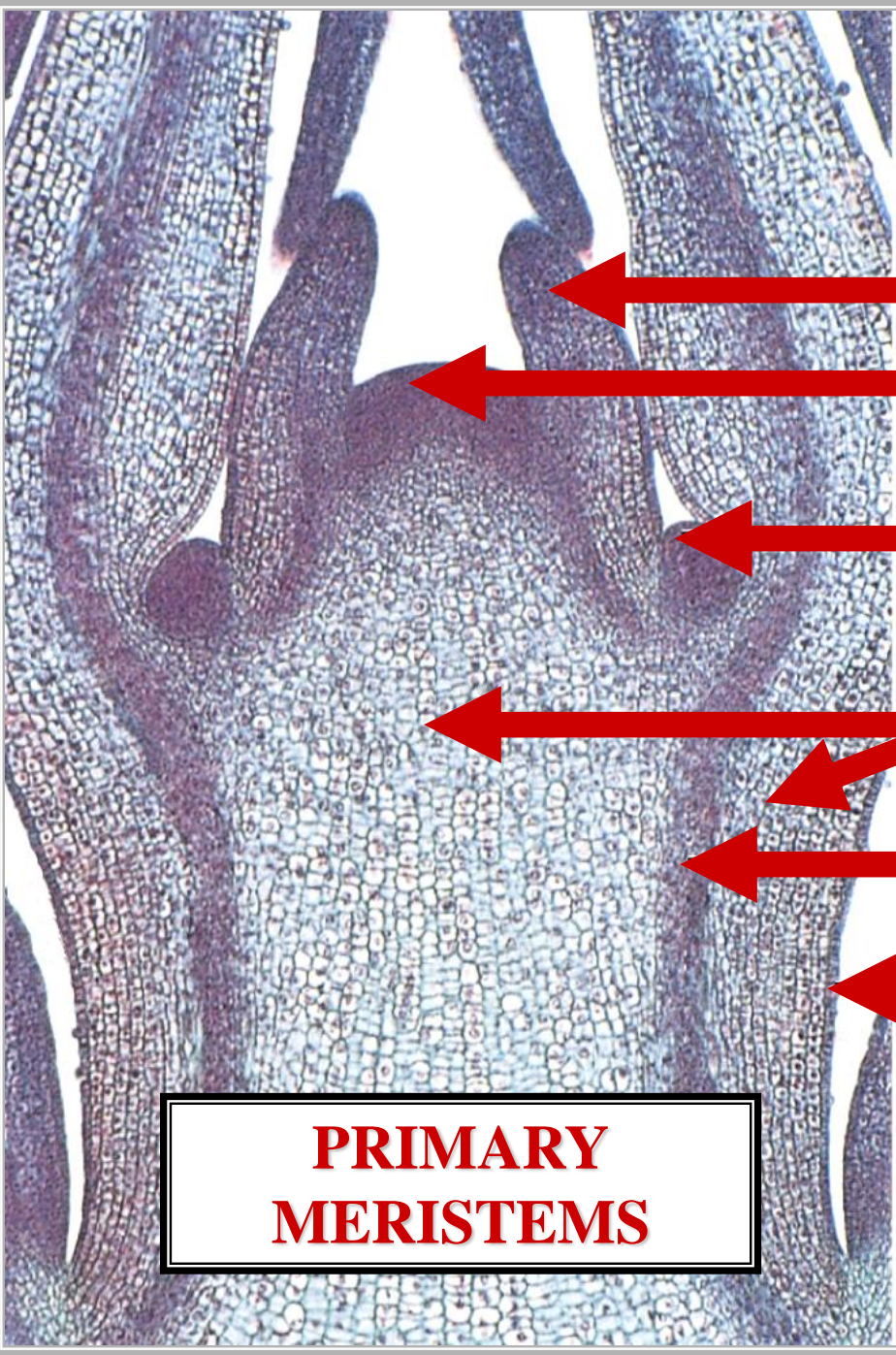
**INITIAL  
DIFFERENTIATION  
ZONES**

**PRIMARY  
MERISTEMS**



# PRIMARY MERISTEM ZONES

# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 MERISTEM ZONE**

**~1 MERISTEM ZONE**

**~1 MERISTEM ZONE**

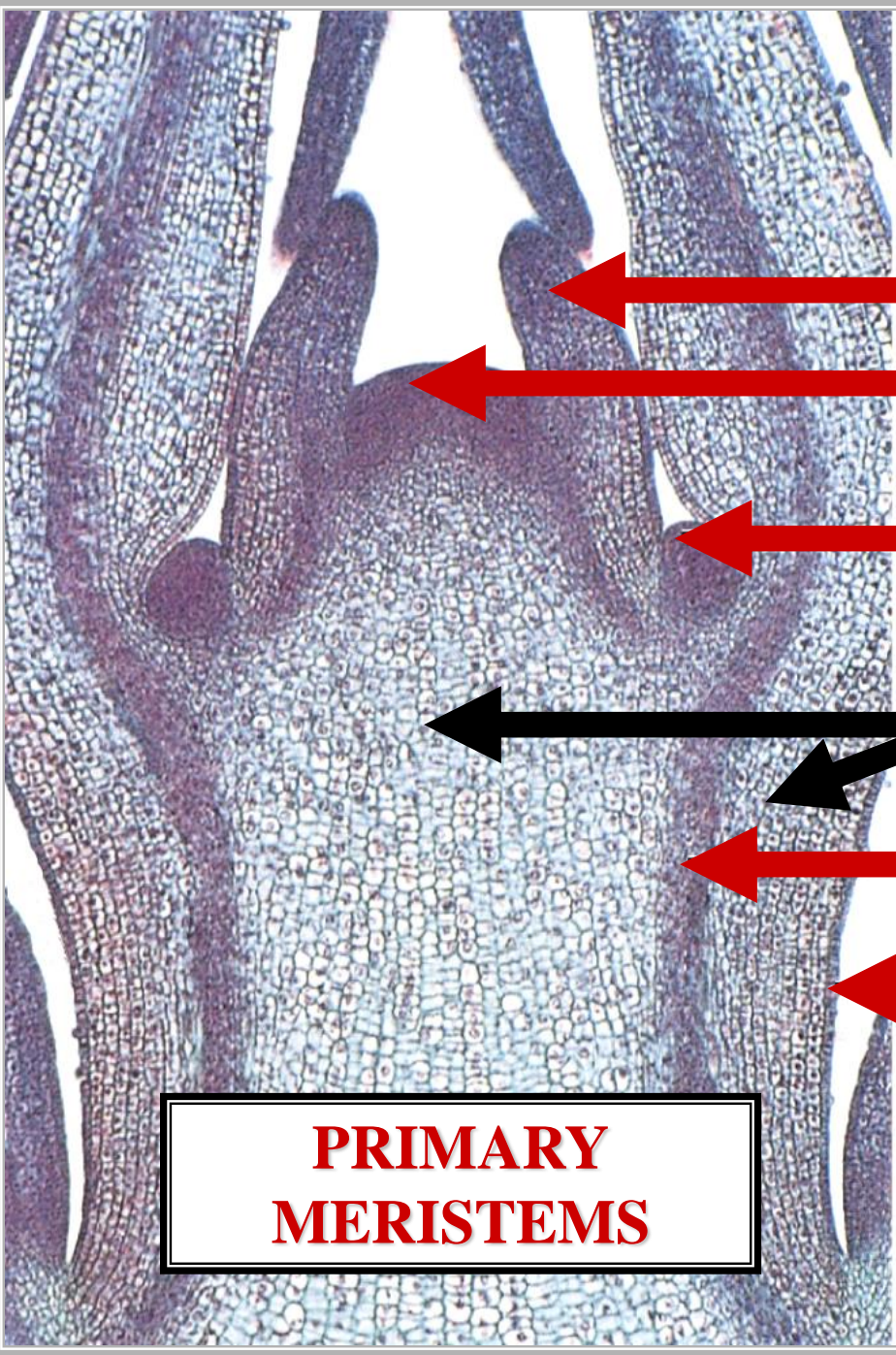
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



