



WOODY STEM STRUCTURAL SUPPORT



STEM

C.S.



STEM

L.S.

TRACHIED FIBERS

LIBRIFORM FIBERS

STRUCTURAL SUPPORT

WOOD FIBERS





SCLEREIDS

SV

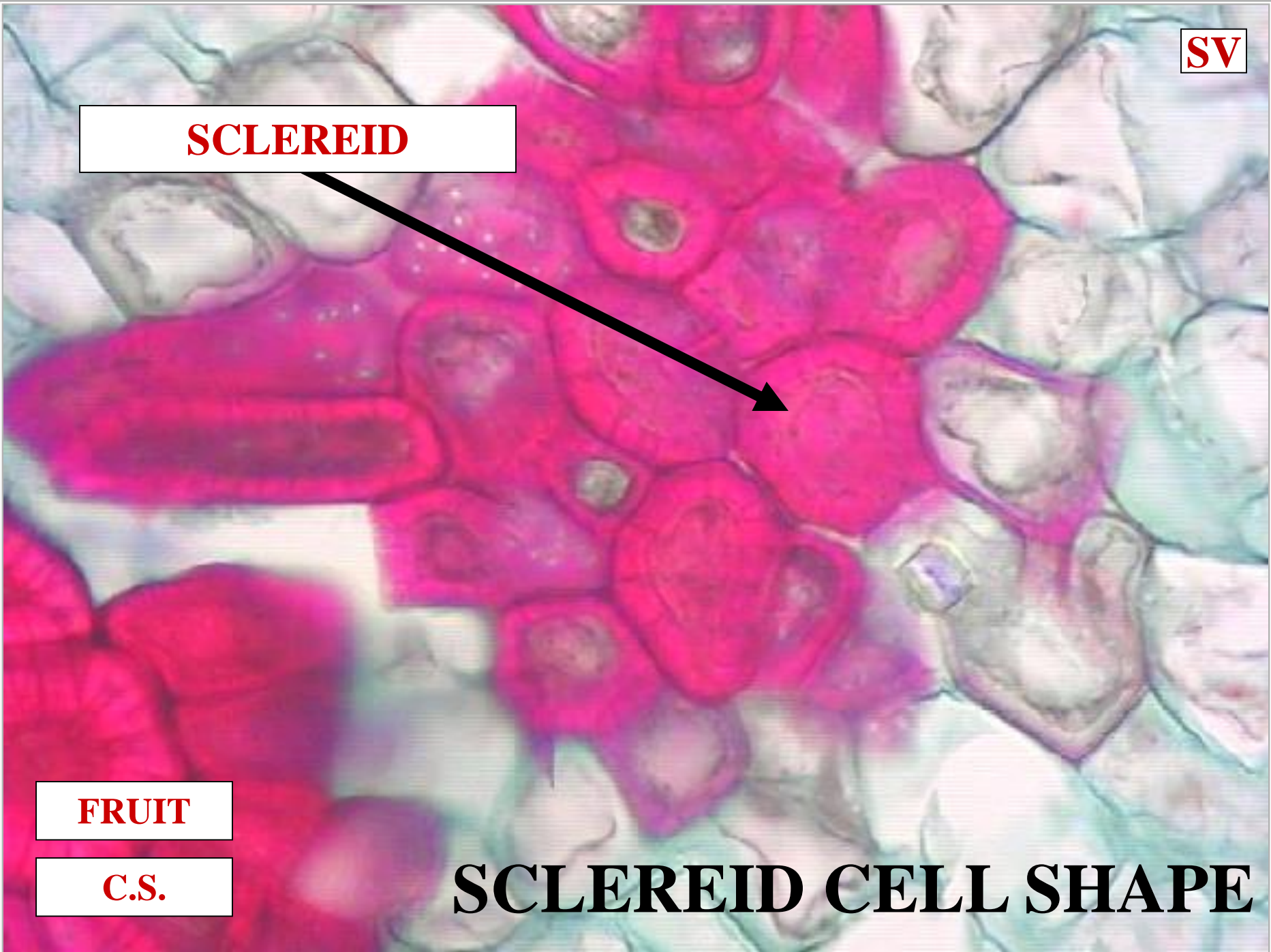
SCLEREID



FRUIT

C.S.

SCLEREID CELL SHAPE



SH

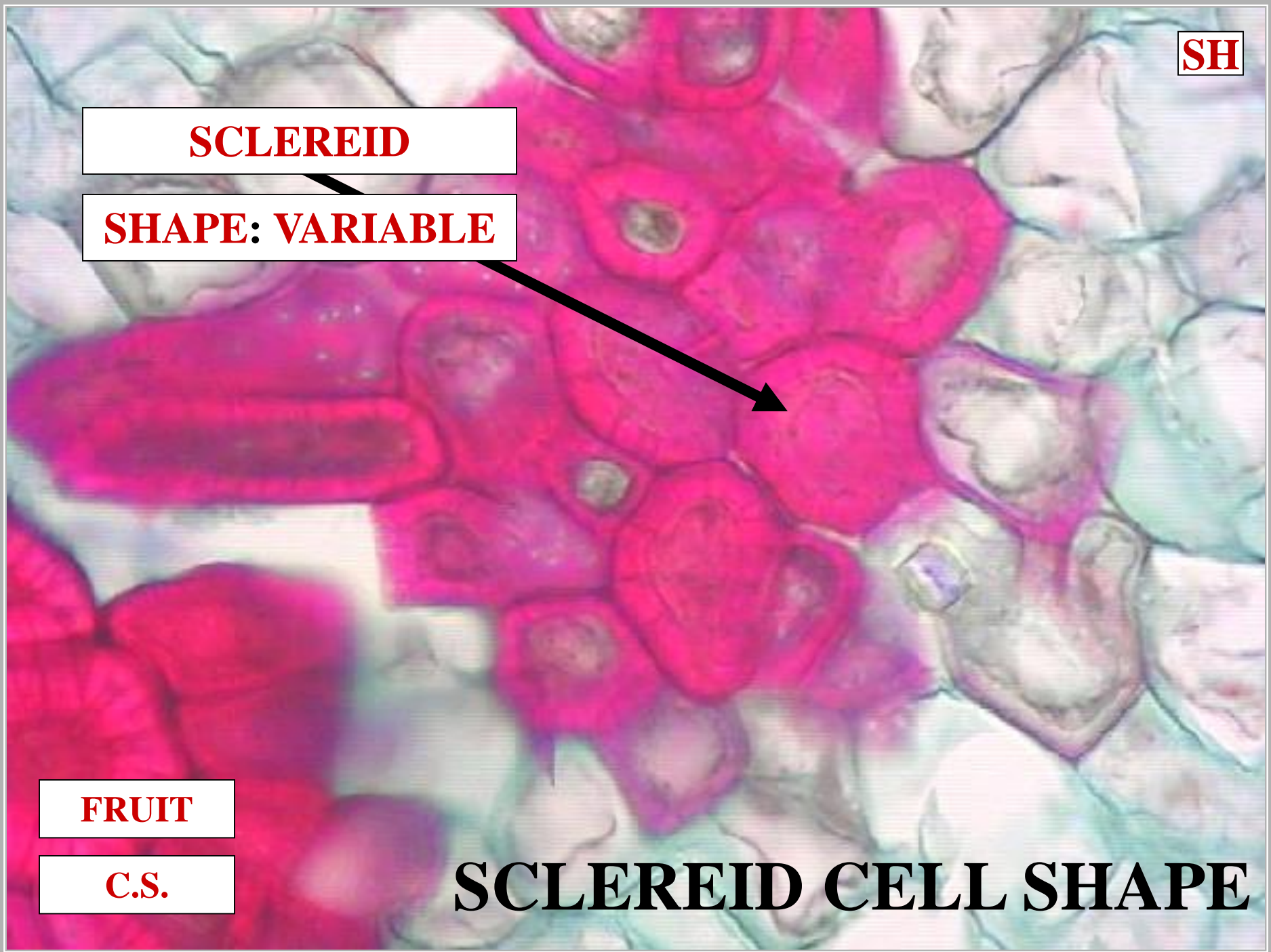
SCLEREID

SHAPE: VARIABLE

FRUIT

C.S.

SCLEREID CELL SHAPE



A micrograph showing a cross-section of a fruit. The image displays various cell types, including large, elongated cells and smaller, more rounded cells. A prominent feature is a cluster of cells with thick, dark, lignified cell walls, characteristic of sclereids. These cells are stained a deep magenta color. The surrounding cells are stained a lighter, pale greenish-blue. A black arrow points from a text box to one of the sclereid cells.

SCLEREID

SHAPE: VARIABLE

SHORTER THAN FIBERS

FRUIT

C.S.

SCLEREID CELL SHAPE

SCLEREID CELL TYPES

SCLEREID CELL TYPES

BRACHYSCLEREIDS

SCLEREID CELL TYPES

SCLEREID CELL TYPES

BRACHYSCLEREIDS

TRICHOSCLEREIDS

SCLEREID CELL TYPES

SCLEREID CELL TYPES

BRACHYSCLEREIDS

TRICHOSCLEREIDS

ASTROSCLEREIDS

SCLEREID CELL TYPES

BRA CHYSCLEREID

**SCLEREID CELL
BRACHYSCLEREID**

STONE SHAPED

**SCLEREID CELL
BRACHYSCLEREID**

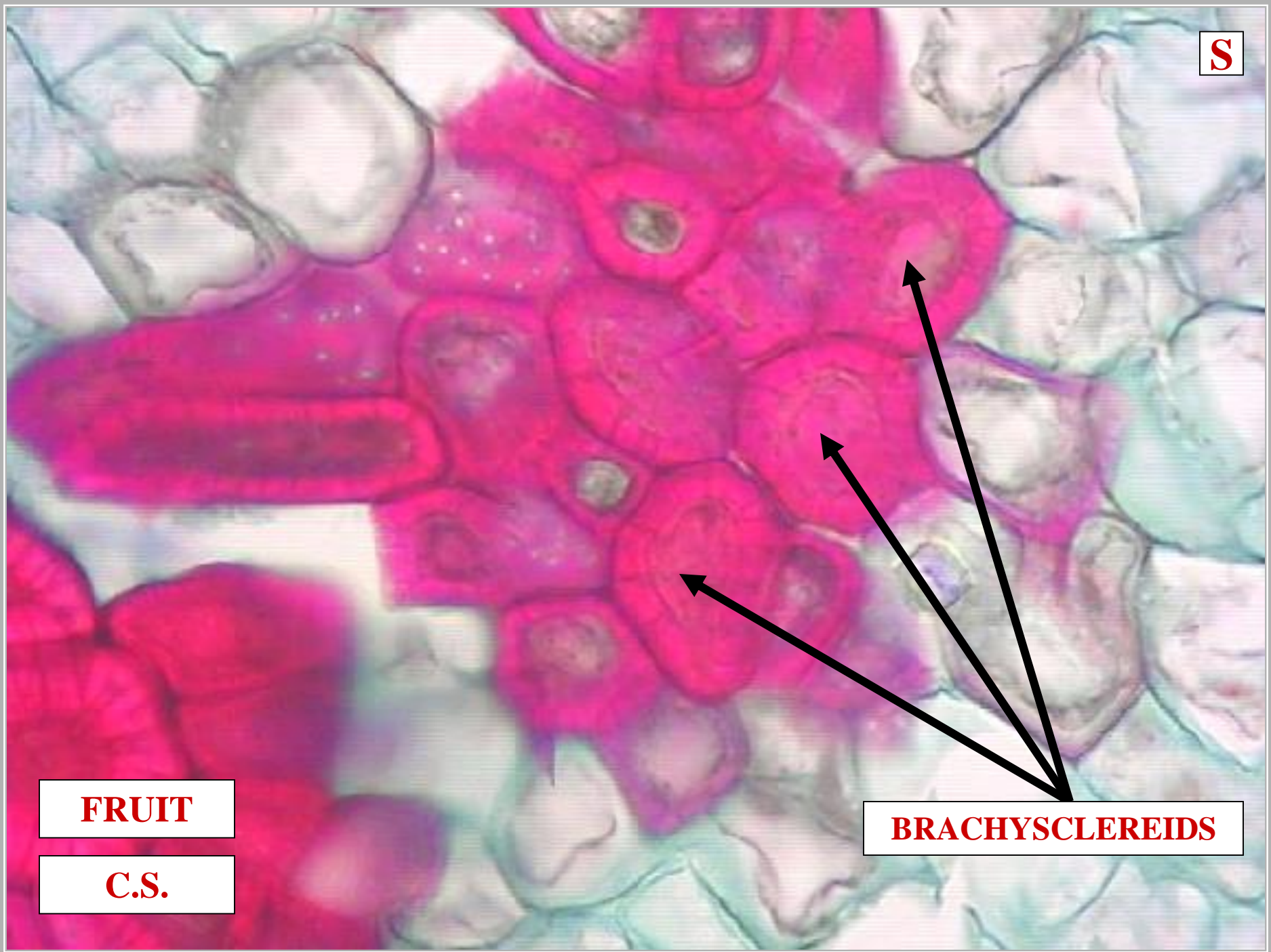


S

FRUIT

C.S.

BRACHYSCLEREIDS



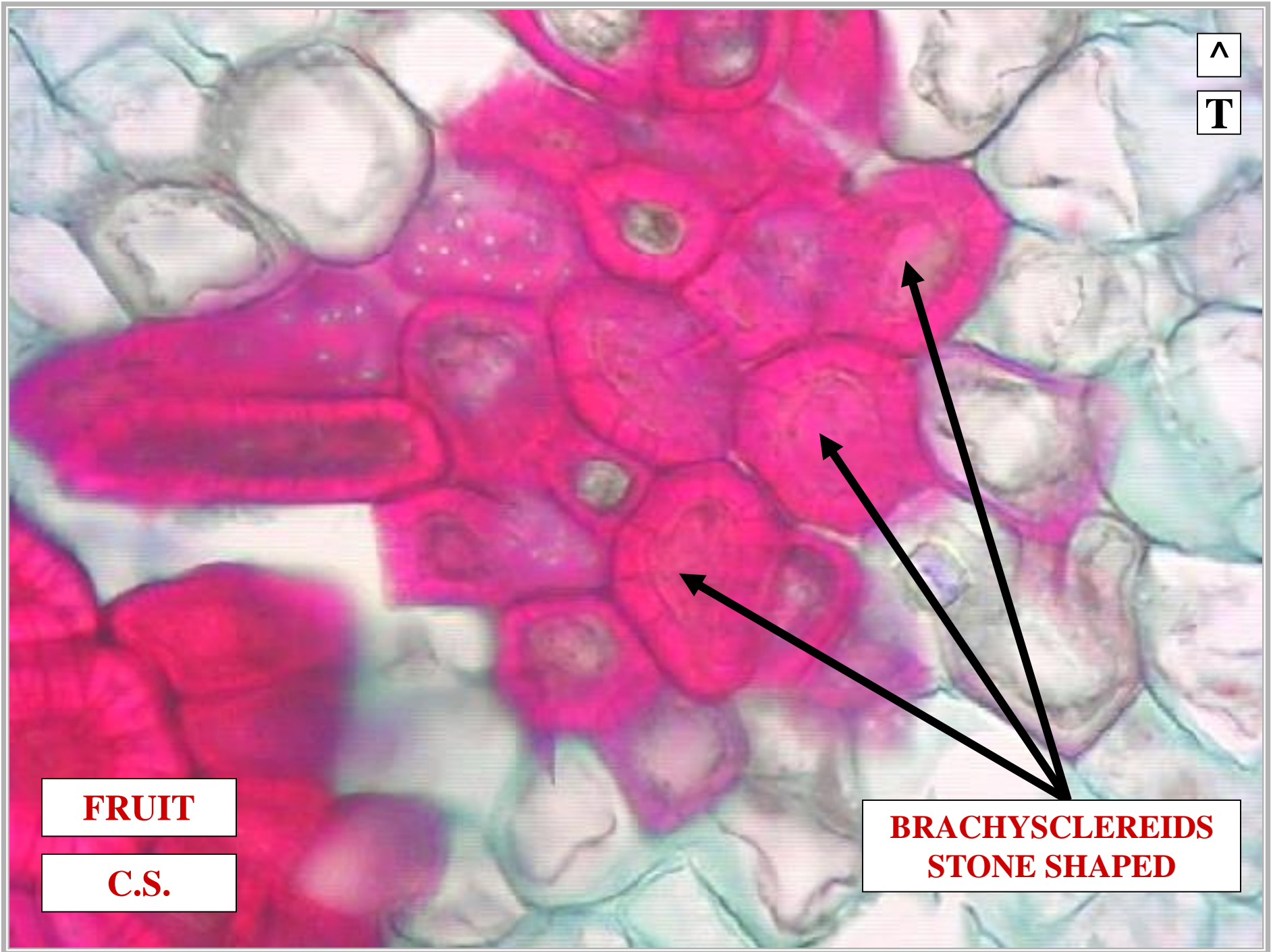
^

T

FRUIT

C.S.

**BRACHYSCLEREIDS
STONE SHAPED**



TRICHOSCLEREID

**SCLEREID CELL
TRICHOSCLEREID**

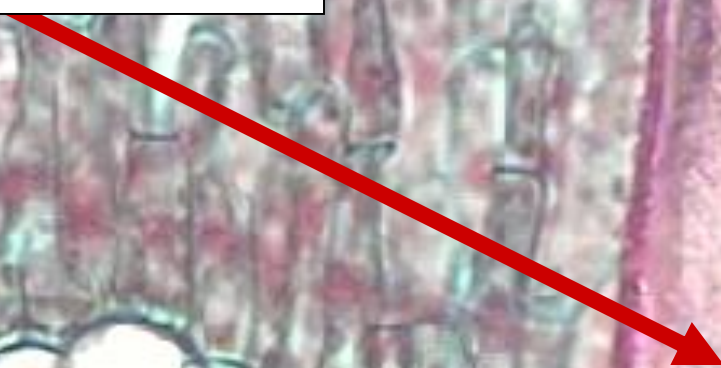


BROAD BRANCHES

**SCLEREID CELL
TRICHOSCLEREID**

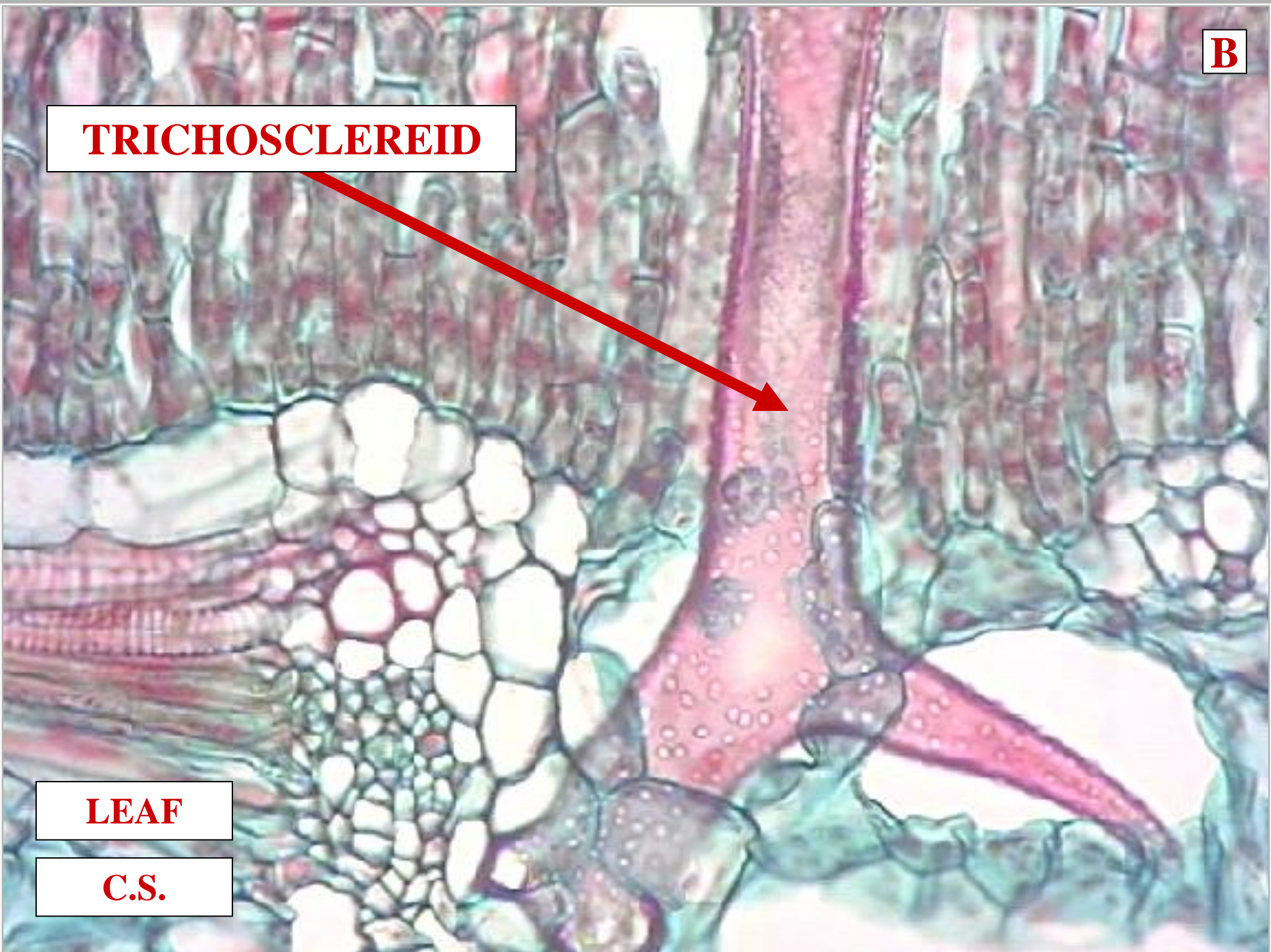
B

TRICHOSCLEREID



LEAF

C.S.



^

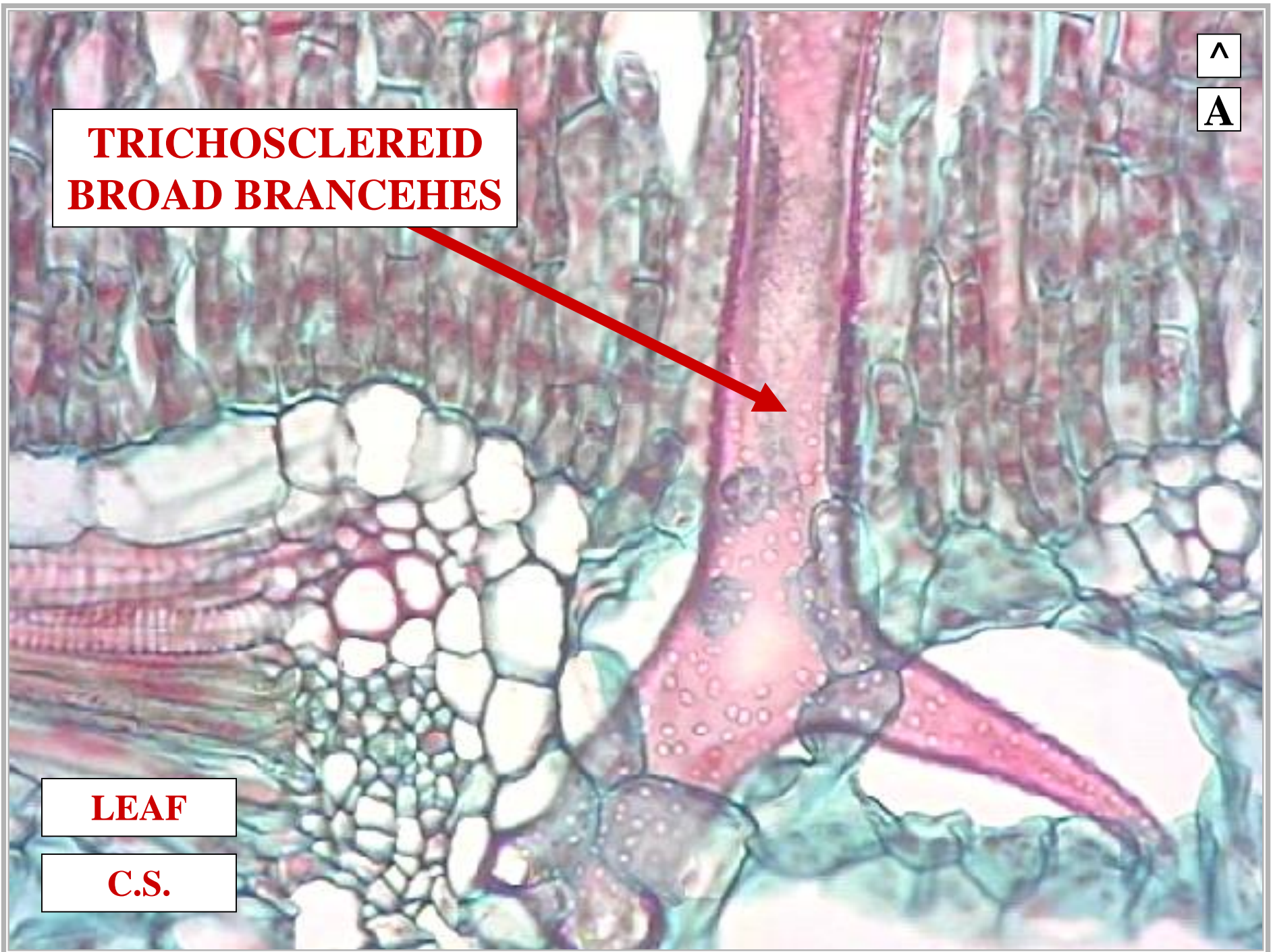
A

**TRICHOSCLEREID
BROAD BRANCEHES**



LEAF

C.S.