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MERISTEM**

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**GROUND ~1 MERISTEM**

**~1 MERISTEM ZONE**

**~1 MERISTEM ZONE**

**PRIMARY  
MERISTEMS**

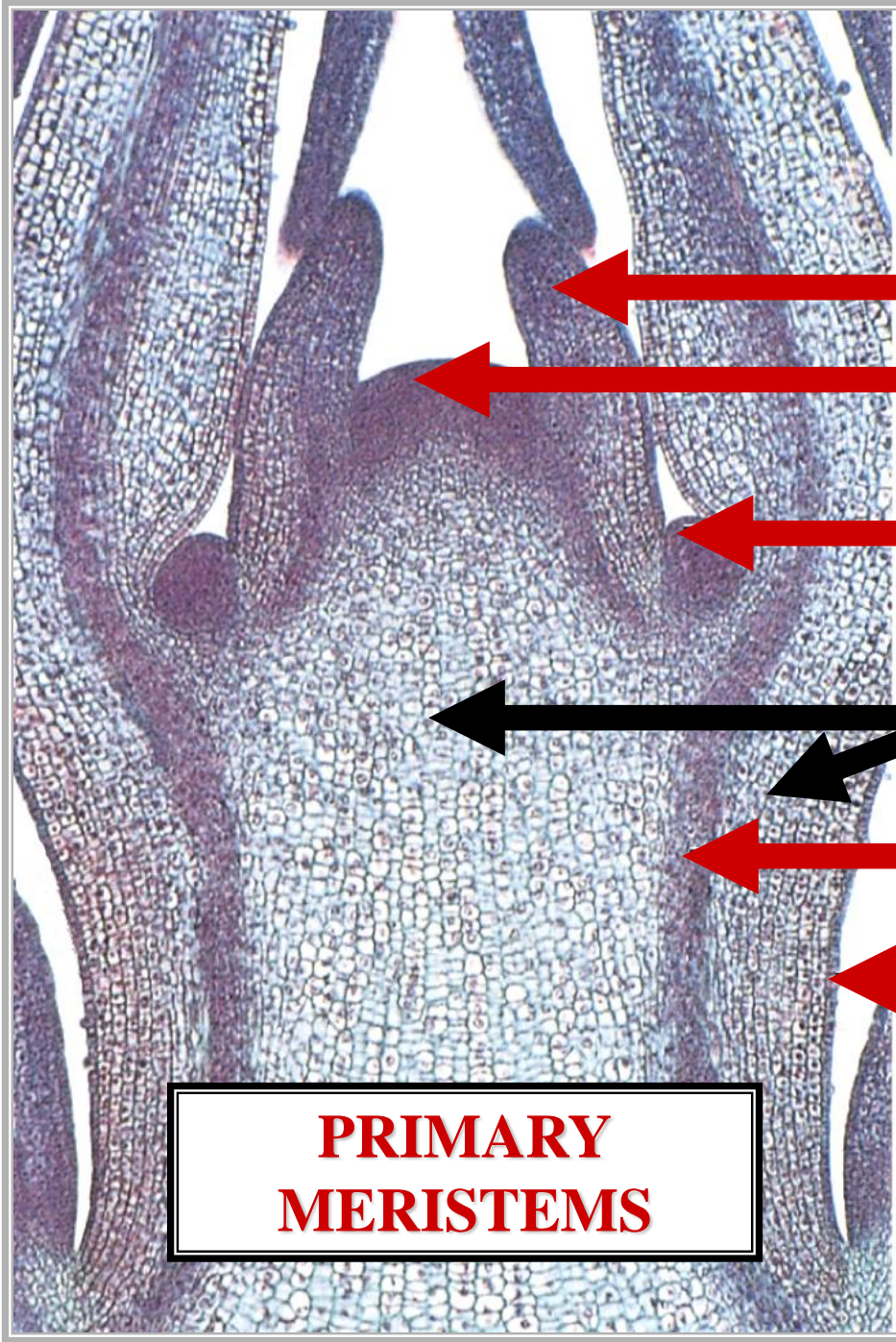
**STEM**

**L.S.**



# ANGIOSPERM P

## PRIMARY MERISTEMS



[ ]

**APICAL  
MERISTEM**

[ ]