ASTROSCLEREID

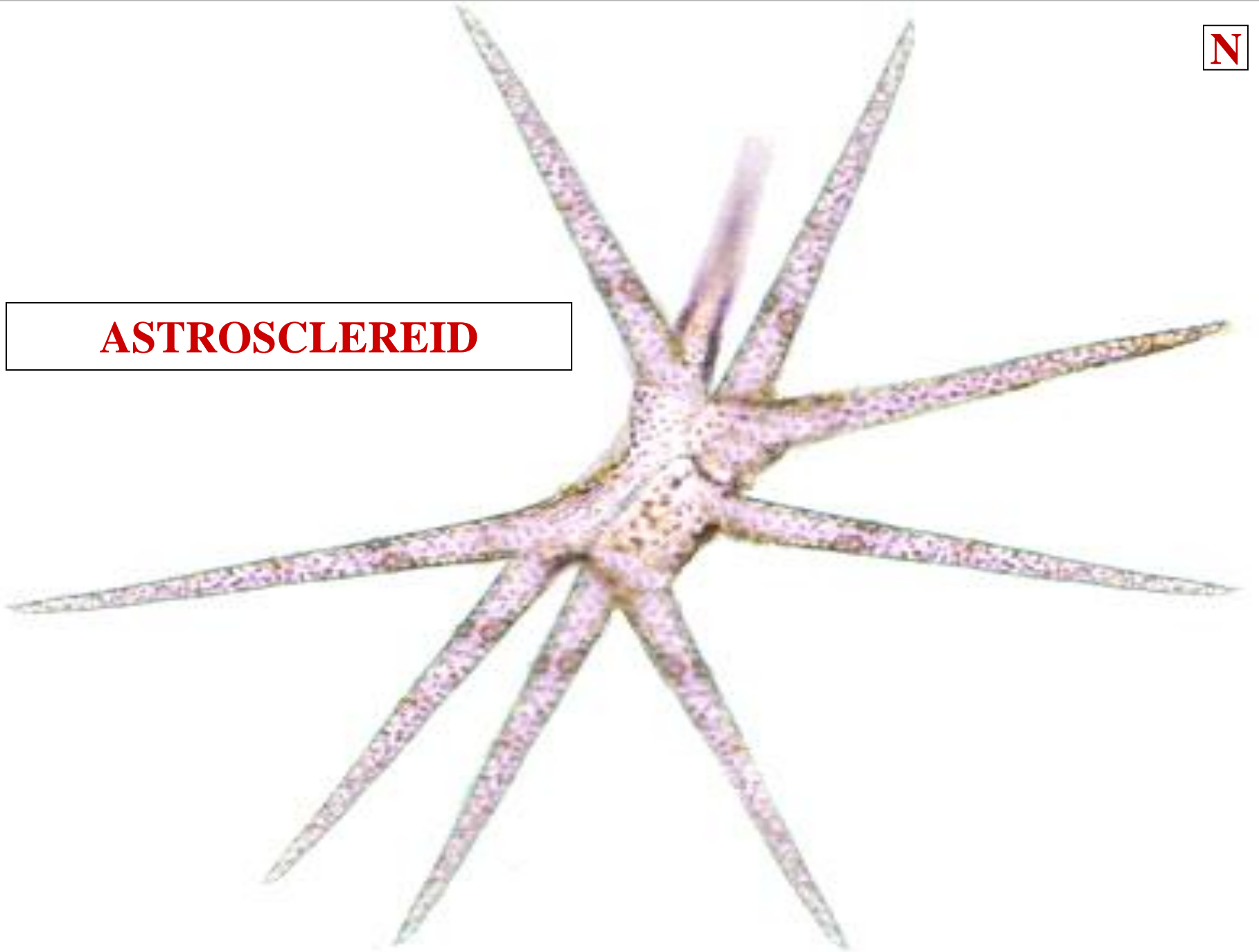
**SCLEREID CELL
ASTROSCLEREID**



NARROW BRANCHES

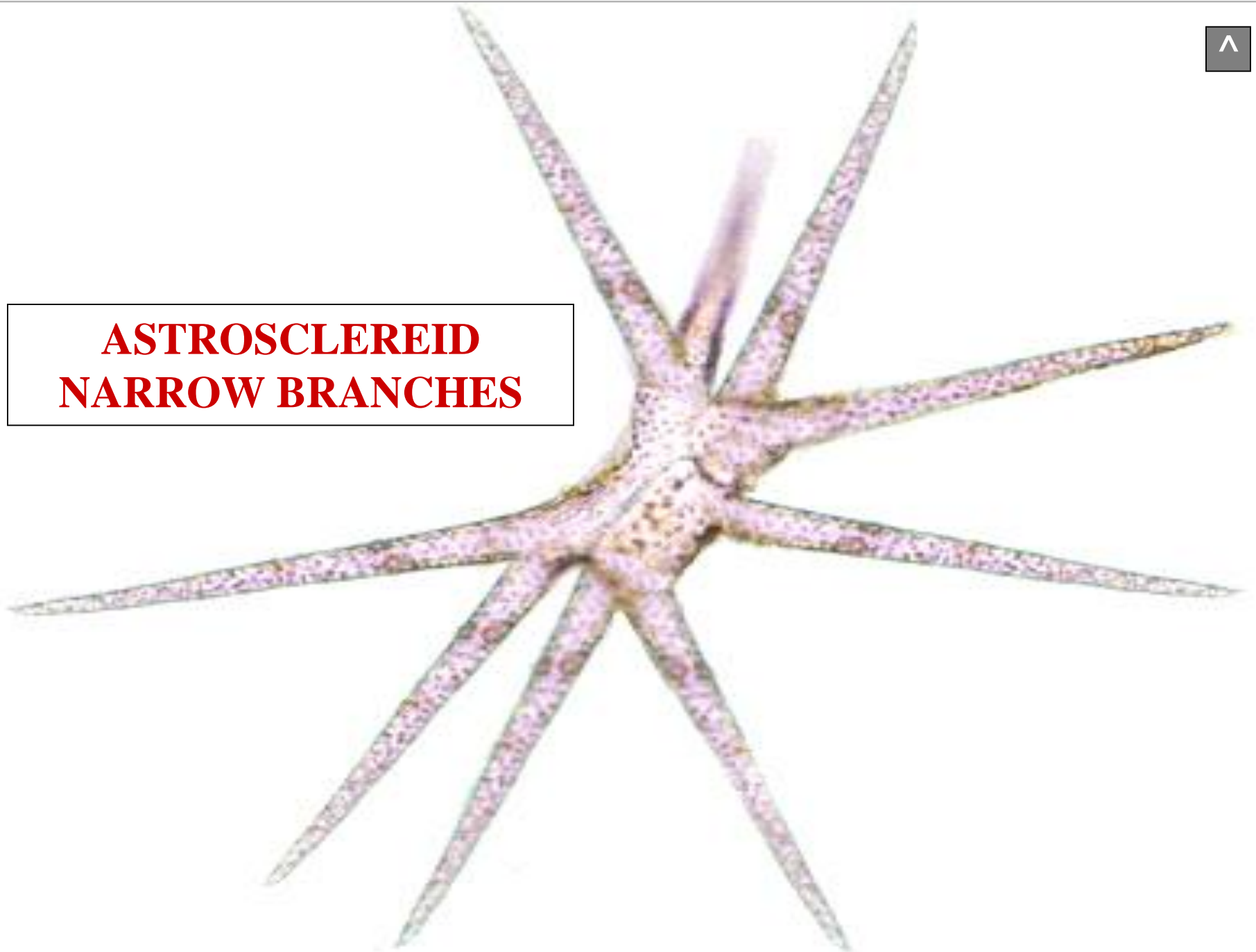
**SCLEREID CELL
ASTROSCLEREID**

ASTROSCLEREID





**ASTROSCLEREID
NARROW BRANCHES**



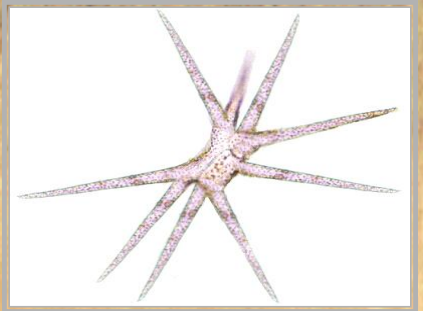


I

SCLEREID FUNCTION

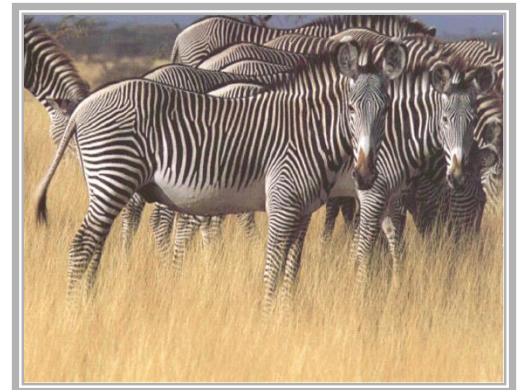
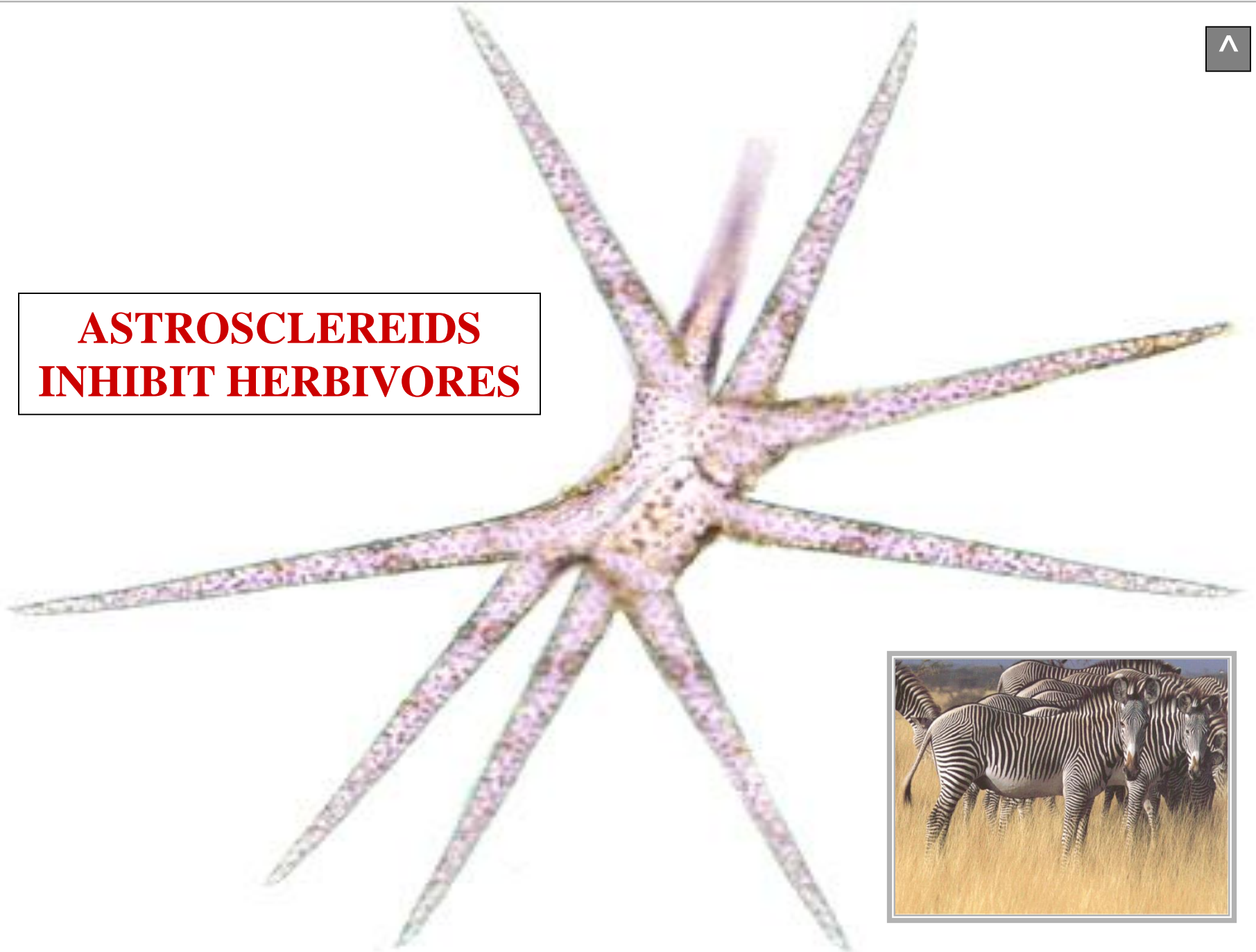


INHIBIT HERBIVORES





**ASTROSCLEREIDS
INHIBIT HERBIVORES**



SCLERENCHYMA TISSUE

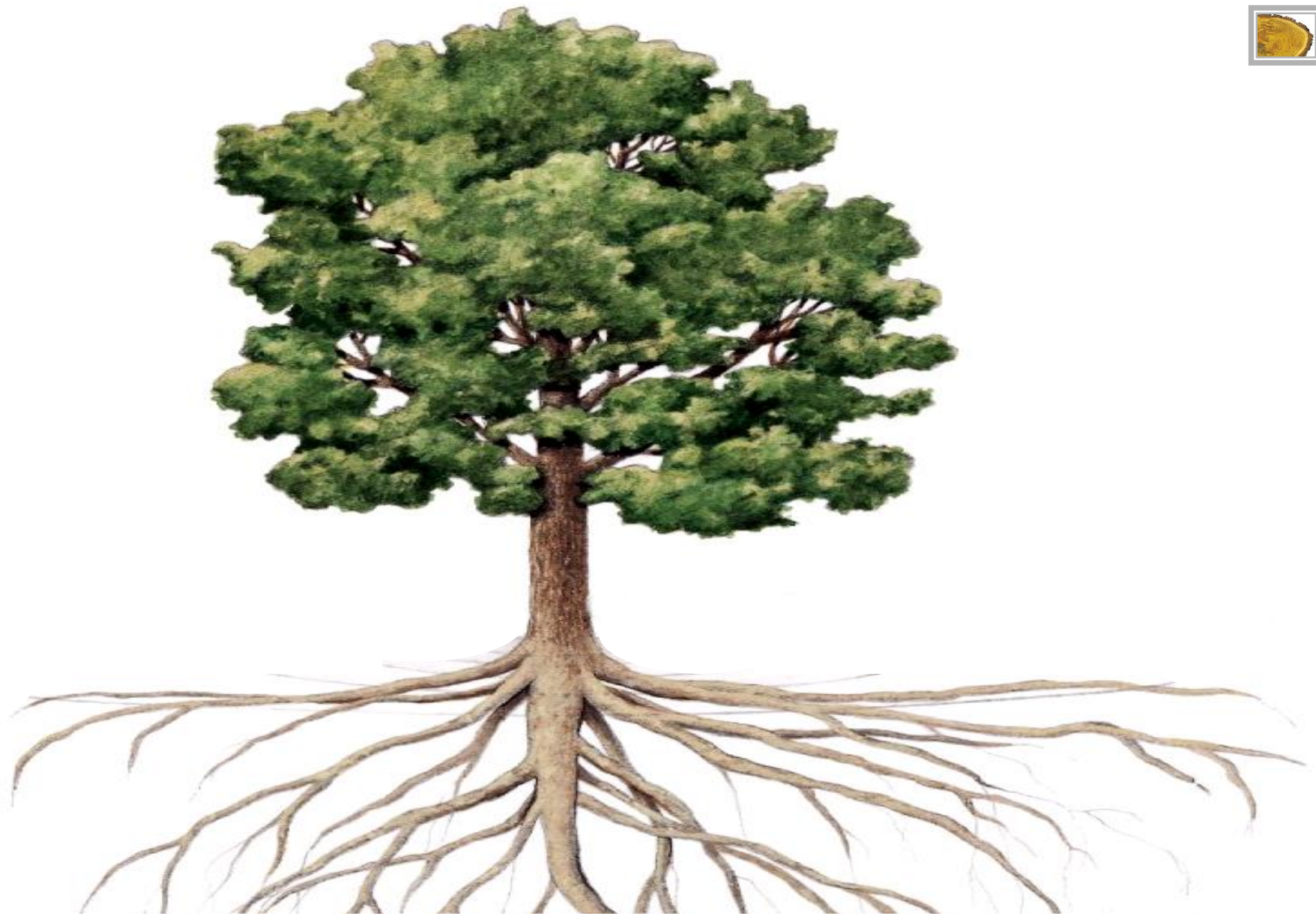
SCLERENCHYMA TISSUE

SCLERENCHYMA TISSUE

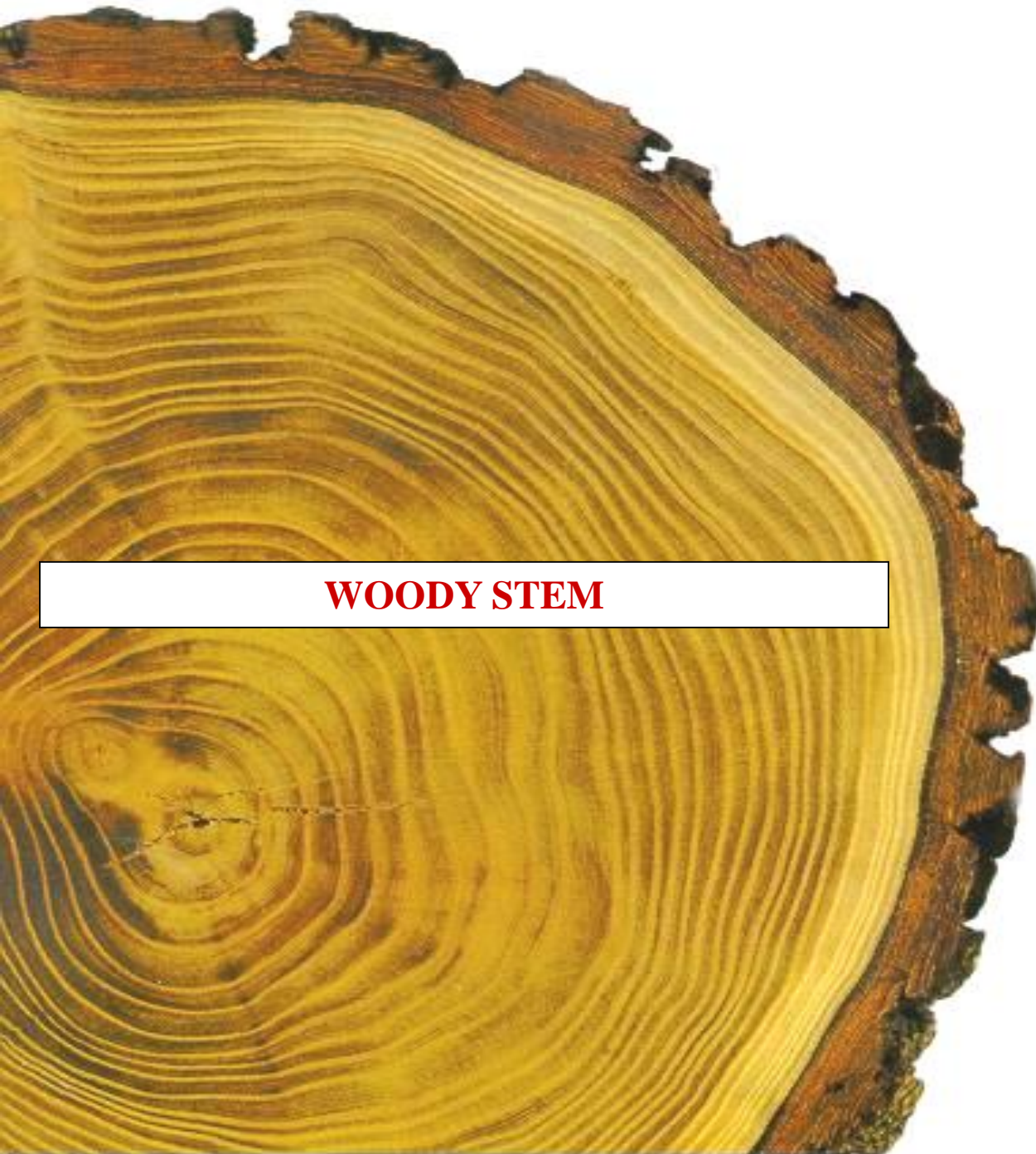


SCLERENCHYMA CELL AGGREGATE

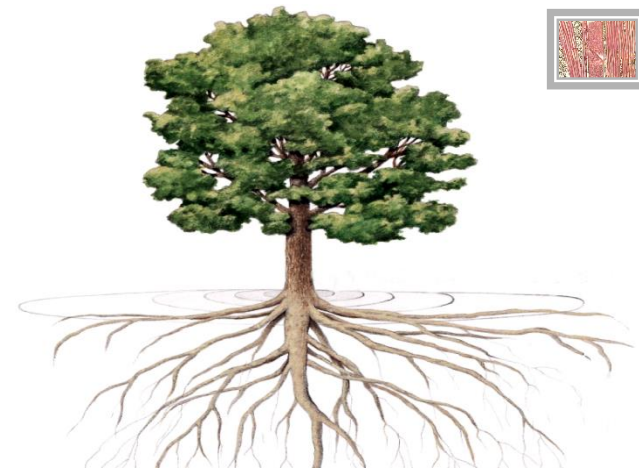
SCLERENCHYMA TISSUE



WOODY PLANT



WOODY STEM



STEM

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^
S
A



STEM

L.S.

SCLERENCHYMA TISSUE

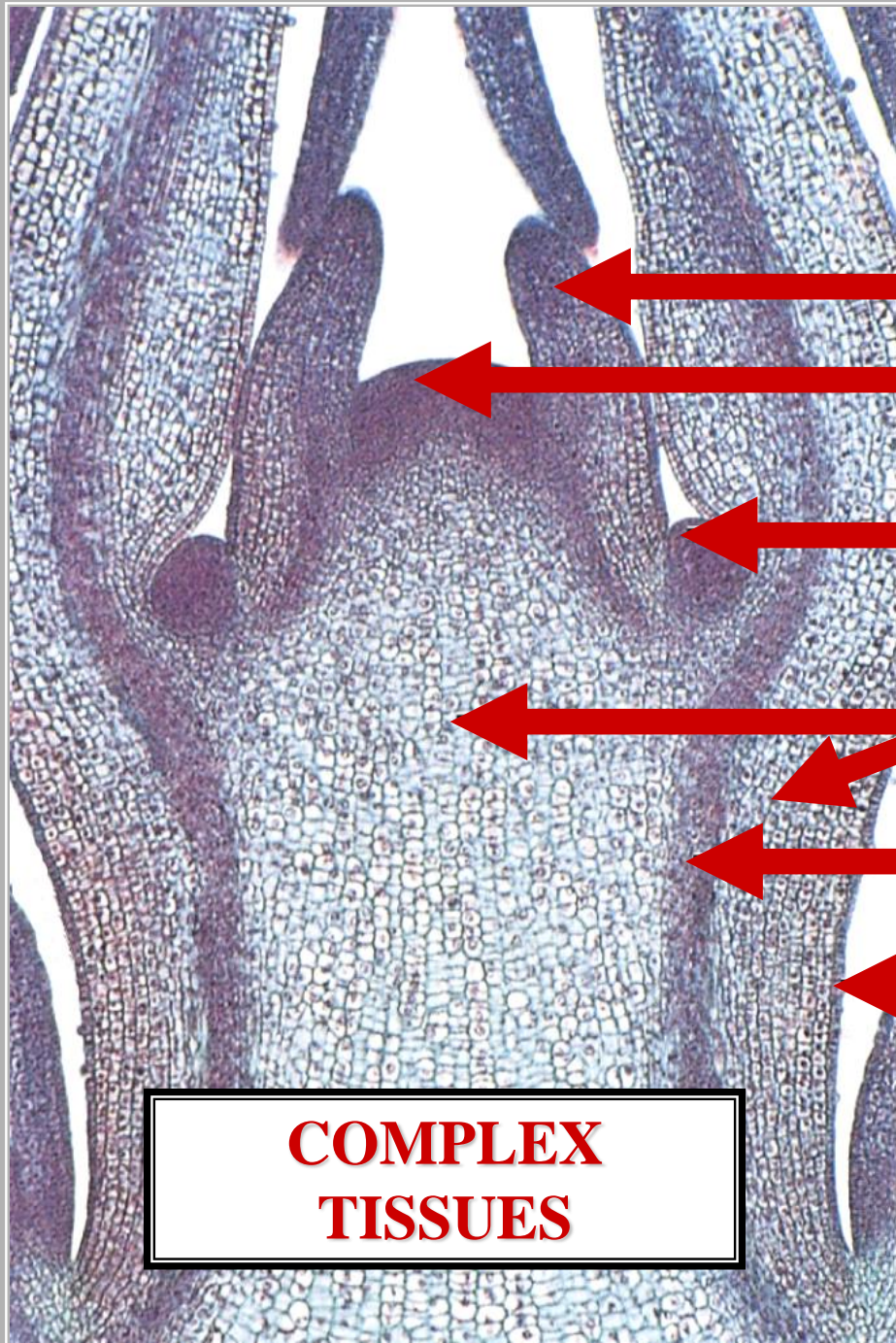
WOOD FIBER TISSUE





ANGIOSPERM COMPLEX TISSUES SUMMARY

ANGIOSPERM COMPLEX TISSUES



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**APICAL
MERISTEM**

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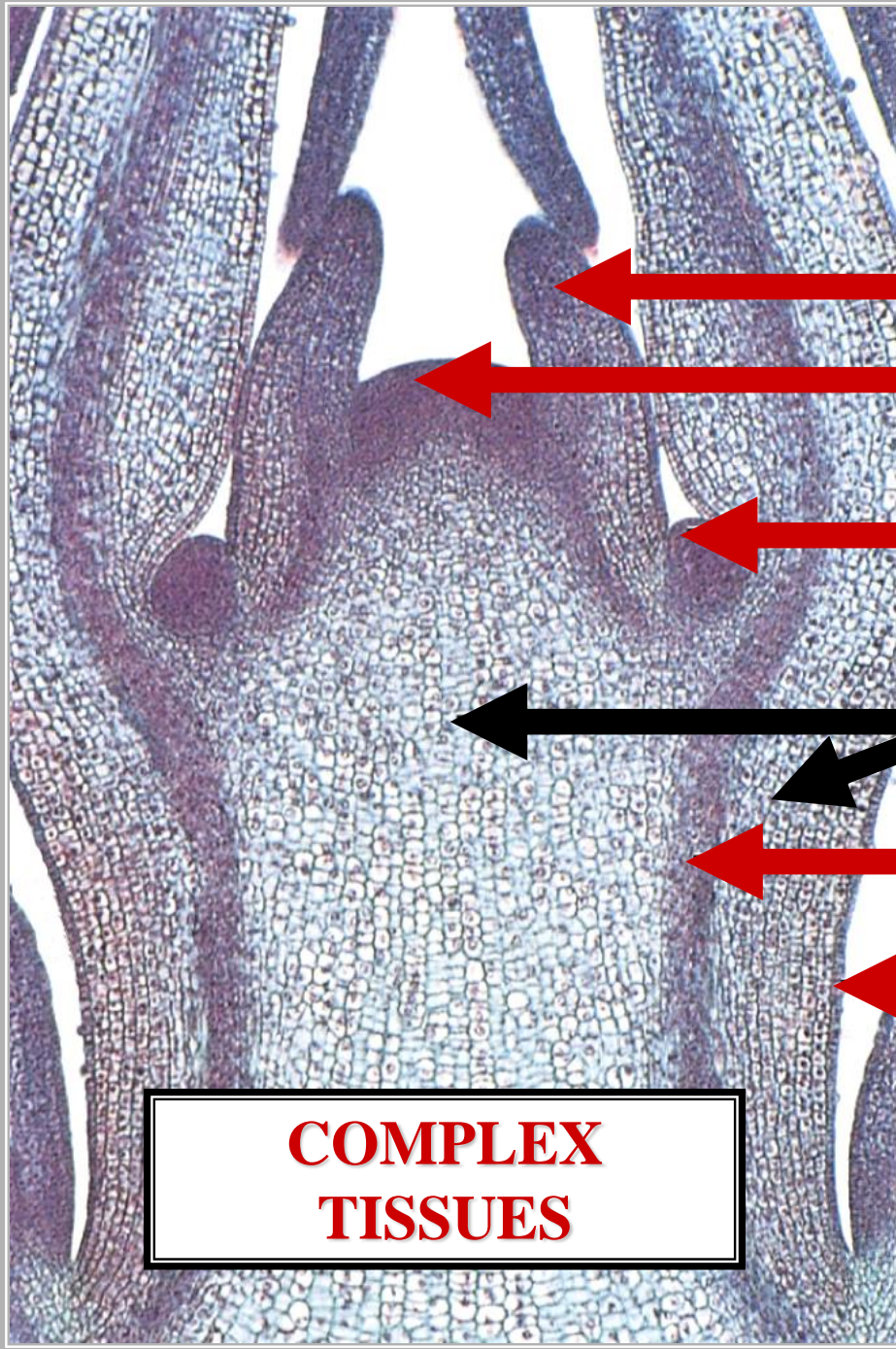
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**COMPLEX
TISSUES**

STEM

L.S.