**~1 GROUND TISSUE**

**~1 MERISTEM ZONE**

**~1 MERISTEM ZONE**

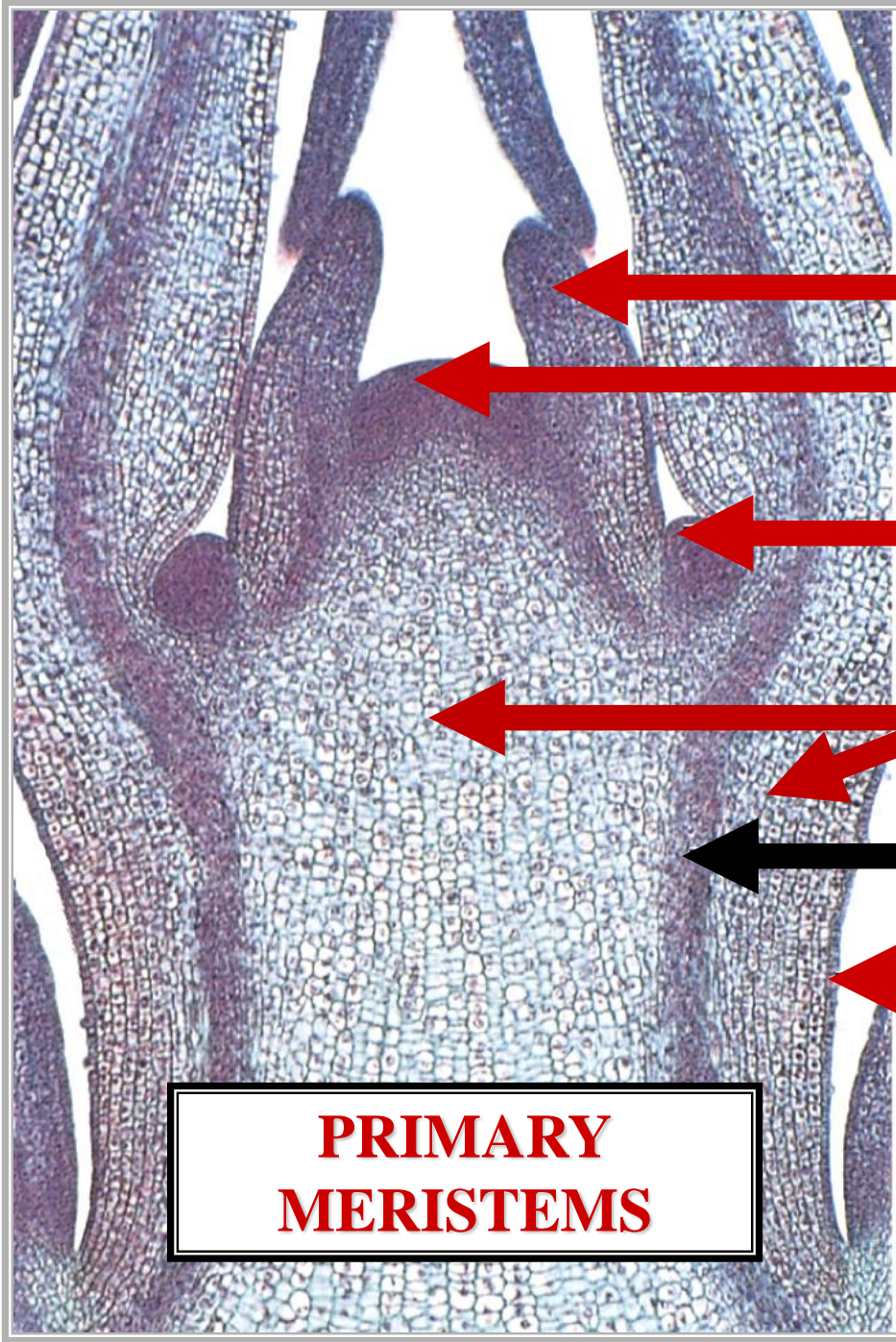
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 GROUND TISSUE**

**PROCAMBIUM ~1 MERISTEM**

**~1 MERISTEM ZONE**

**PRIMARY  
MERISTEMS**

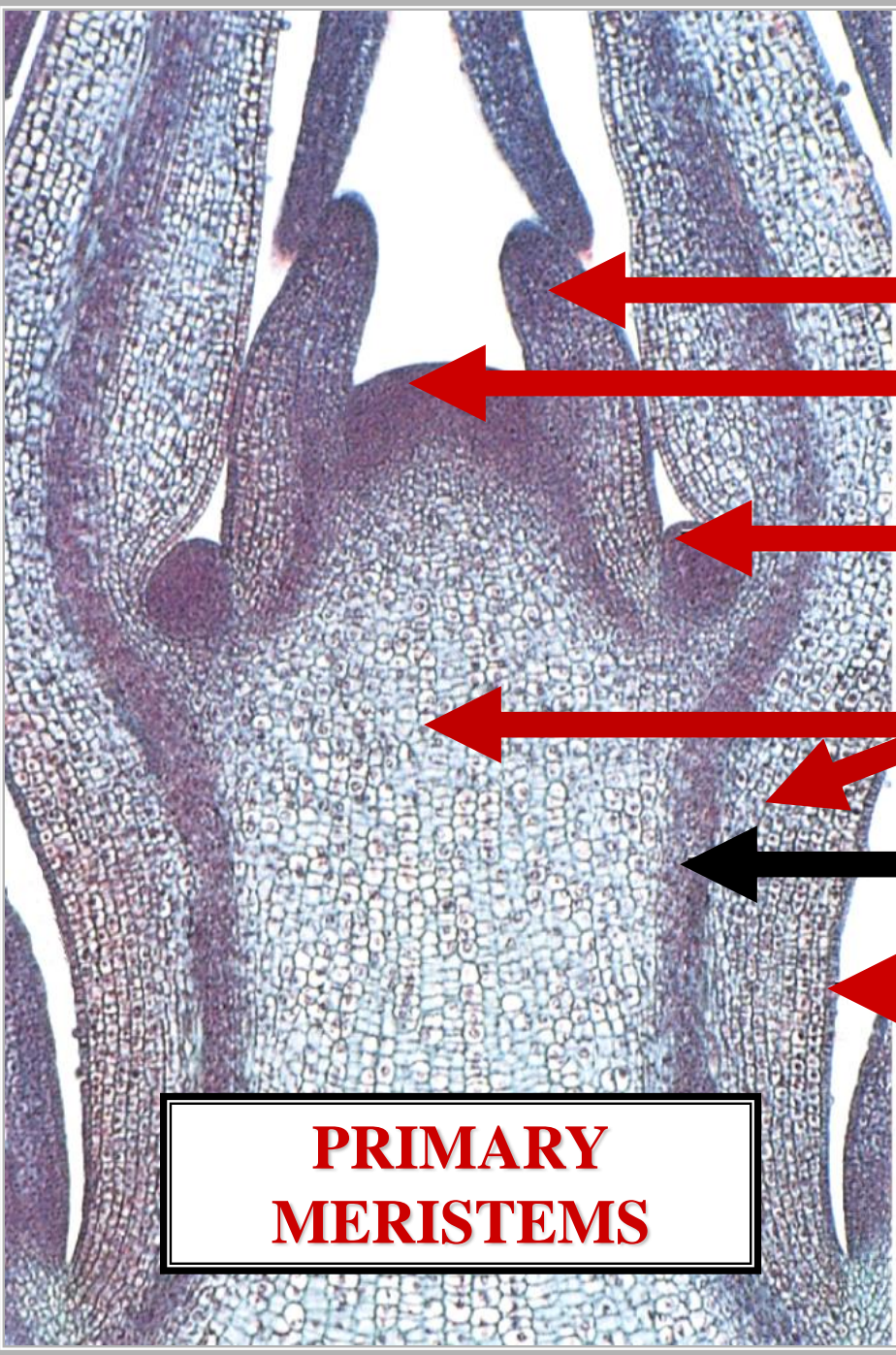
**STEM**

**L.S.**



# ANGIOSPERM P

## PRIMARY MERISTEMS



[ ]

**APICAL  
MERISTEM**

[ ]

**~1 GROUND TISSUE**

**~1 VASCULAR TISSUE**

**~1 MERISTEM ZONE**

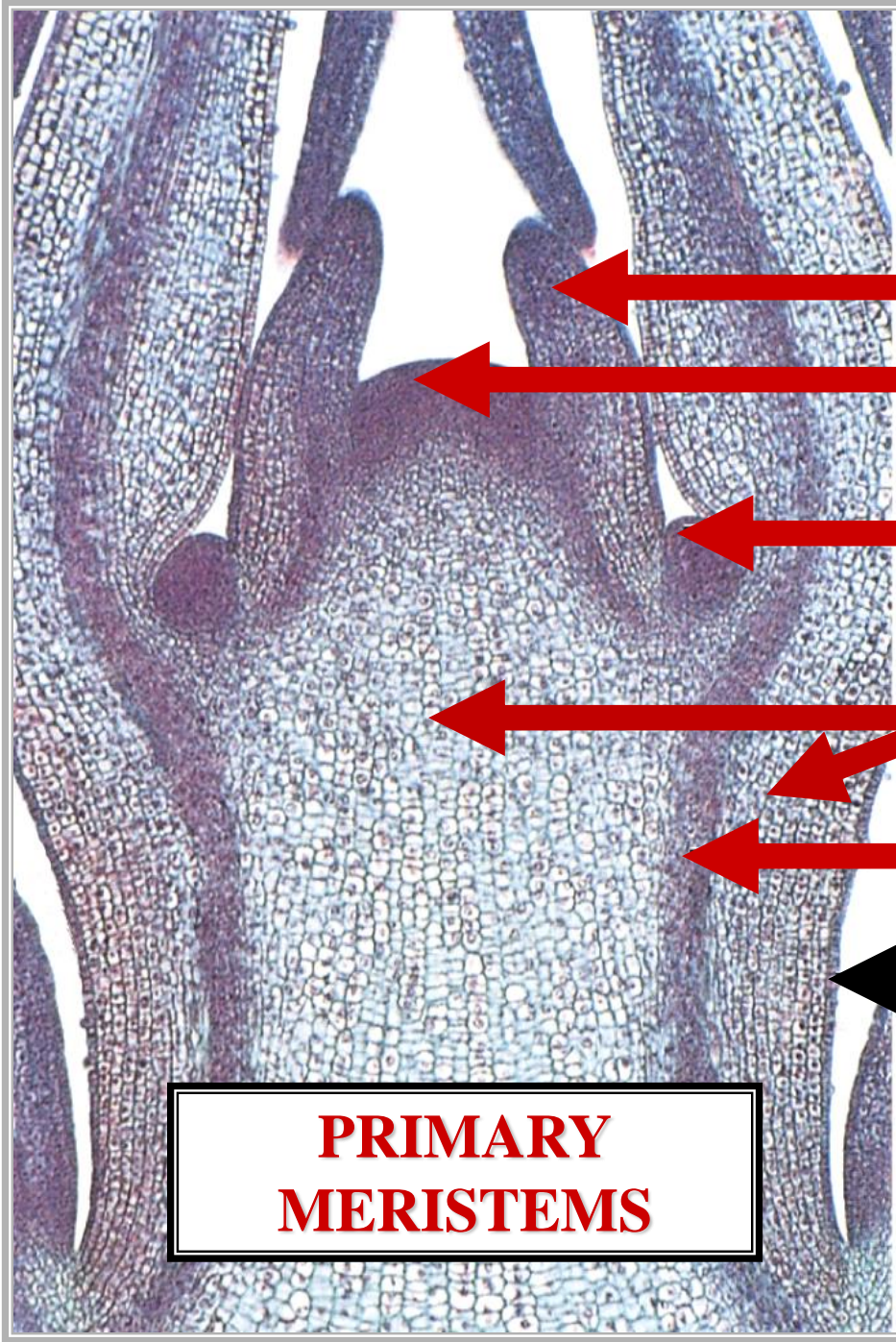
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 GROUND TISSUE**