ANGIOSPERM COMPLEX TISSUES



[]

**APICAL
MERISTEM**

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GROUND TISSUE

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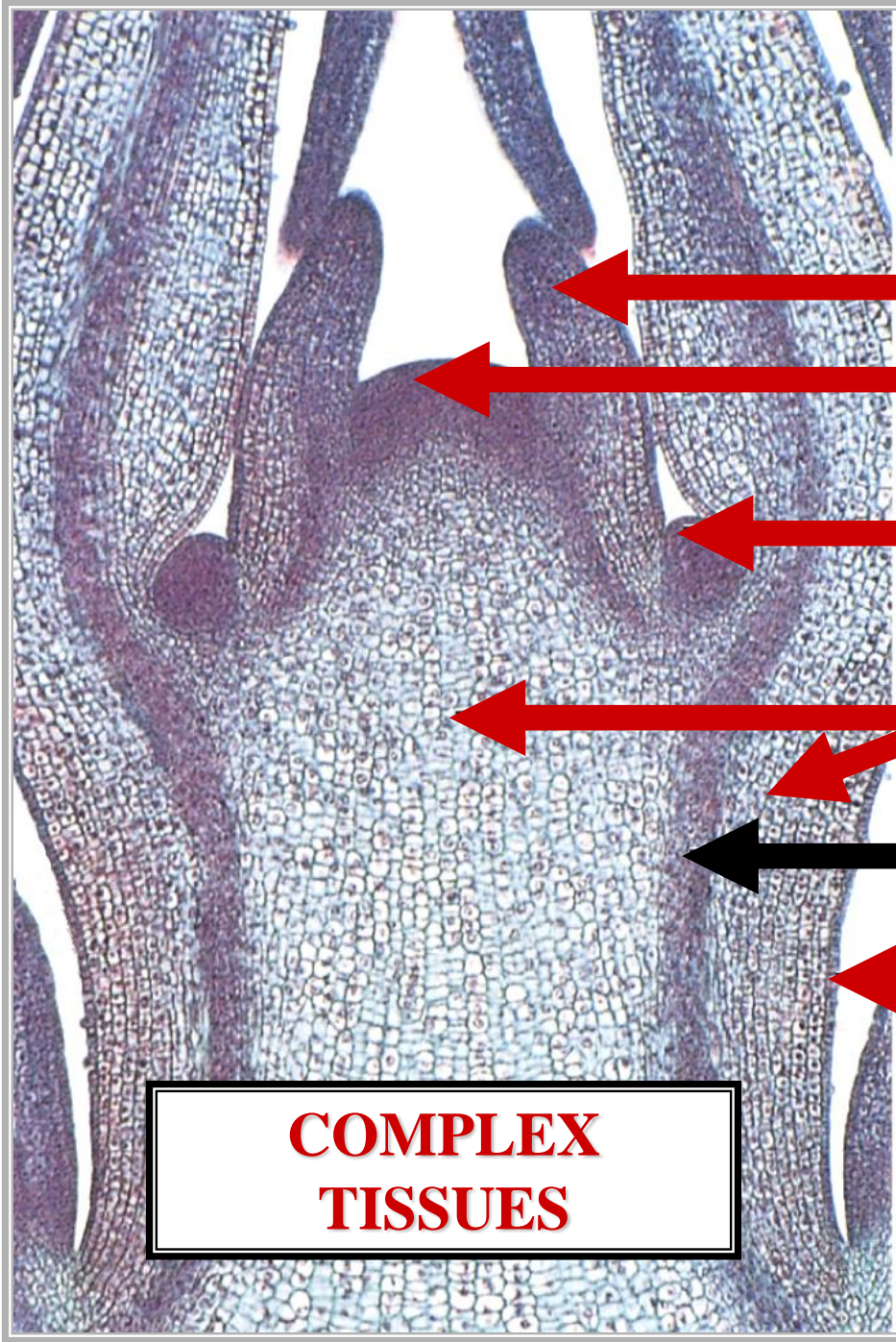
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**COMPLEX
TISSUES**

STEM

L.S.

ANGIOSPERM COMPLEX TISSUES



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**APICAL
MERISTEM**

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GROUND TISSUE

VASCULAR TISSUE

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**COMPLEX
TISSUES**

STEM

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VASCULAR TISSUE

VASCULAR TISSUE



VASCULAR TISSUE

CONDUCTING TISSUE

VASCULAR TISSUE



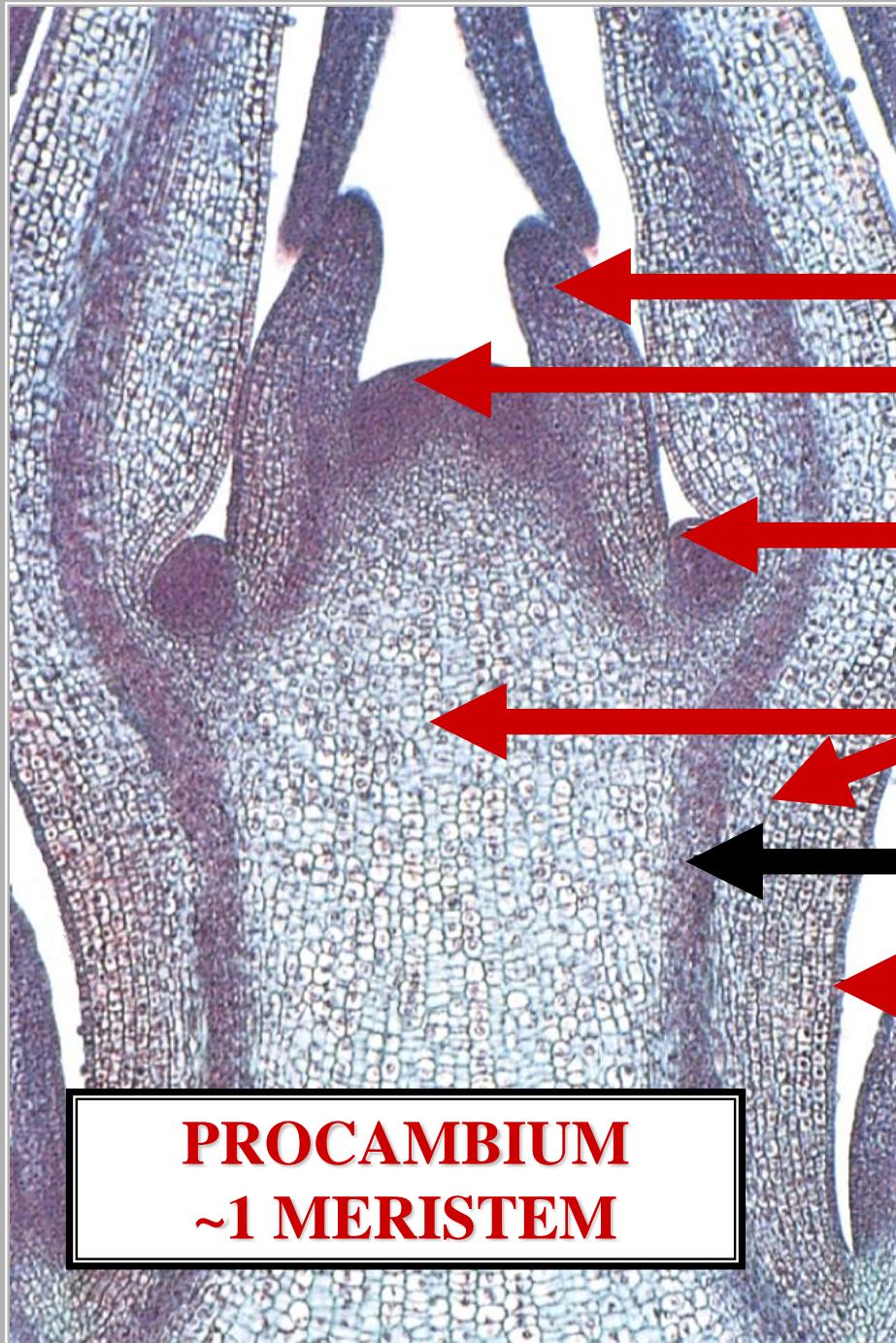
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VASCULAR TISSUE

PRIMARY

MERISTEM

ANGIOSPERM PRIMARY MERISTEMS



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**APICAL
MERISTEM**

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PROCAMBIUM ~1 MERISTEM

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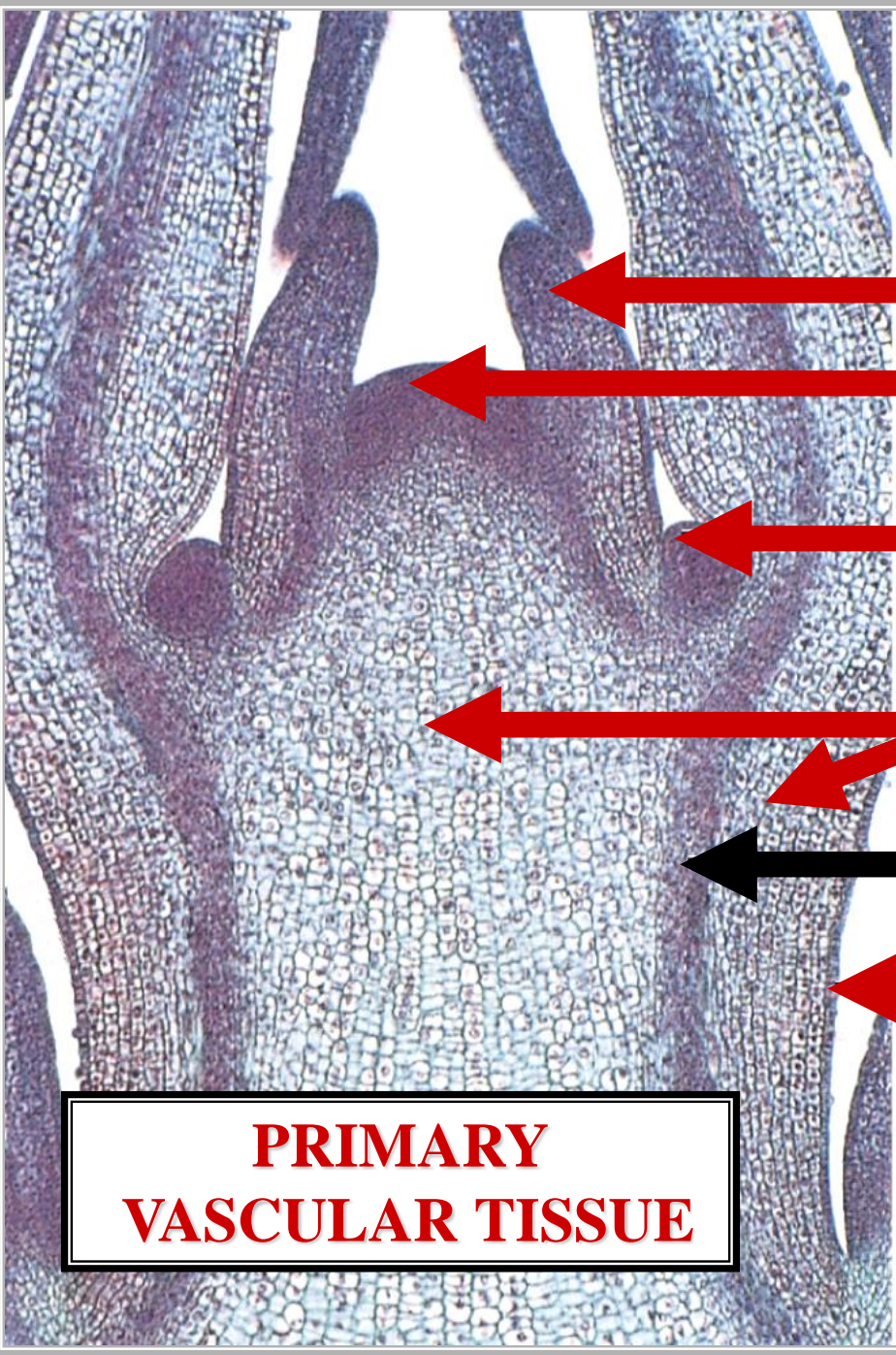
**PROCAMBIUM
~1 MERISTEM**

STEM

L.S.



ANGIOSPERM PRIMARY MERISTEMS



[Empty box]

**APICAL
MERISTEM**

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~1 VASCULAR TISSUE

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**PRIMARY
VASCULAR TISSUE**

STEM

L.S.

VASCULAR TISSUE TYPES

VASCULAR TISSUE TYPES

XYLEM

VASCULAR TISSUE TYPES

VASCULAR TISSUE TYPES



XYLEM

PHLOEM

VASCULAR TISSUE TYPES

TYPICAL ANGIOSPERM



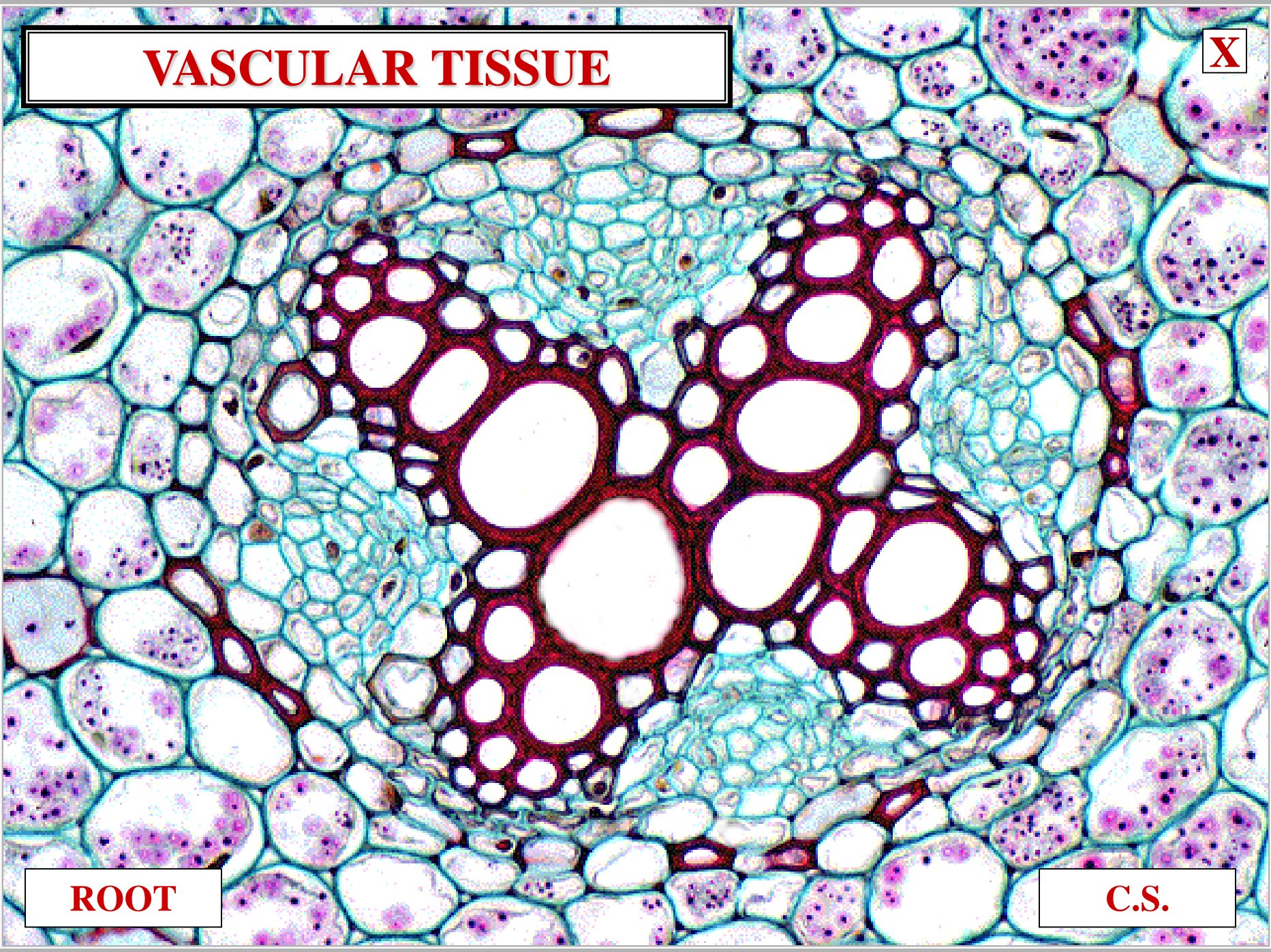
LEAF

STEM

ROOT

VASCULAR TISSUE

X



ROOT

C.S.