**~1 VASCULAR TISSUE**

**PROTODERM ~1 MERISTEM**

**PRIMARY  
MERISTEMS**

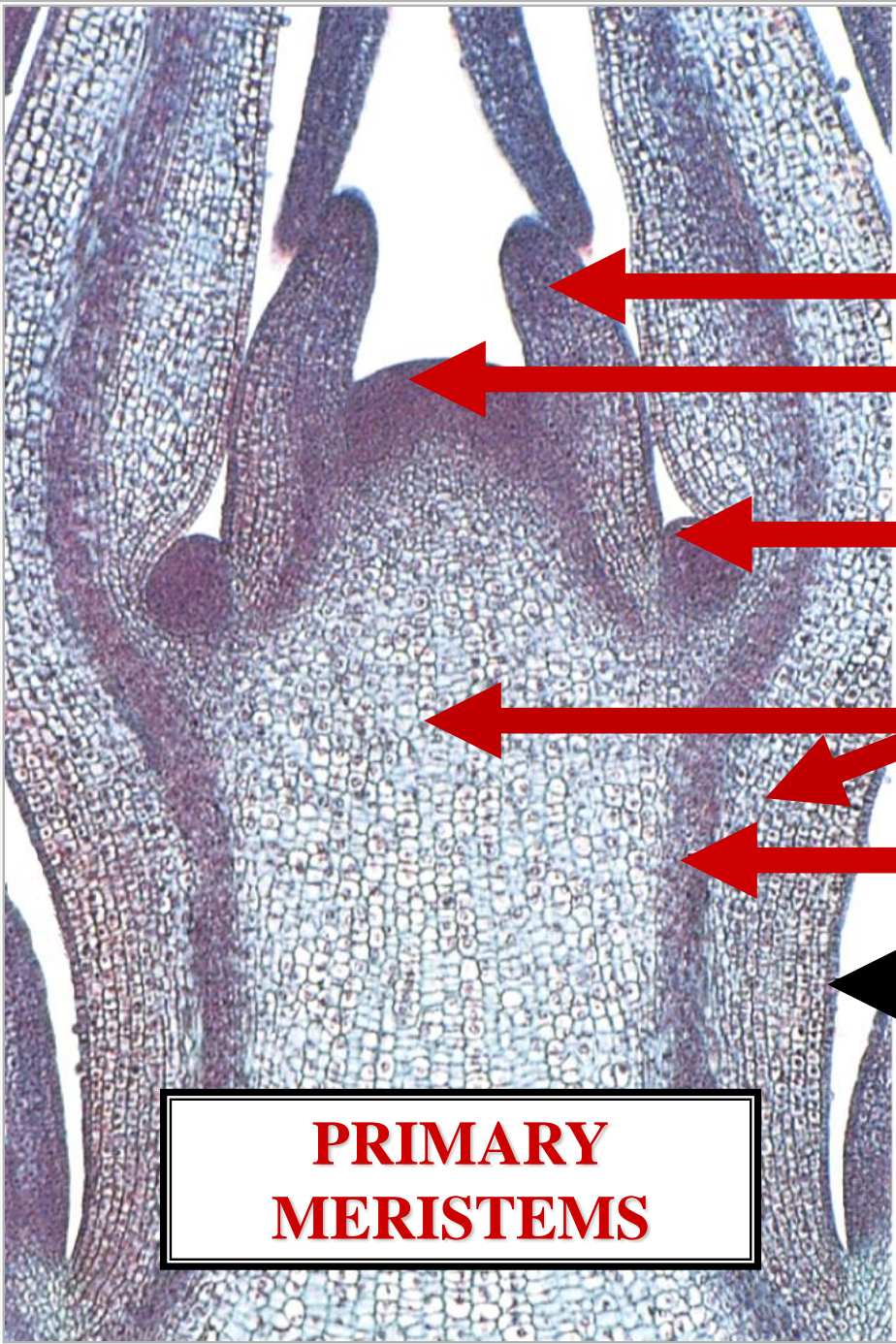
**STEM**

**L.S.**





# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 GROUND TISSUE**

**~1 VASCULAR TISSUE**

**~1 DERMAL TISSUE**

**PRIMARY  
MERISTEMS**

**STEM**

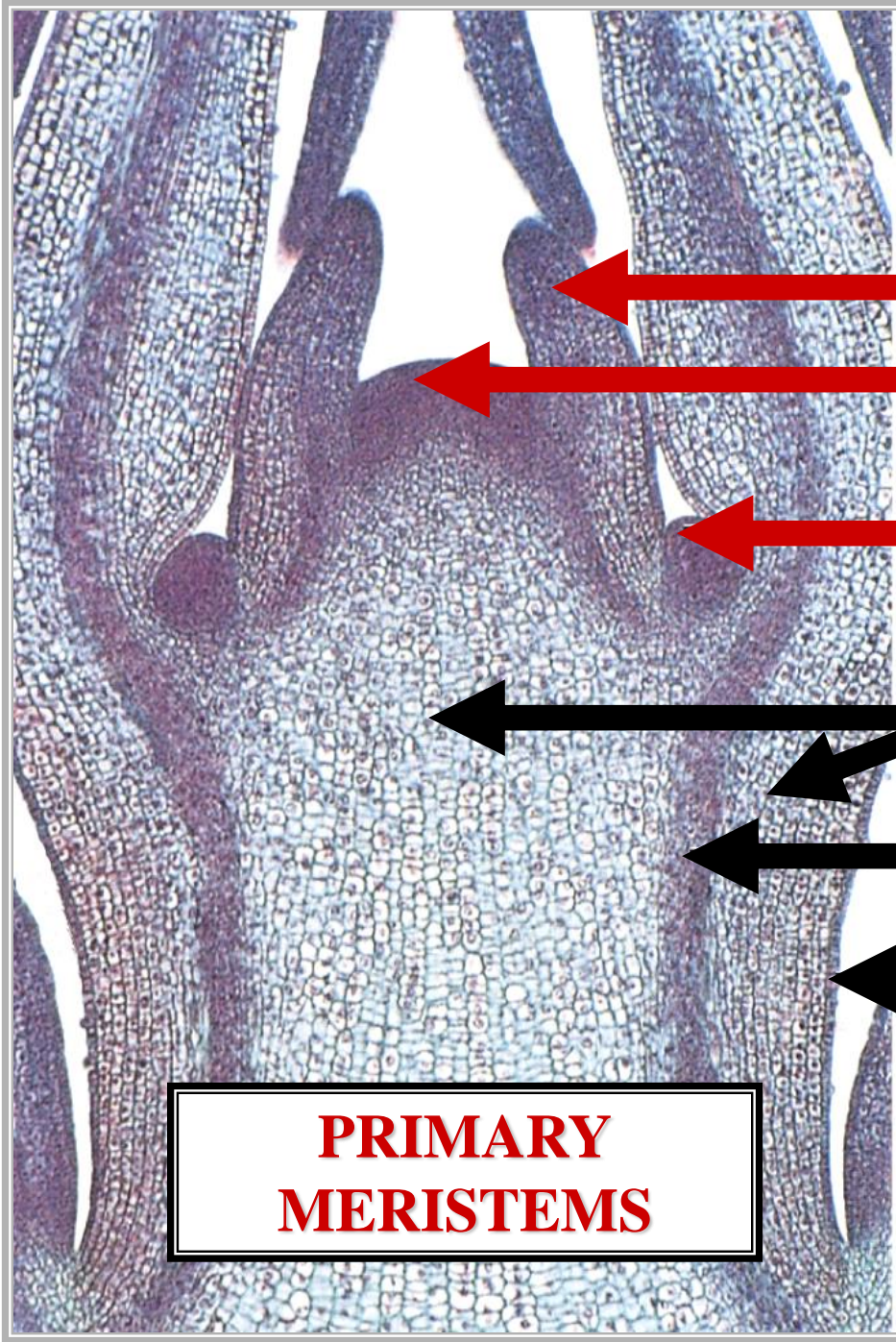
**L.S.**





# PRIMARY MERISTEMS SUMMARY

# ANGIOSPERM PRIMARY MERISTEMS



[ ]

**APICAL  
MERISTEM**

[ ]

**~1 MERISTEM**

**~1 MERISTEM**

**~1 MERISTEM**

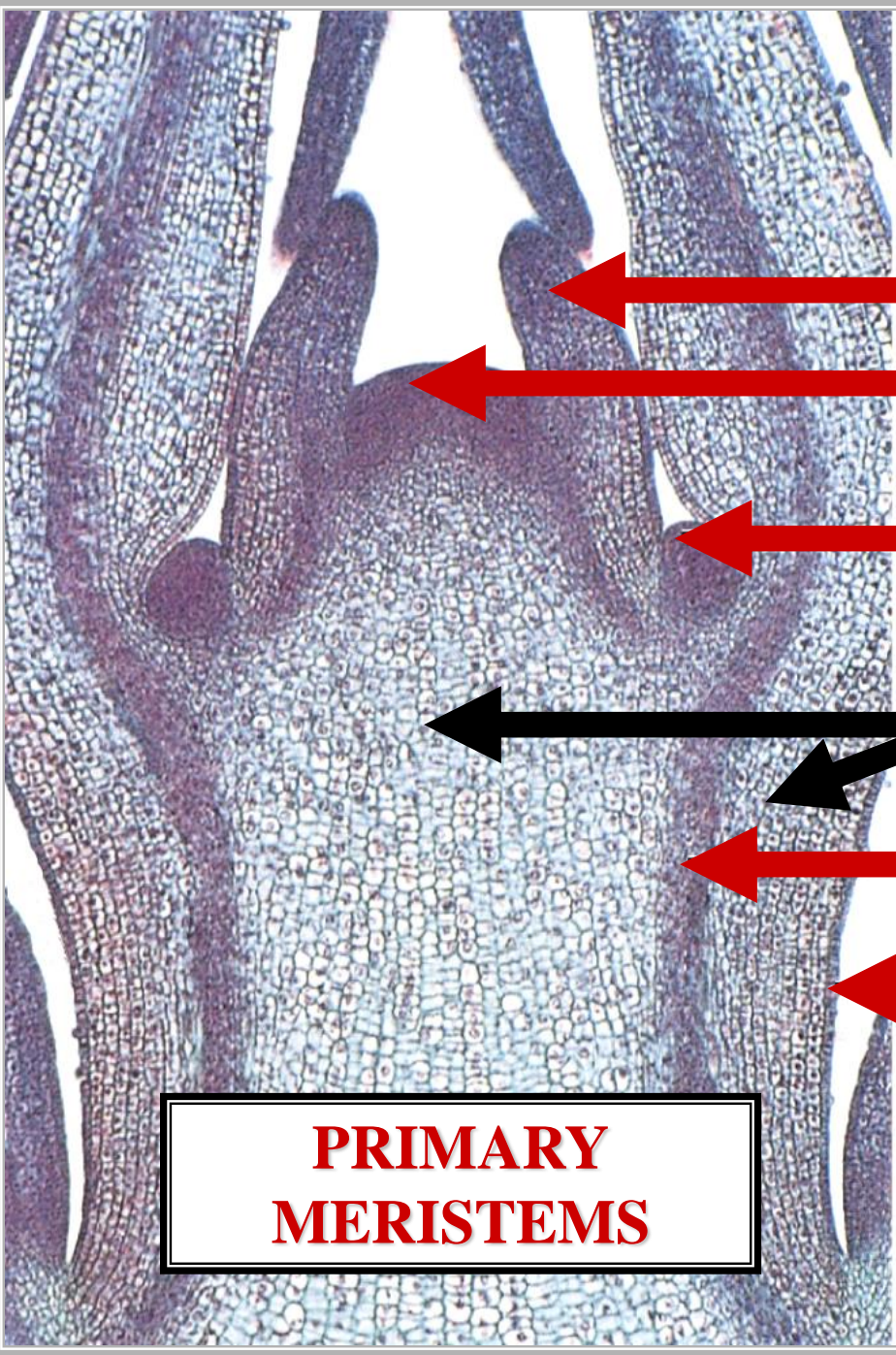
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**GROUND ~1 MERISTEM**

**~1 MERISTEM**

**~1 MERISTEM**

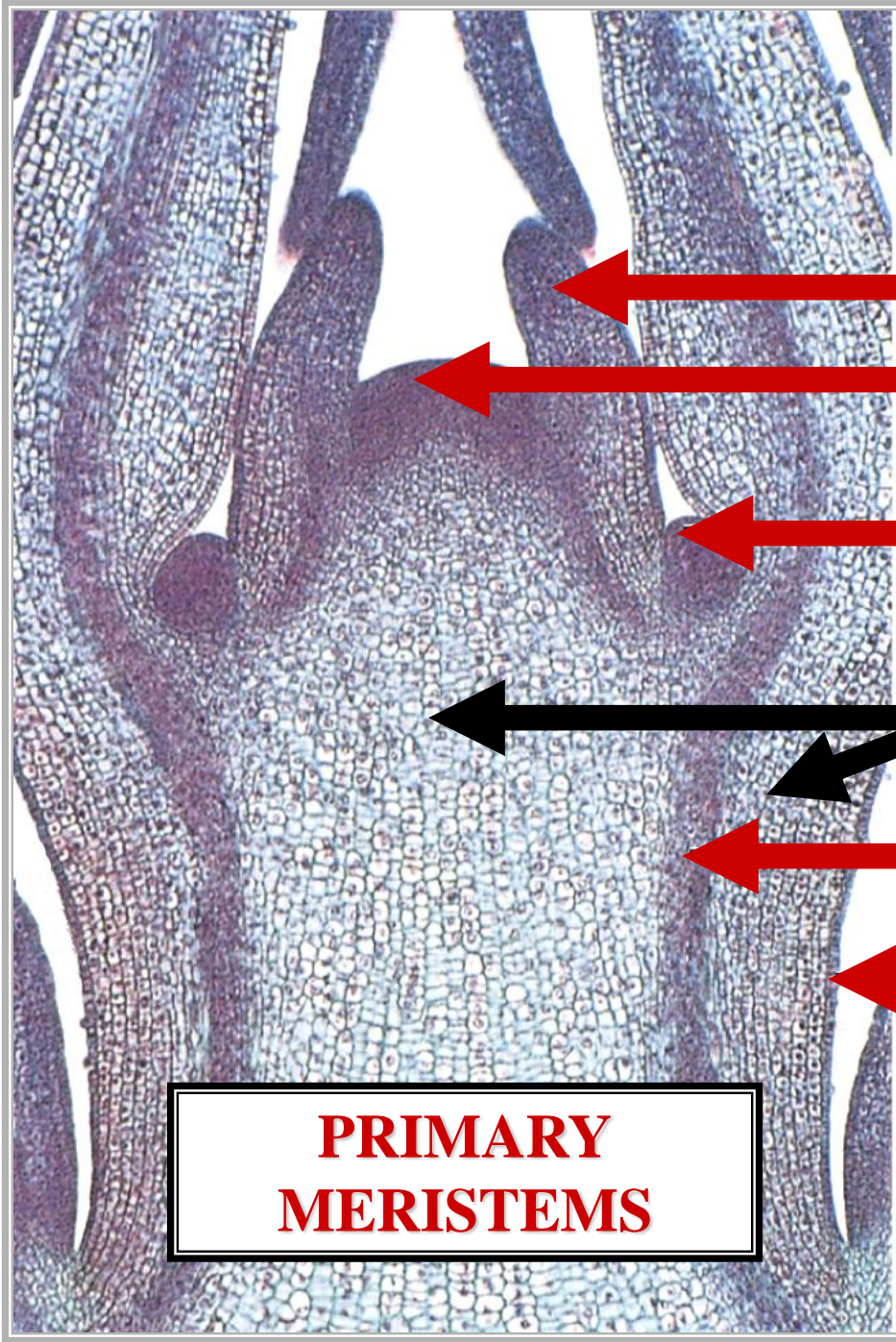
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