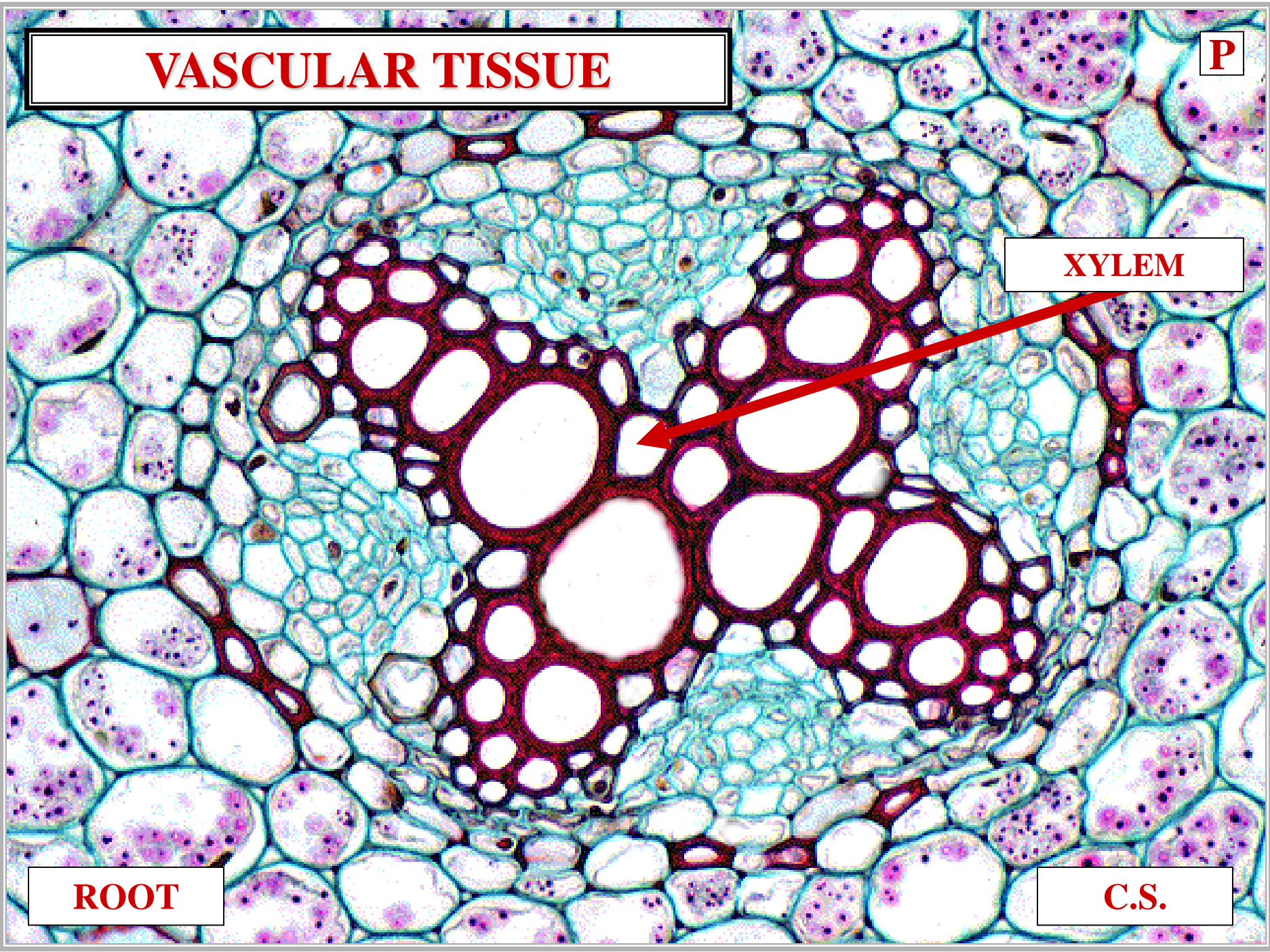
VASCULAR TISSUE

P

XYLEM

ROOT

C.S.



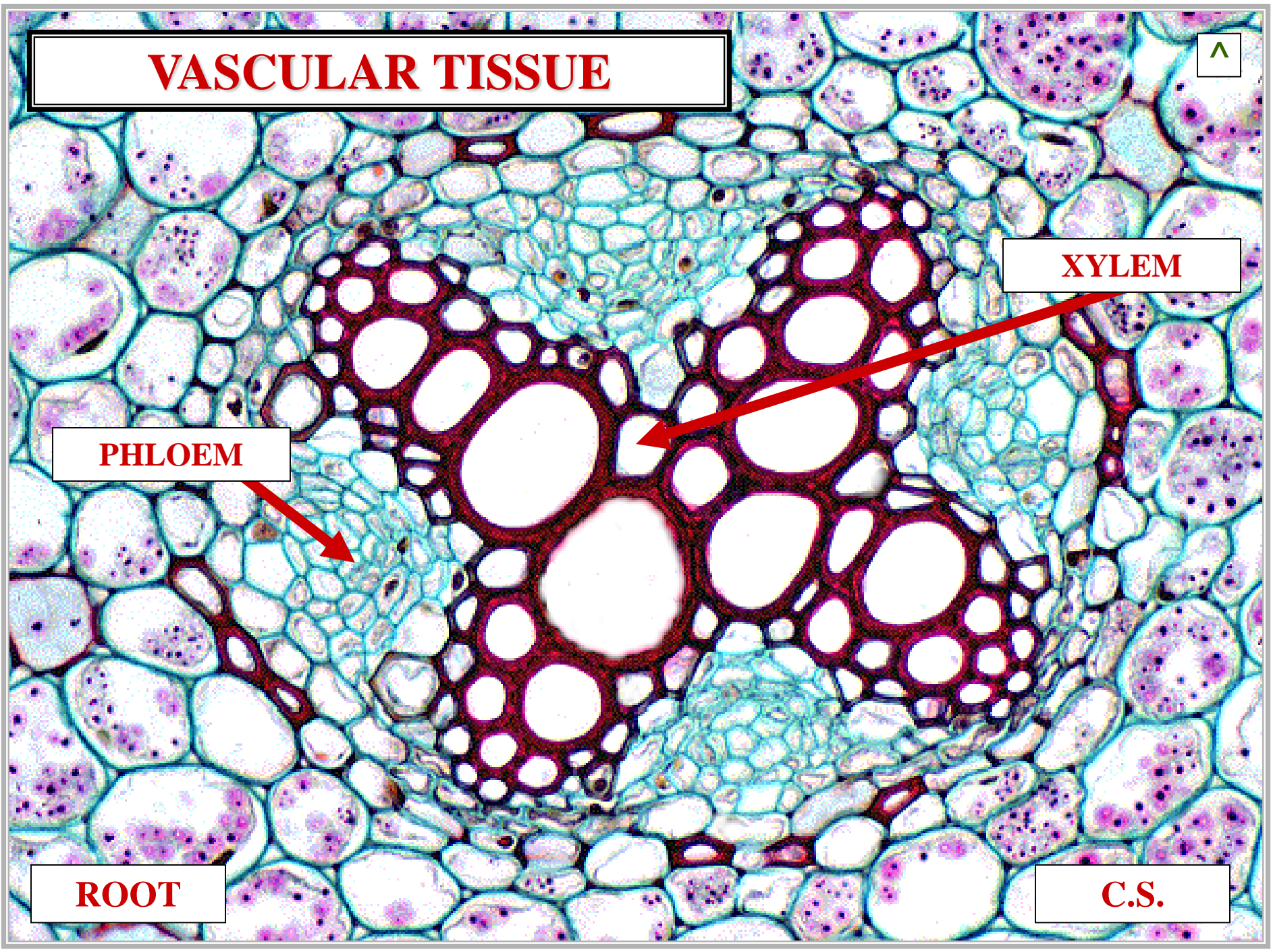
VASCULAR TISSUE

XYLEM

PHLOEM

ROOT

C.S.



XYLEM

VASCULAR TISSUE

XYLEM TISSUE



XYLEM TISSUE

CONDUCTS WATER

XYLEM TISSUE

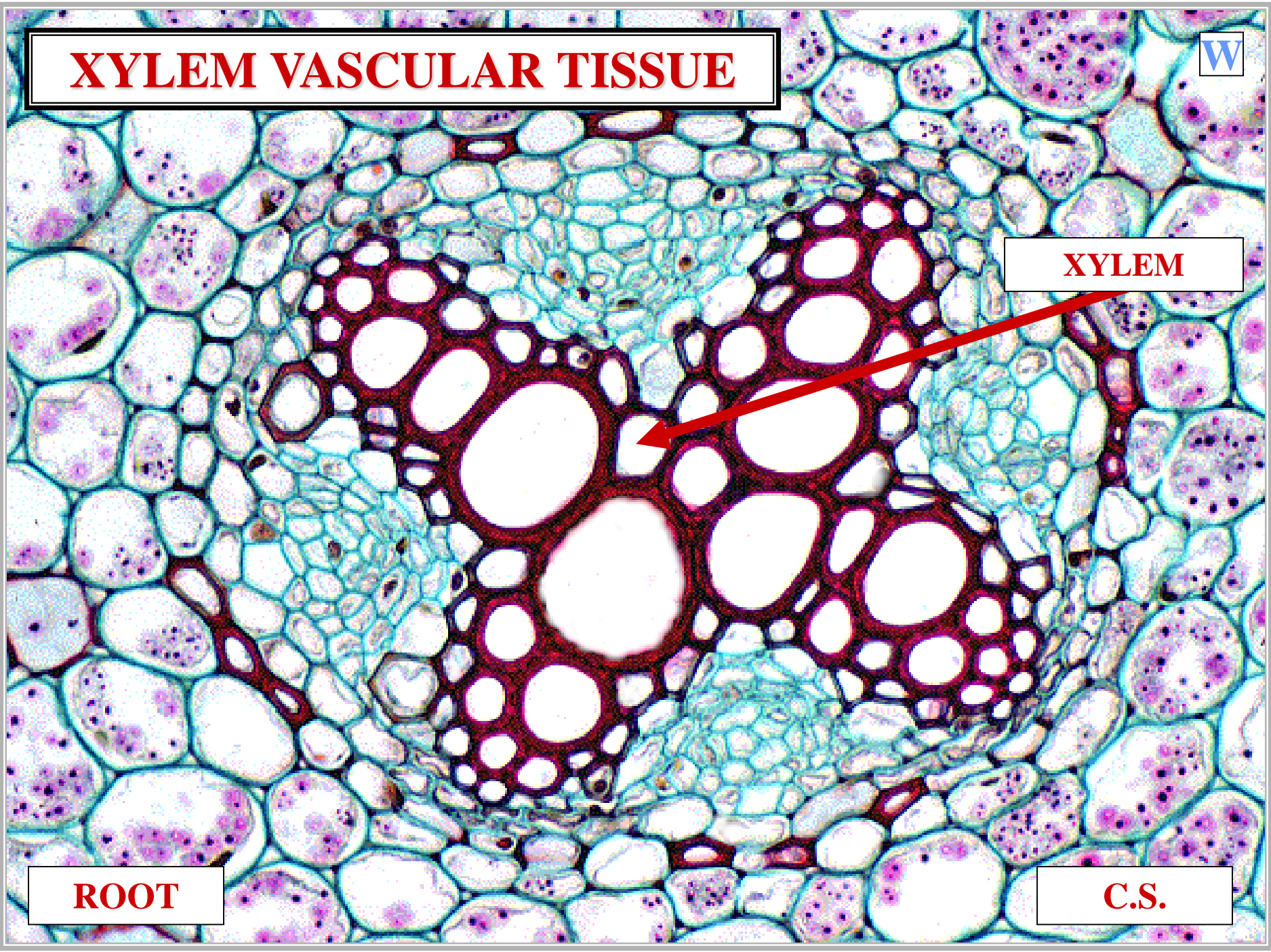
XYLEM VASCULAR TISSUE

W

XYLEM

ROOT

C.S.



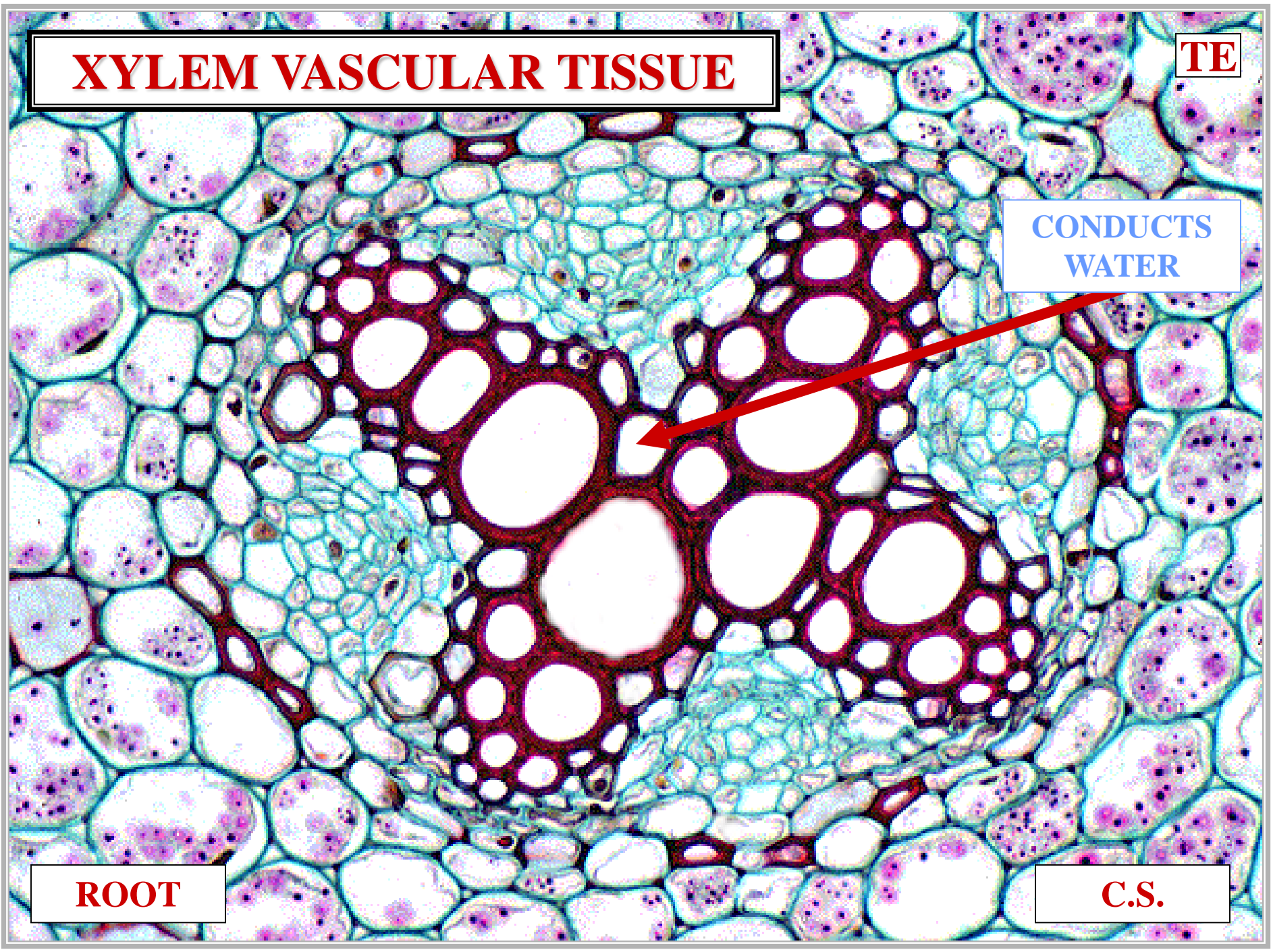
XYLEM VASCULAR TISSUE

TE

**CONDUCTS
WATER**

ROOT

C.S.

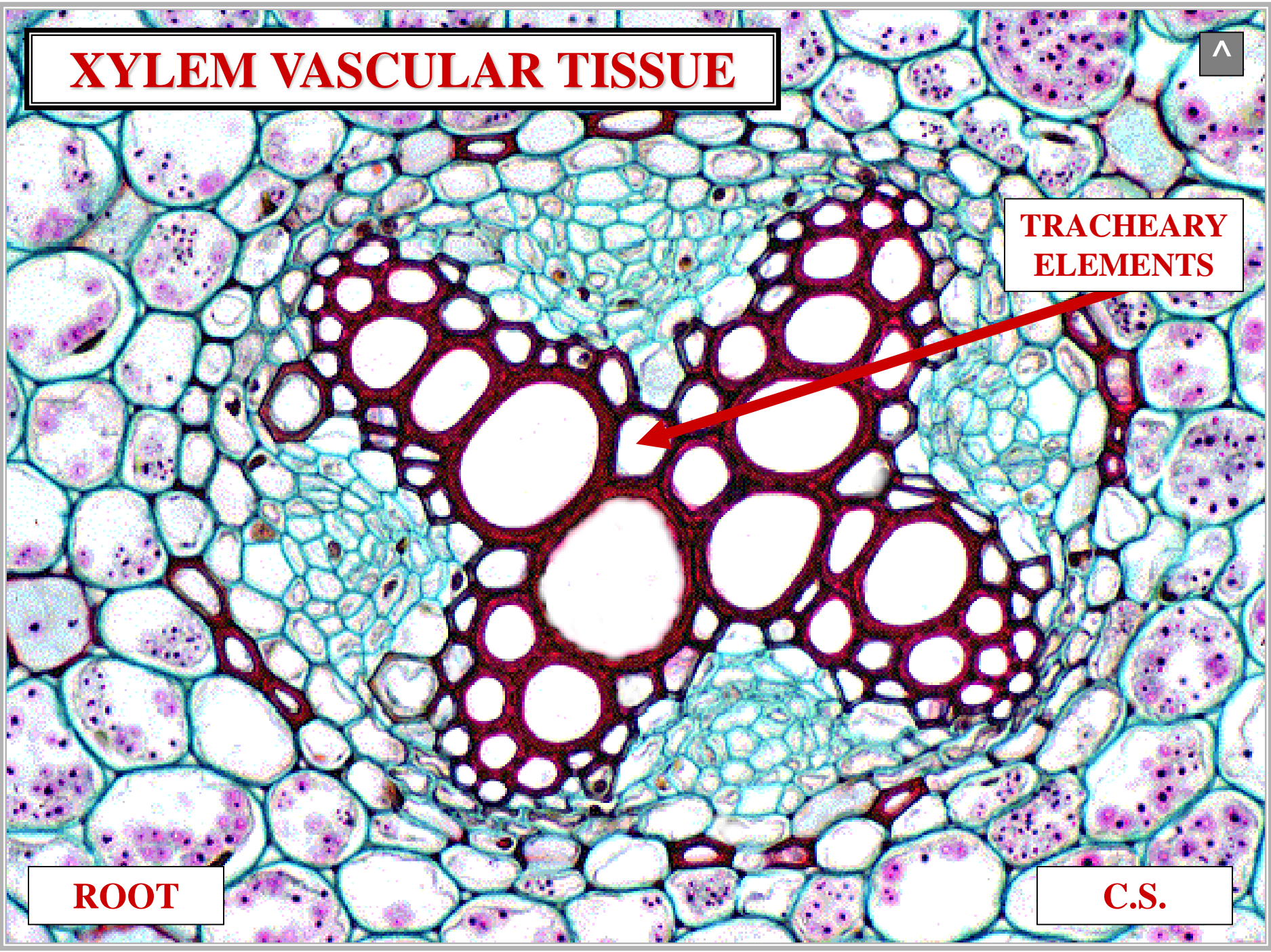


XYLEM VASCULAR TISSUE

**TRACHEARY
ELEMENTS**

ROOT

C.S.



TRACHEARY ELEMENTS

TRACHEARY ELEMENTS

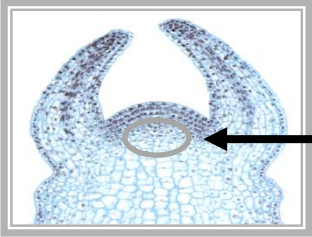
TRACHEARY ELEMENTS



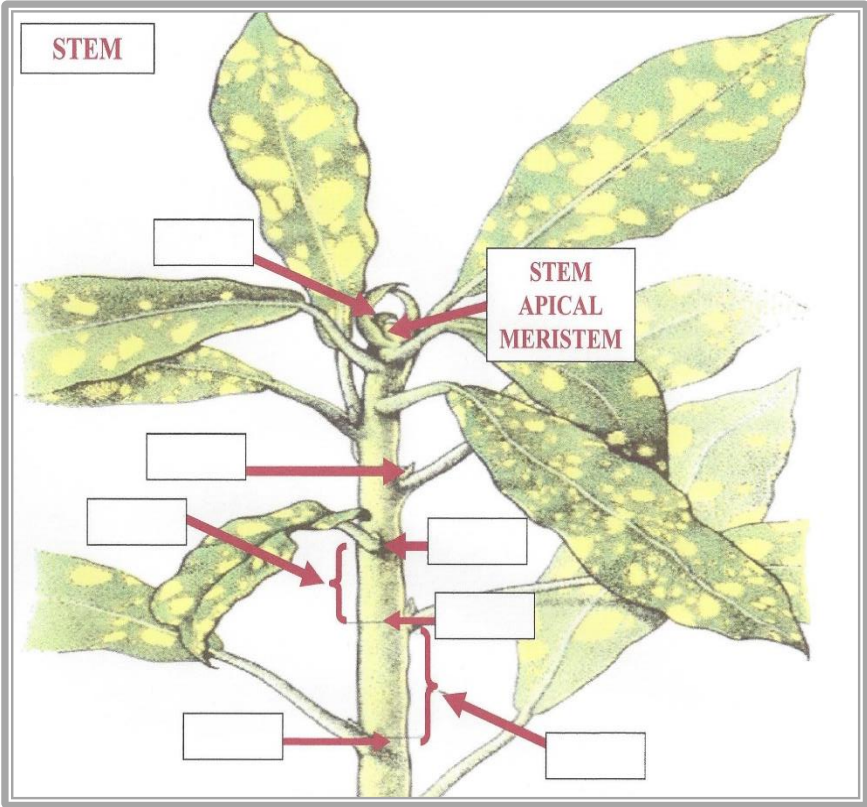
XYLEM WATER
CONDUCTING CELLS

TRACHEARY ELEMENTS

STEM APICAL MERISTEM



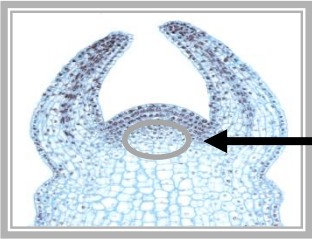
STEM APICAL MERISTEM



STEM

STEM APICAL MERISTEM

STEM APICAL MERISTEM

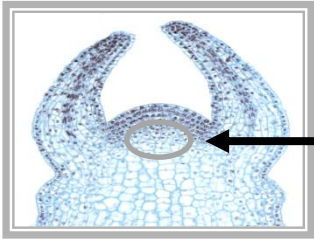


STEM APICAL MERISTEM



MERISTEM CELL INITIAL

**STEM APICAL
MERISTEM**



STEM APICAL MERISTEM

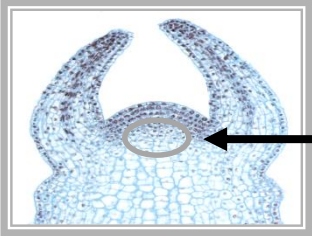


MERISTEM CELL INITIAL

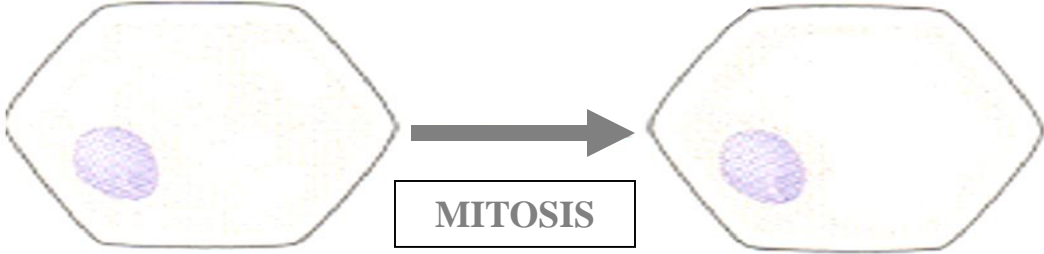
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**



STEM APICAL MERISTEM



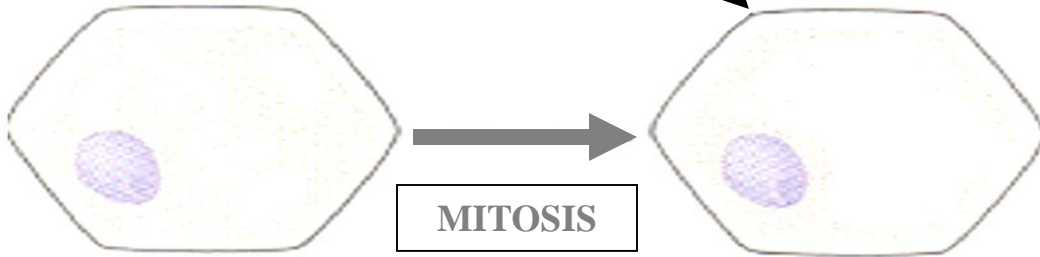
MERISTEM CELL INITIAL

PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL



MERISTEM CELL INITIAL

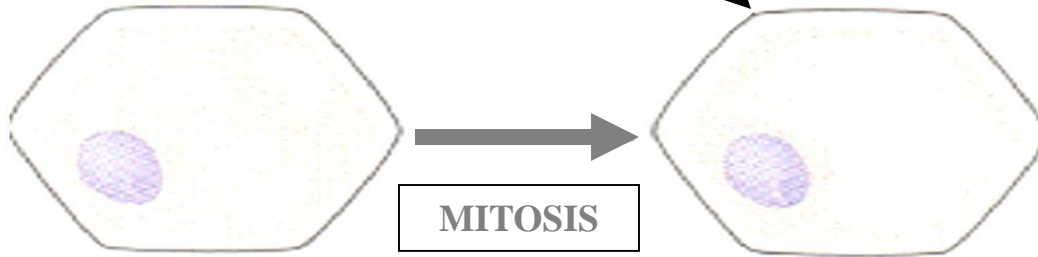
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



MERISTEM CELL INITIAL

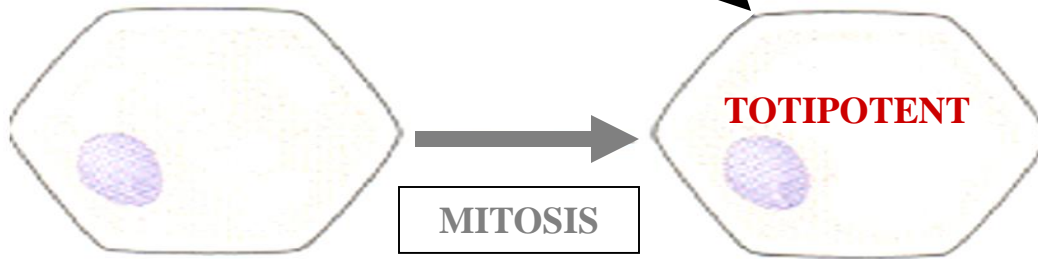
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



**PARENCHYMA CELL
CAN POTENTIALLY
DIFFERENTIATE
INTO ANY PLANT CELL TYPE**

MERISTEM CELL INITIAL

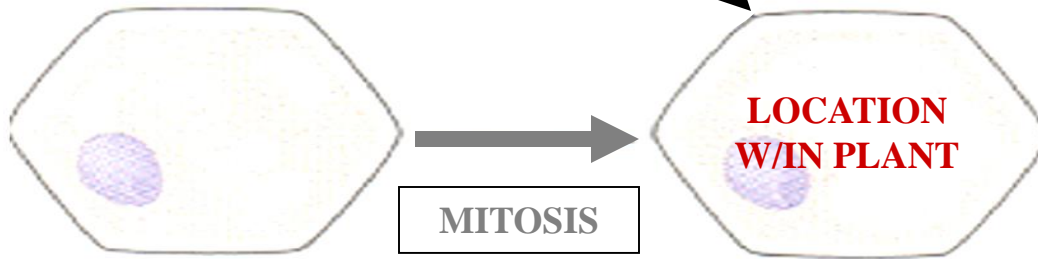
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



**PARENCHYMA CELL
CAN POTENTIALLY
DIFFERENTIATE
INTO ANY PLANT CELL TYPE**

MERISTEM CELL INITIAL

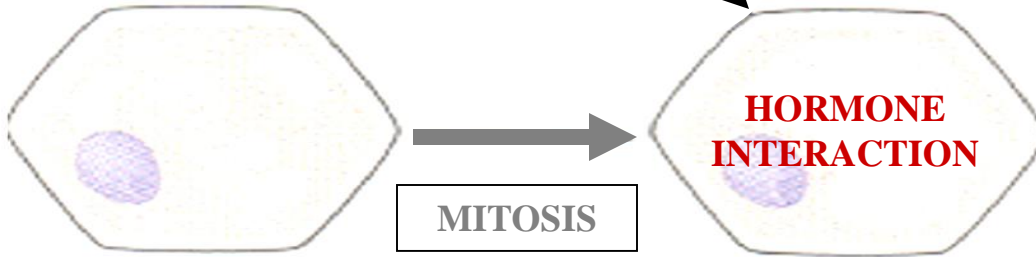
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



**PARENCHYMA CELL
CAN POTENTIALLY
DIFFERENTIATE
INTO ANY PLANT CELL TYPE**

MERISTEM CELL INITIAL

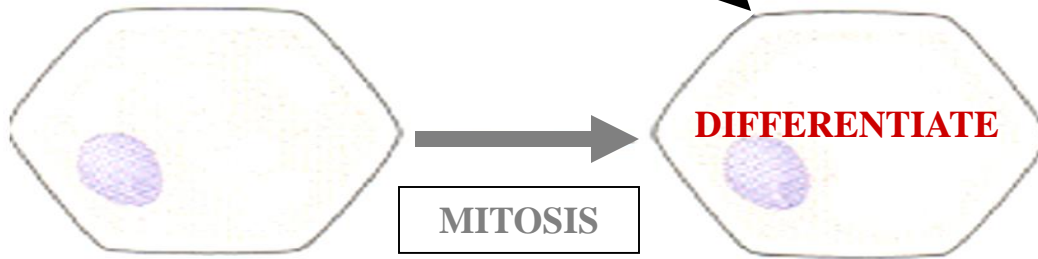
PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**

**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



**PARENCHYMA CELL
CAN POTENTIALLY
DIFFERENTIATE
INTO ANY PLANT CELL TYPE**

MERISTEM CELL INITIAL

PARENCHYMA CELL

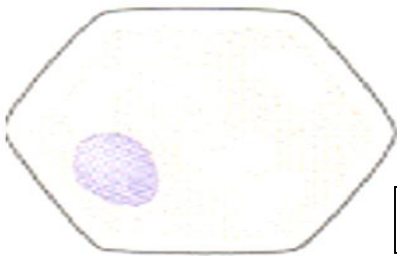
**PARENCHYMA
BASIC
PLANT CELL**



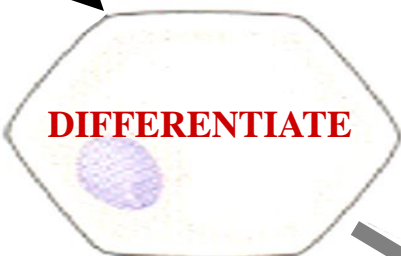
**STEM APICAL
MERISTEM**

DERIVATIVE CELL

PARENCHYMA CELL



MITOSIS

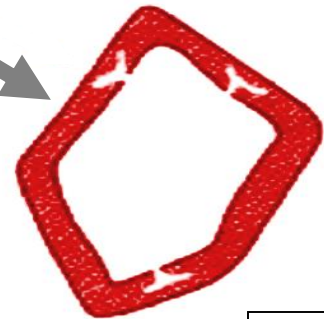


**PARENCHYMA CELL
CAN POTENTIALLY
DIFFERENTIATE
INTO ANY PLANT CELL TYPE**

MERISTEM CELL INITIAL

PARENCHYMA CELL

**PARENCHYMA
BASIC
PLANT CELL**



**TRACHEARY
ELEMENT**



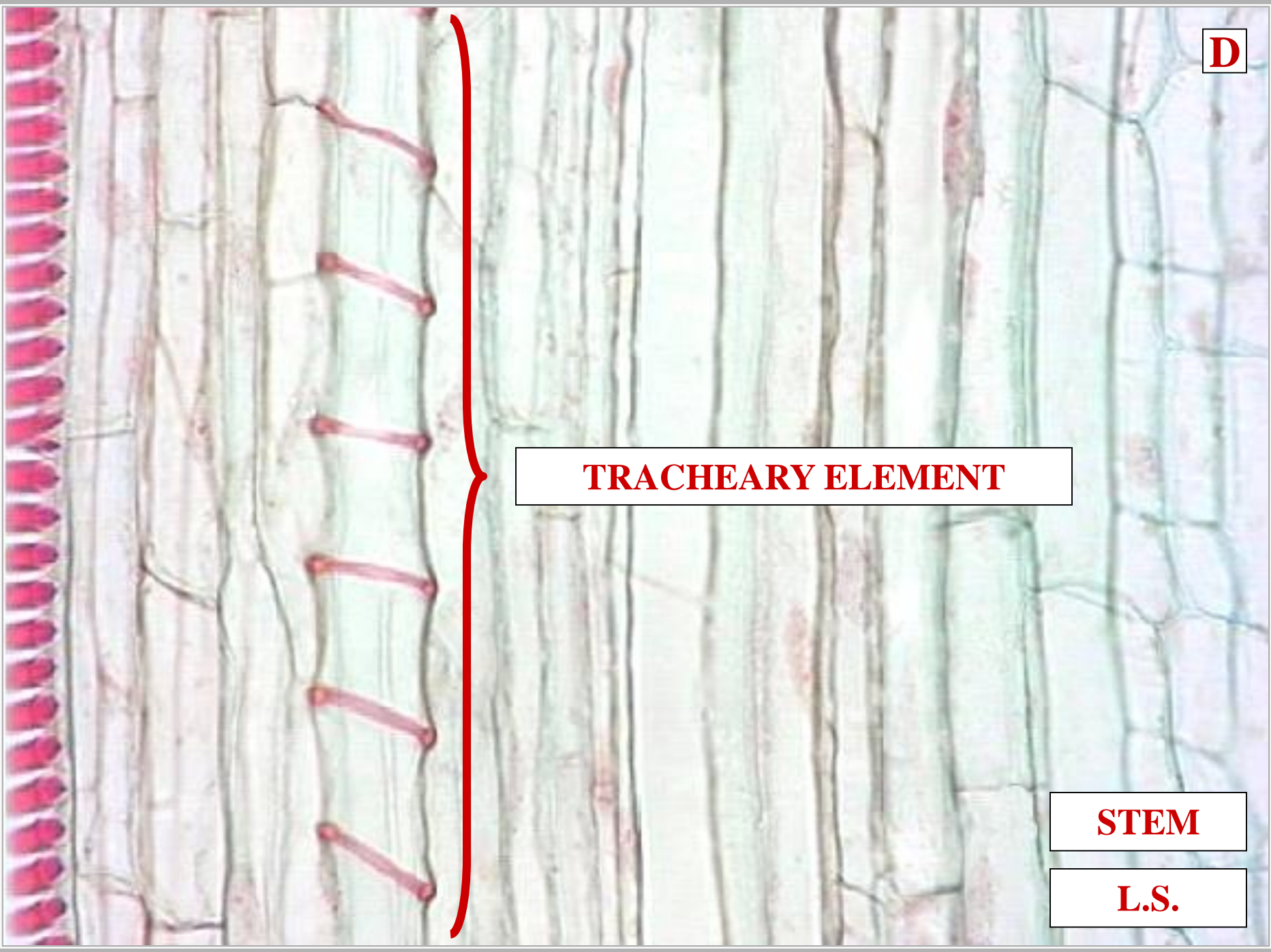
TRACHEARY ELEMENT CHARACTERS

D

TRACHEARY ELEMENT

STEM

L.S.