[ ]

**APICAL  
MERISTEM**

[ ]

**~1 GROUND TISSUE**

**~1 MERISTEM**

**~1 MERISTEM**

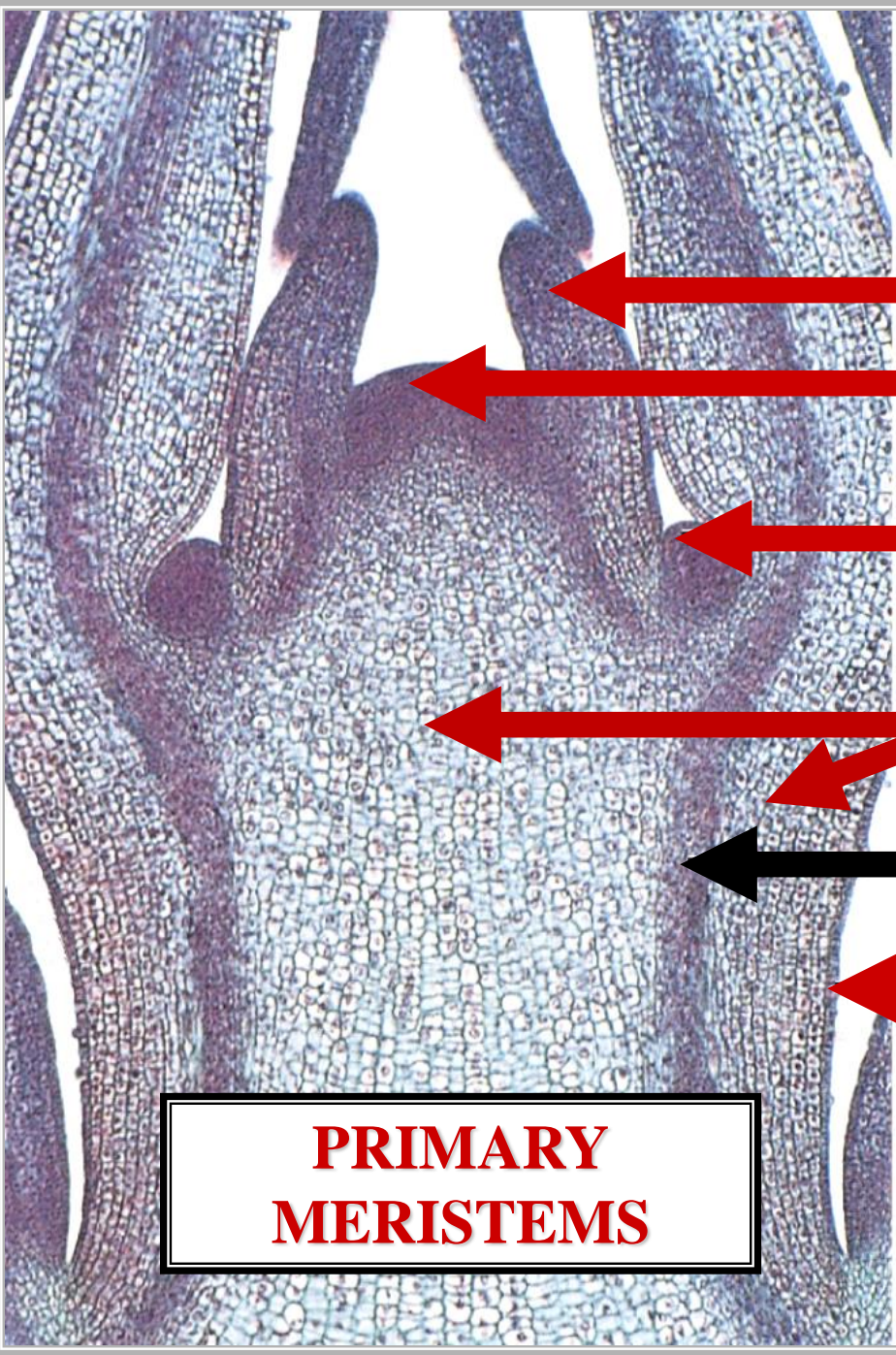
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 GROUND TISSUE**

**PROCAMBIUM ~1 MERISTEM**

**~1 MERISTEM**

**PRIMARY  
MERISTEMS**

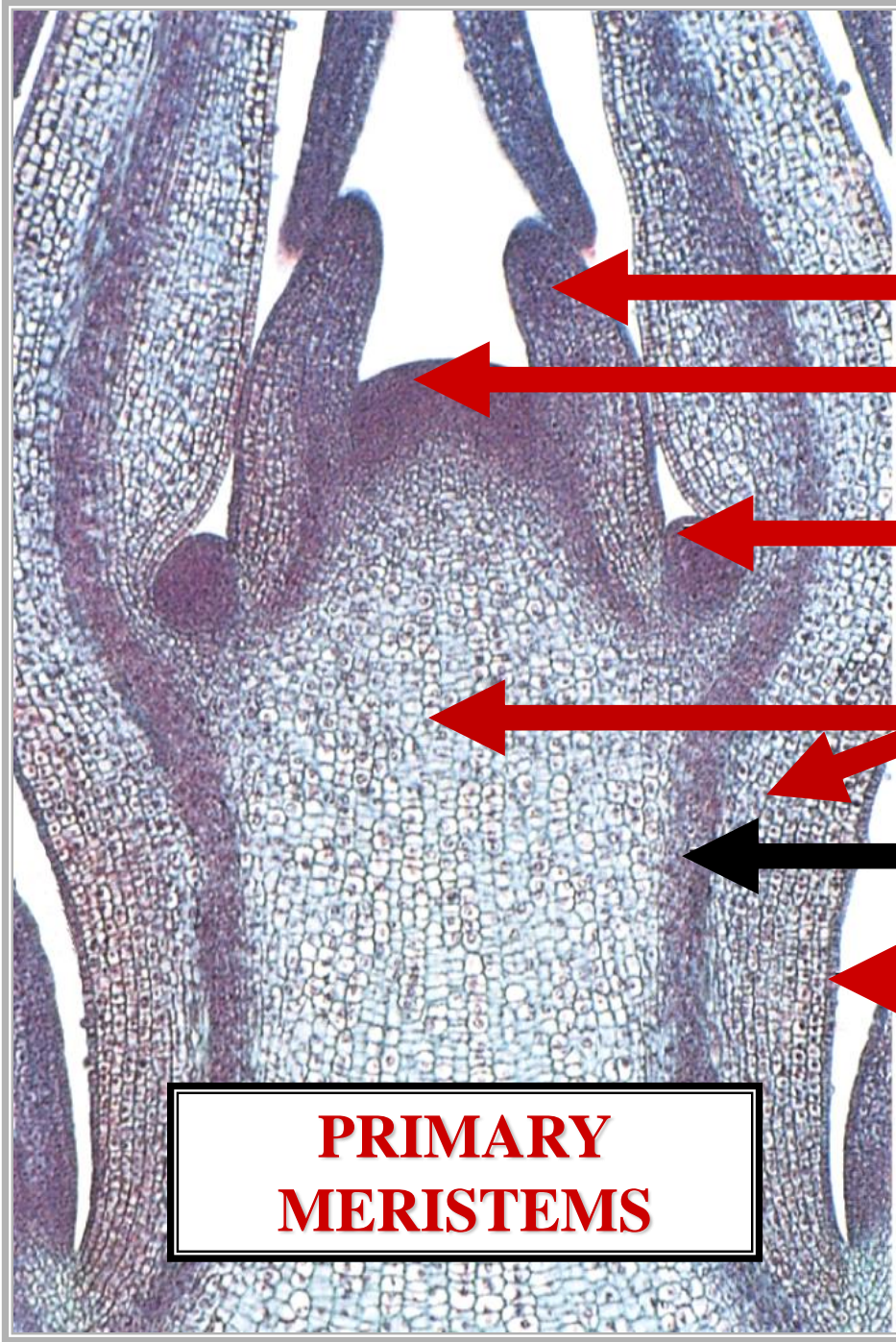
**STEM**

**L.S.**



# ANGIOSPERM P

## PRIMARY MERISTEMS



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**APICAL  
MERISTEM**

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**~1 GROUND TISSUE**

**~1 VASCULAR TISSUE**

**~1 MERISTEM**

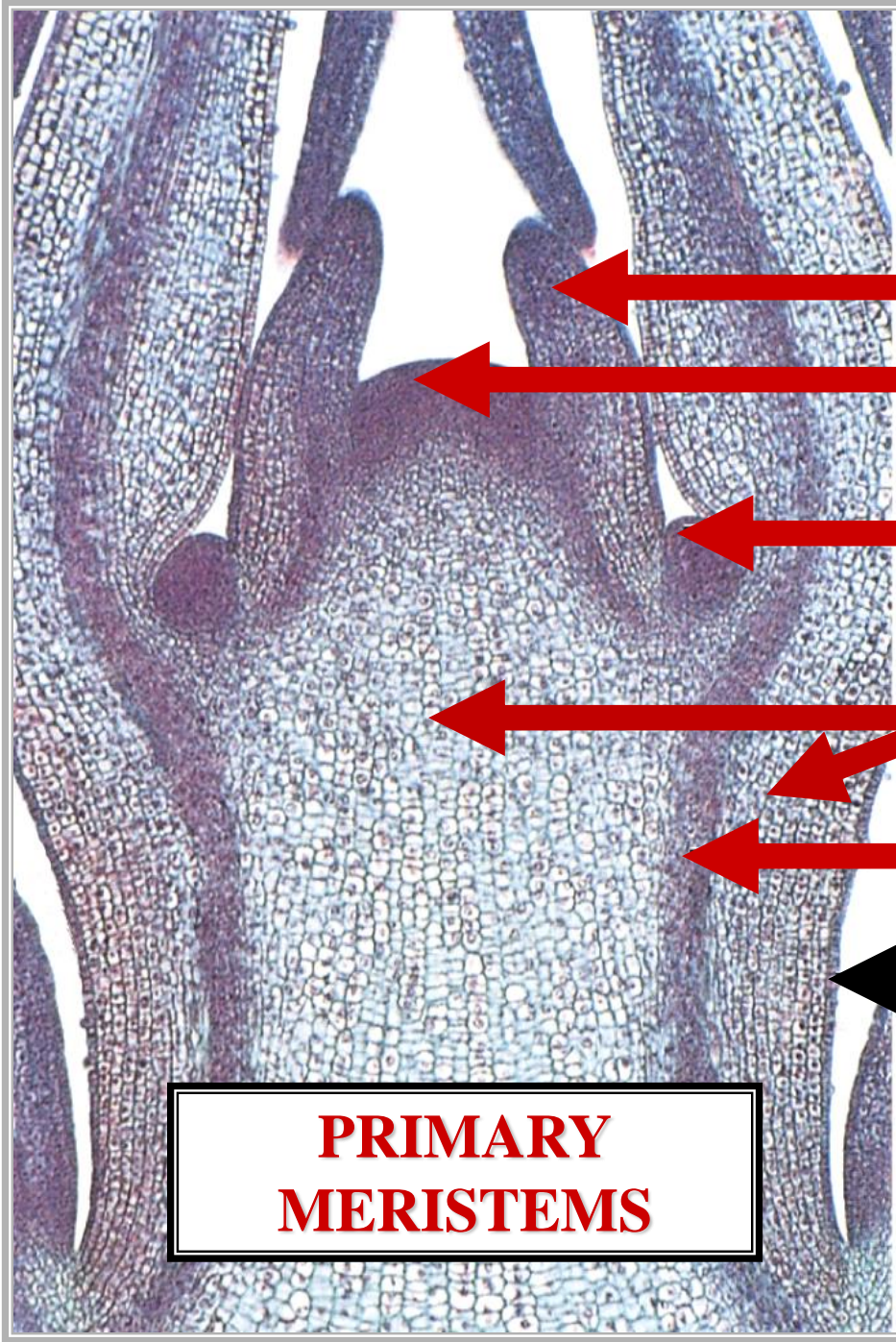
**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**



# ANGIOSPERM PRIMARY MERISTEMS



[Empty box]

**APICAL  
MERISTEM**

[Empty box]

**~1 GROUND TISSUE**

**~1 VASCULAR TISSUE**

**PROTODERM ~1 MERISTEM**

**PRIMARY  
MERISTEMS**

**STEM**

**L.S.**