**TRACHEARY ELEMENT
DEAD FUNCTIONAL CELL**

STEM

L.S.



1



TRACHEARY ELEMENT
~1 & 2 CELL WALL

STEM

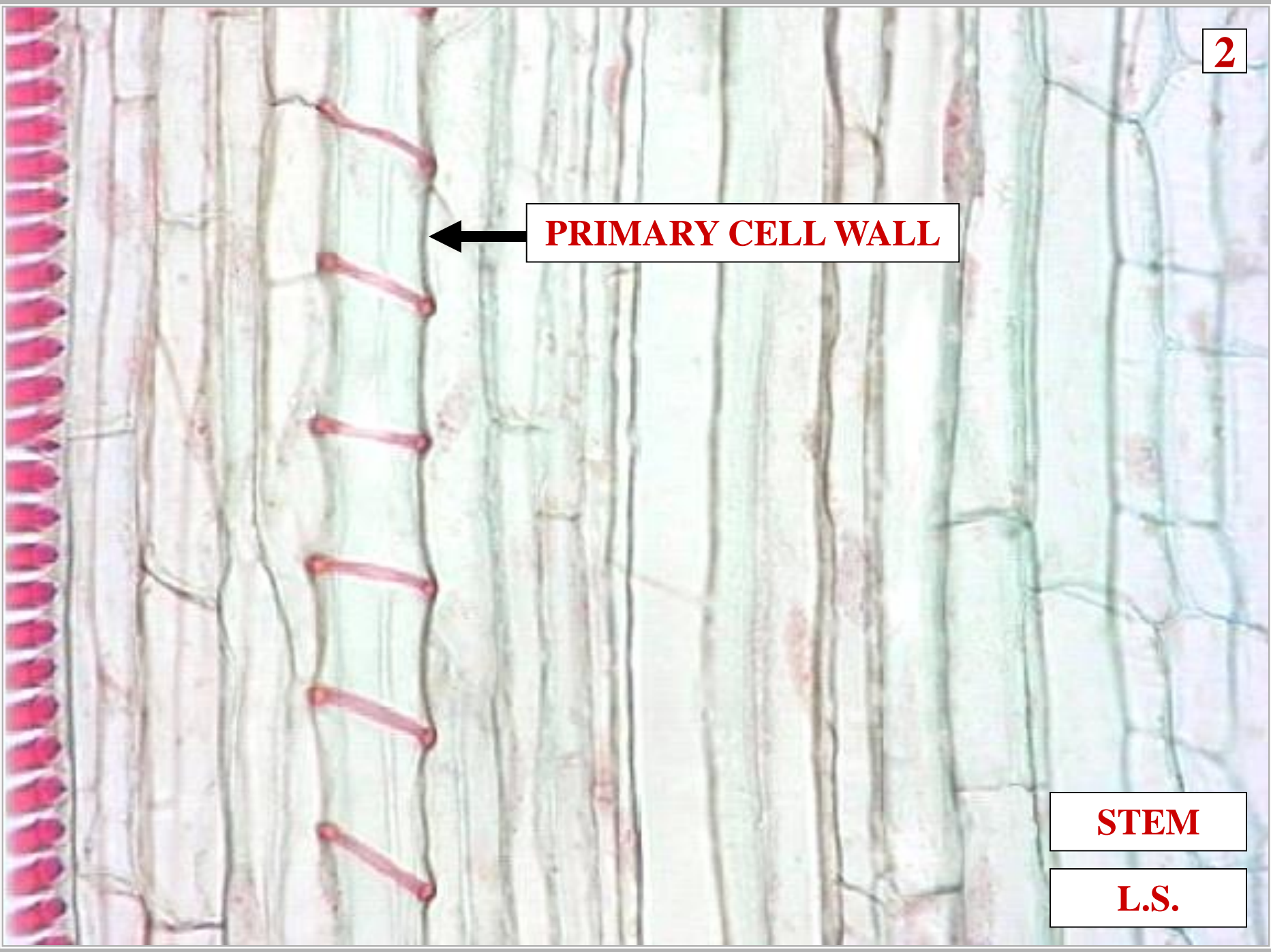
L.S.

PRIMARY CELL WALL



STEM

L.S.



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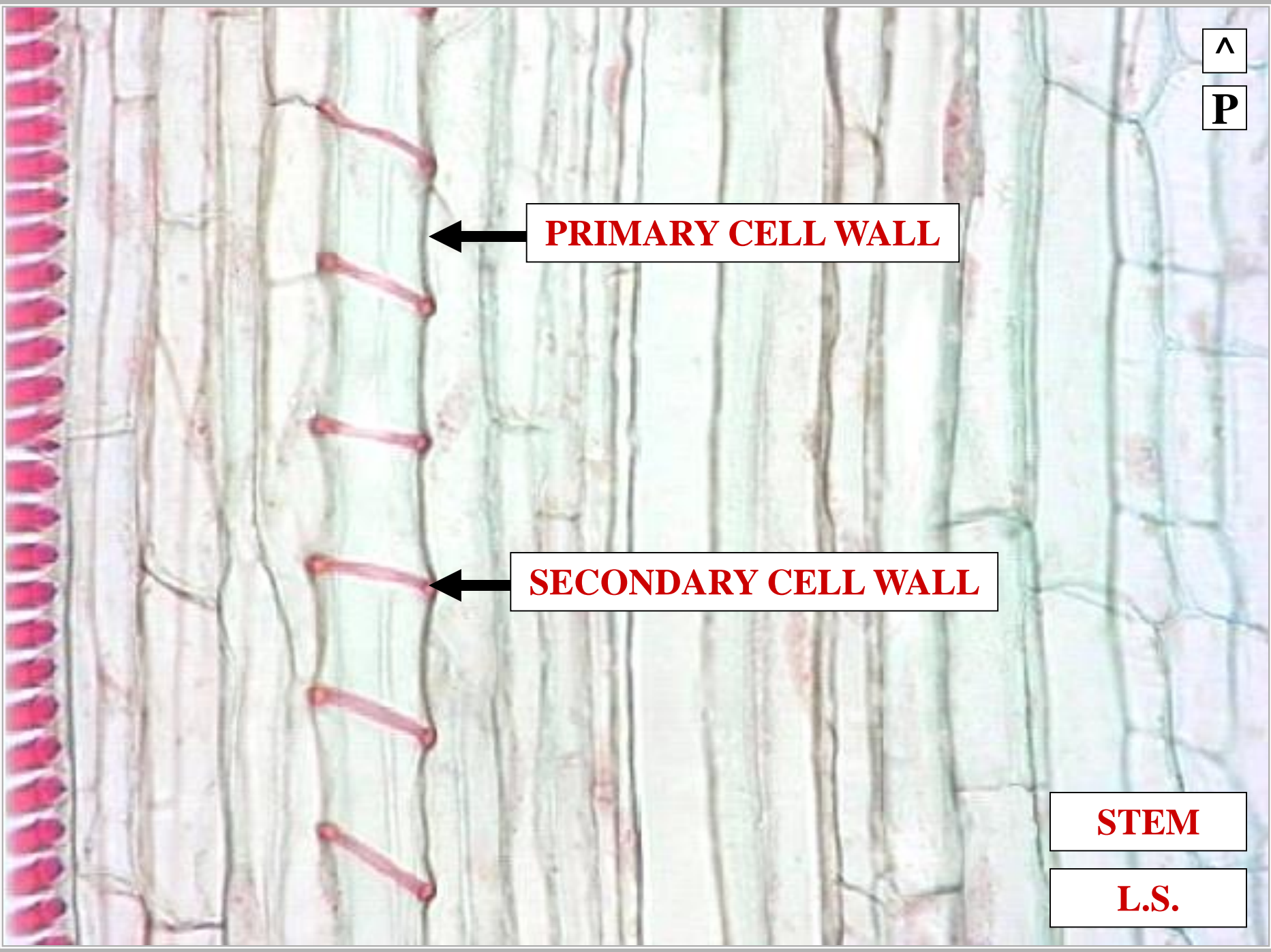
P

PRIMARY CELL WALL

SECONDARY CELL WALL

STEM

L.S.



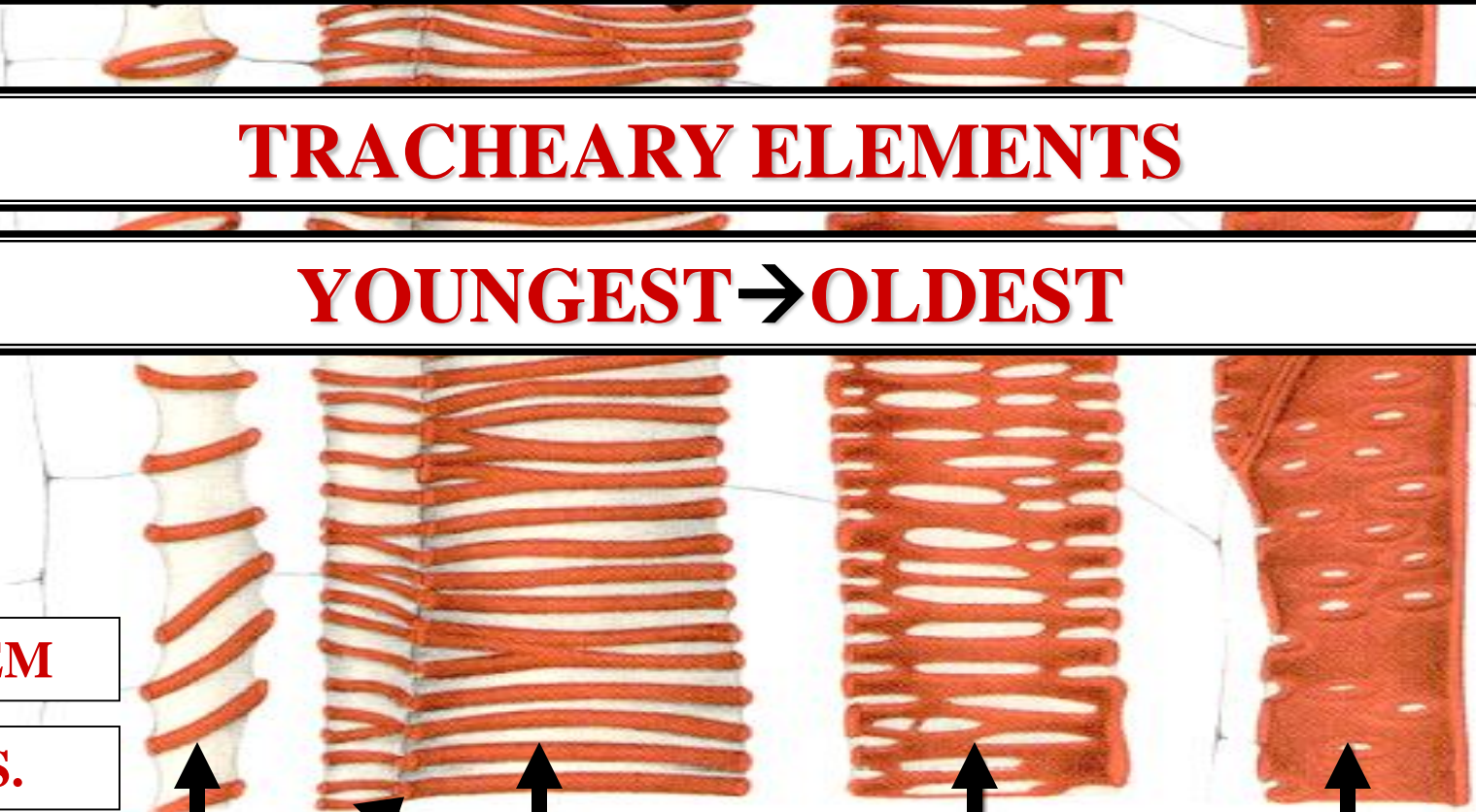


**PRIMARY XYLEM
SECONDARY
CELL WALL
MATURATION
PATTERN**

**PRIMARY XYLEM
SECONDARY CELL WALL
MATURATION PATTERN**

TRACHEARY ELEMENTS

YOUNGEST → OLDEST



STEM

L.S.

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PRIMARY XYLEM SECONDARY CELL WALL MATURATION PATTERN

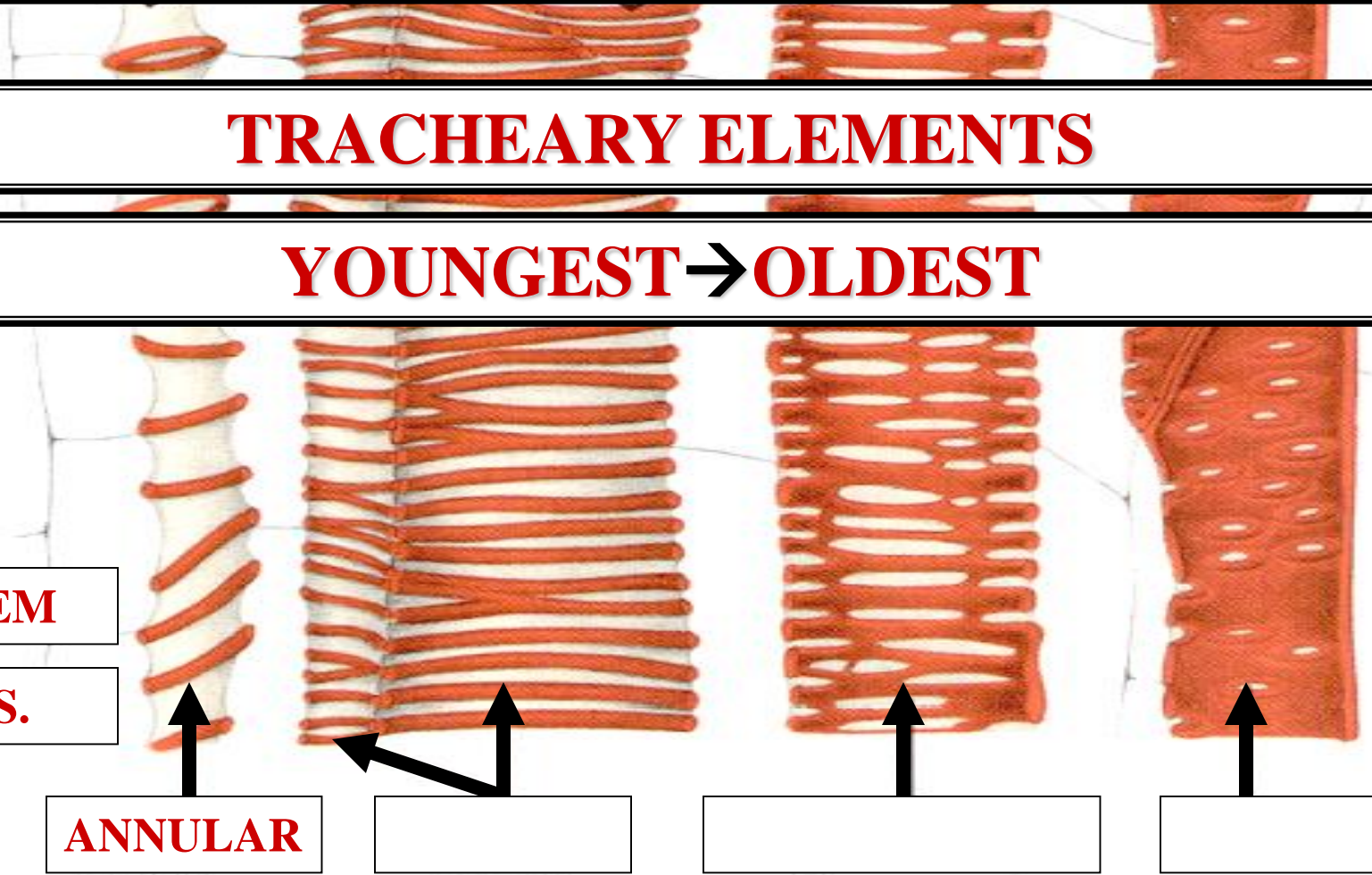
TRACHEARY ELEMENTS

YOUNGEST → OLDEST

STEM

L.S.

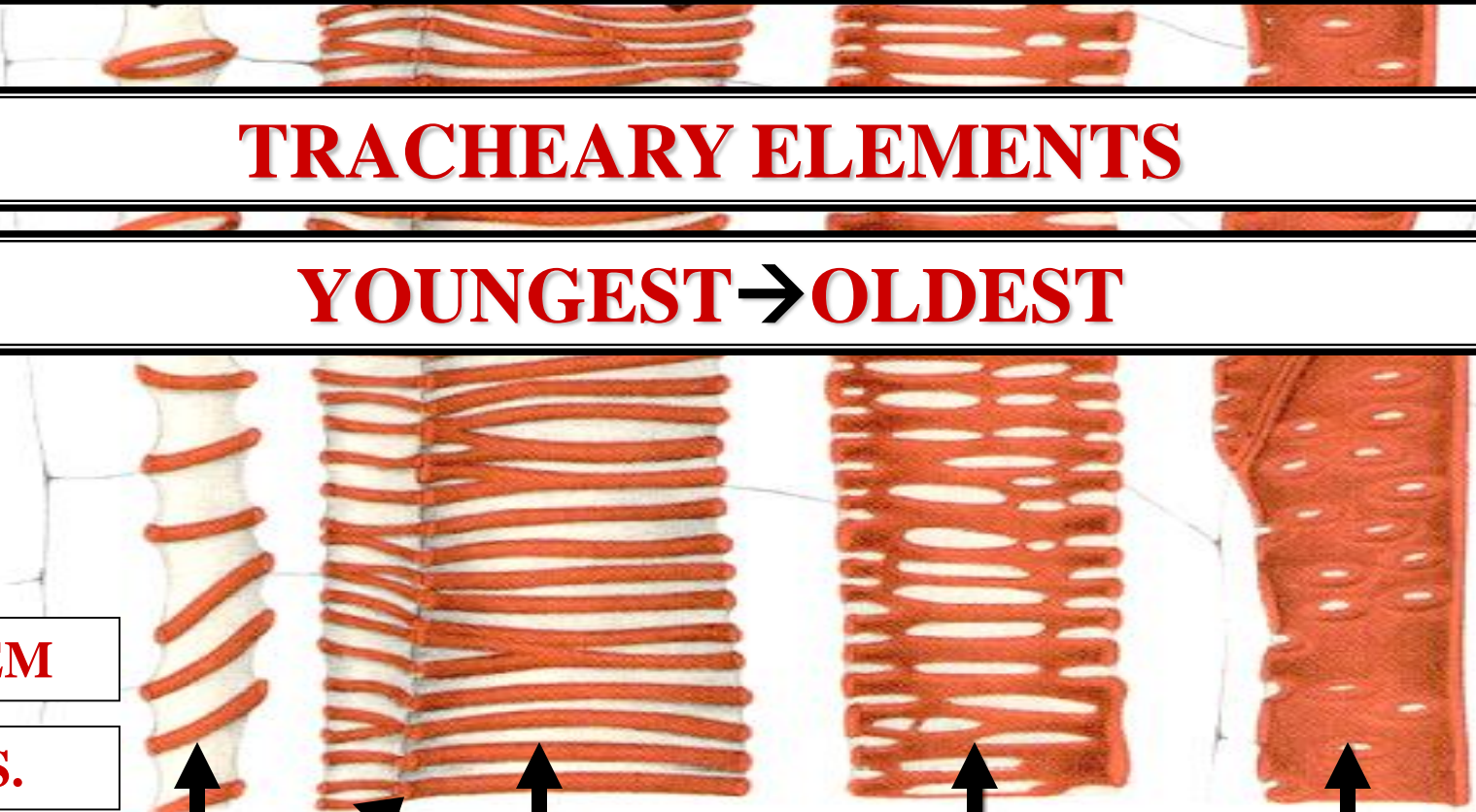
ANNULAR



PRIMARY XYLEM SECONDARY CELL WALL MATURATION PATTERN

TRACHEARY ELEMENTS

YOUNGEST → OLDEST



STEM

L.S.

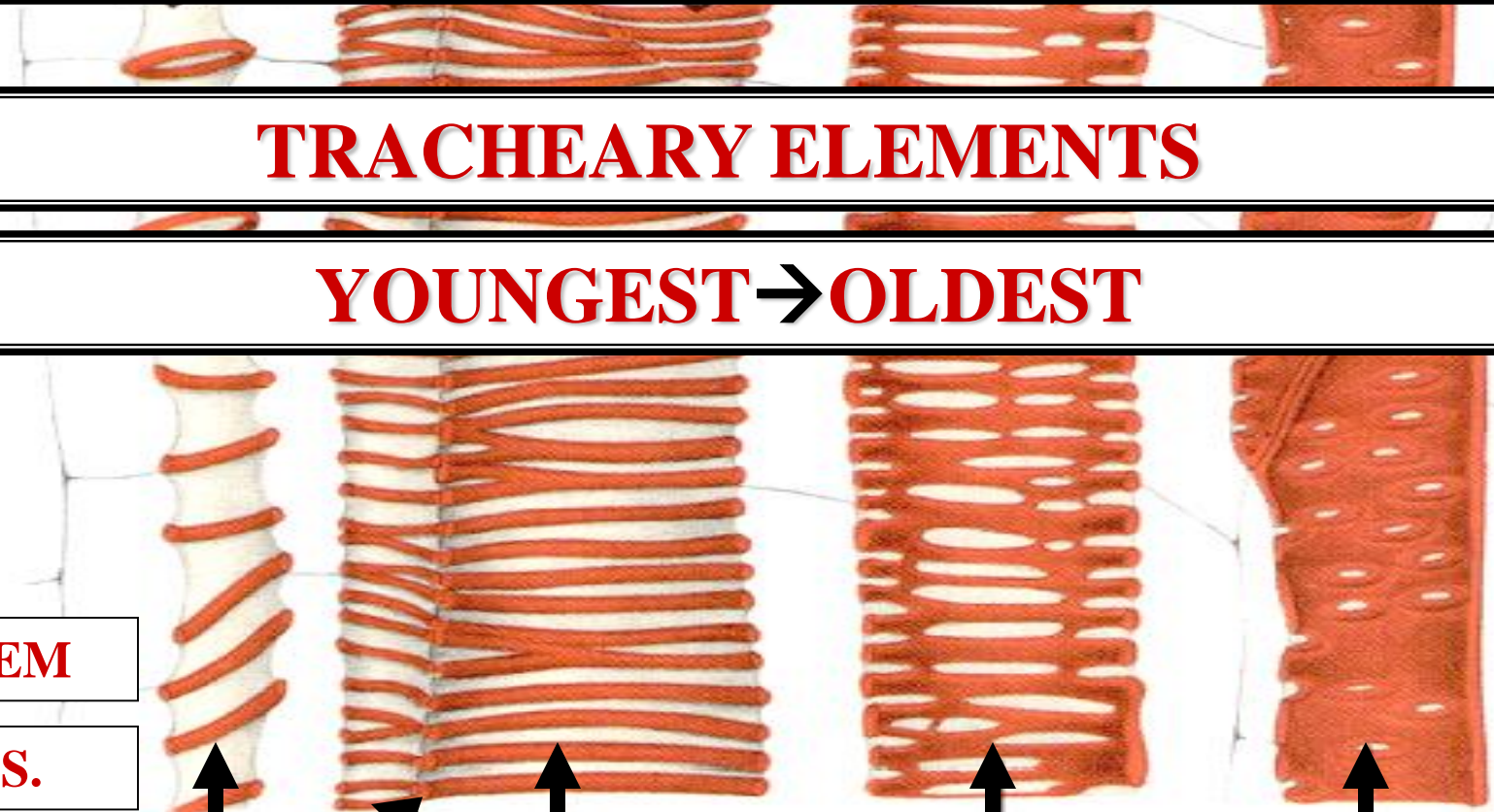
ANNULAR

HELICAL

PRIMARY XYLEM SECONDARY CELL WALL MATURATION PATTERN

TRACHEARY ELEMENTS

YOUNGEST → OLDEST



STEM

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ANNULAR

HELICAL

SCALARIFORM



PRIMARY XYLEM SECONDARY CELL WALL MATURATION PATTERN

TRACHEARY ELEMENTS

YOUNGEST → OLDEST

STEM

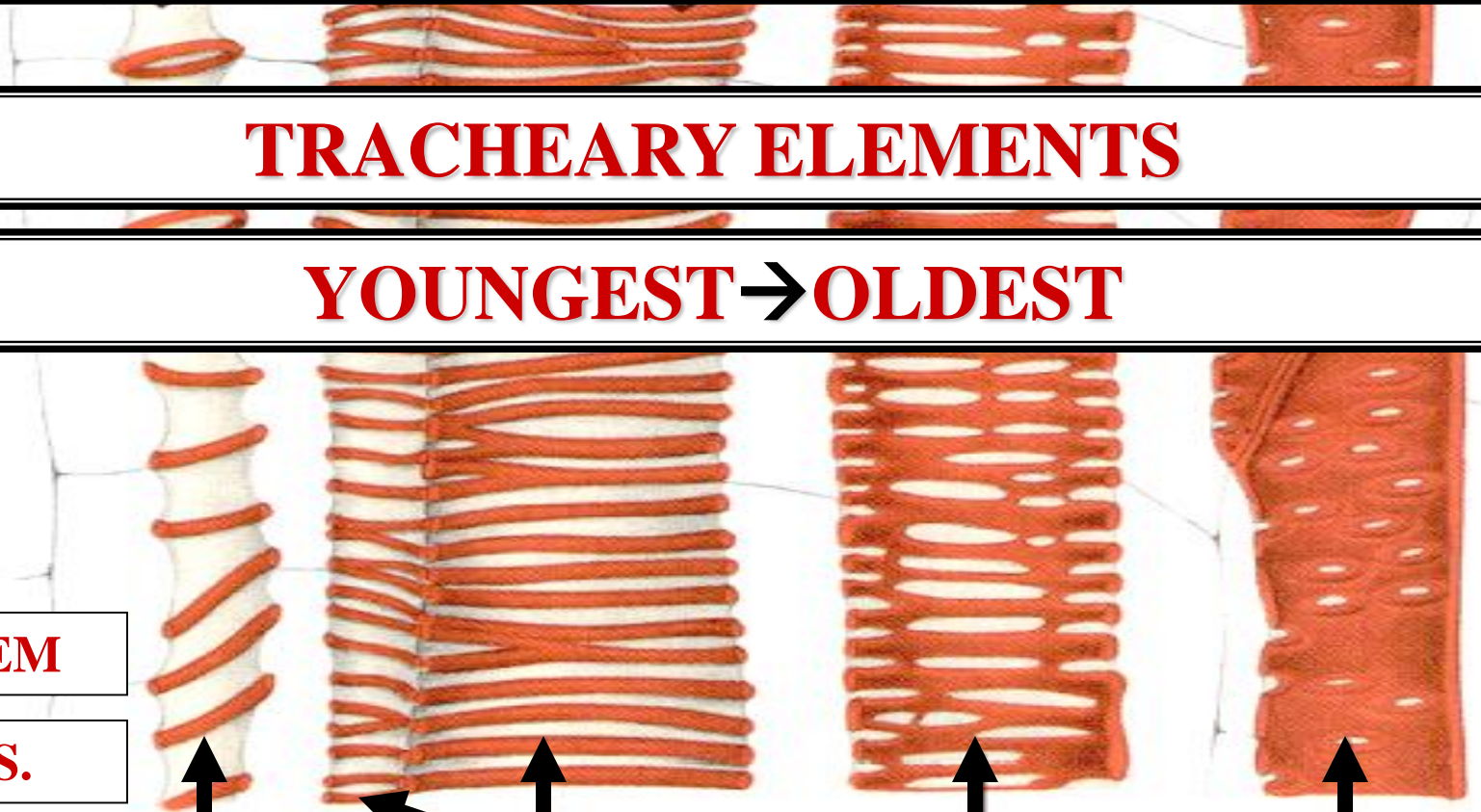
L.S.

ANNULAR

HELICAL

SCALARIFORM

PITTED



TRACHEARY ELEMENT TYPES

TRACHEARY ELEMENT TYPES

TRACHEID

TRACHEARY ELEMENT TYPES

TRACHEARY ELEMENT

TYPES

T

TRACHEID
VESSEL MEMBER

TRACHEARY ELEMENT

TYPES

TRACHEID

TRACHEARY ELEMENT

TRACHEID



KNOWN MOST VASCULAR PLANTS

TRACHEARY ELEMENT

TRACHEID

TRACHEARY ELEMENT
TRACHEID



KNOWN MOST VASCULAR PLANTS

END WALL HIGHLY TAPPERED

TRACHEARY ELEMENT
TRACHEID

TRACHEARY ELEMENT



TRACHEID

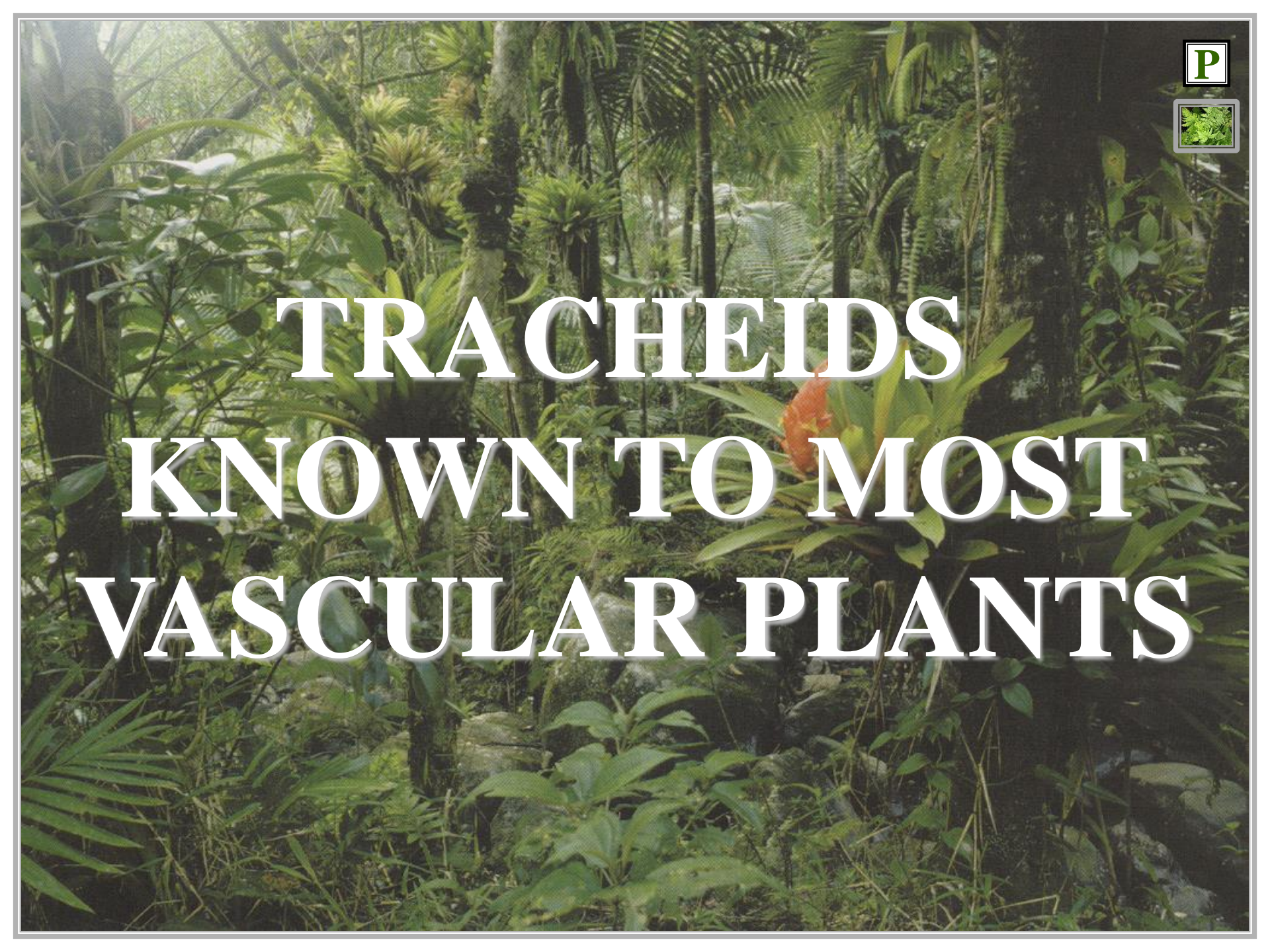
KNOWN MOST VASCULAR PLANTS

END WALL HIGHLY TAPPED

END WALL WITH PITS

TRACHEARY ELEMENT

TRACHEID



**TRACHEIDS
KNOWN TO MOST
VASCULAR PLANTS**



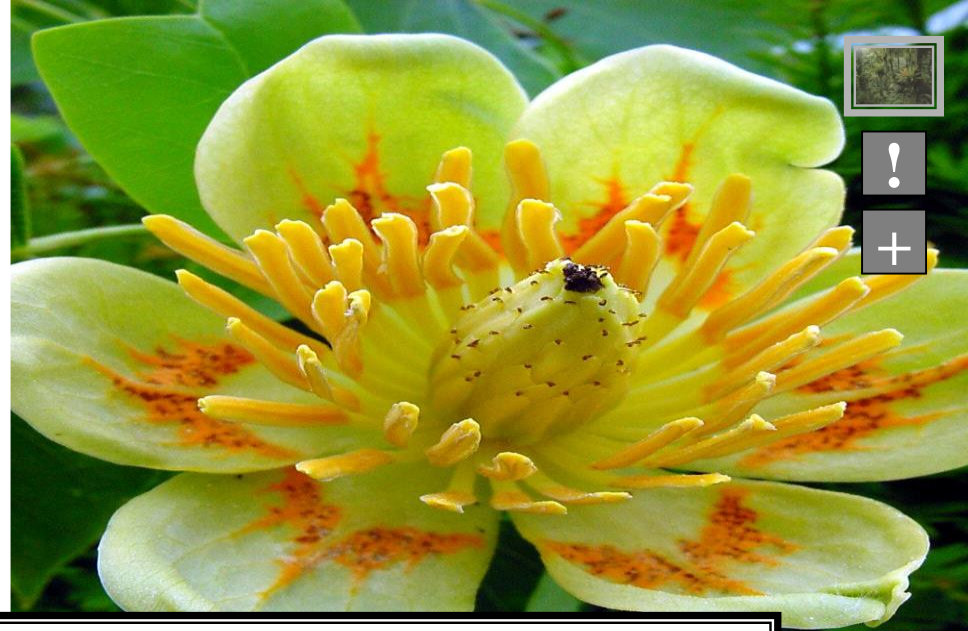
PTERIDOPHYTES





GYMNOSPERMS





ANGIOSPERMS





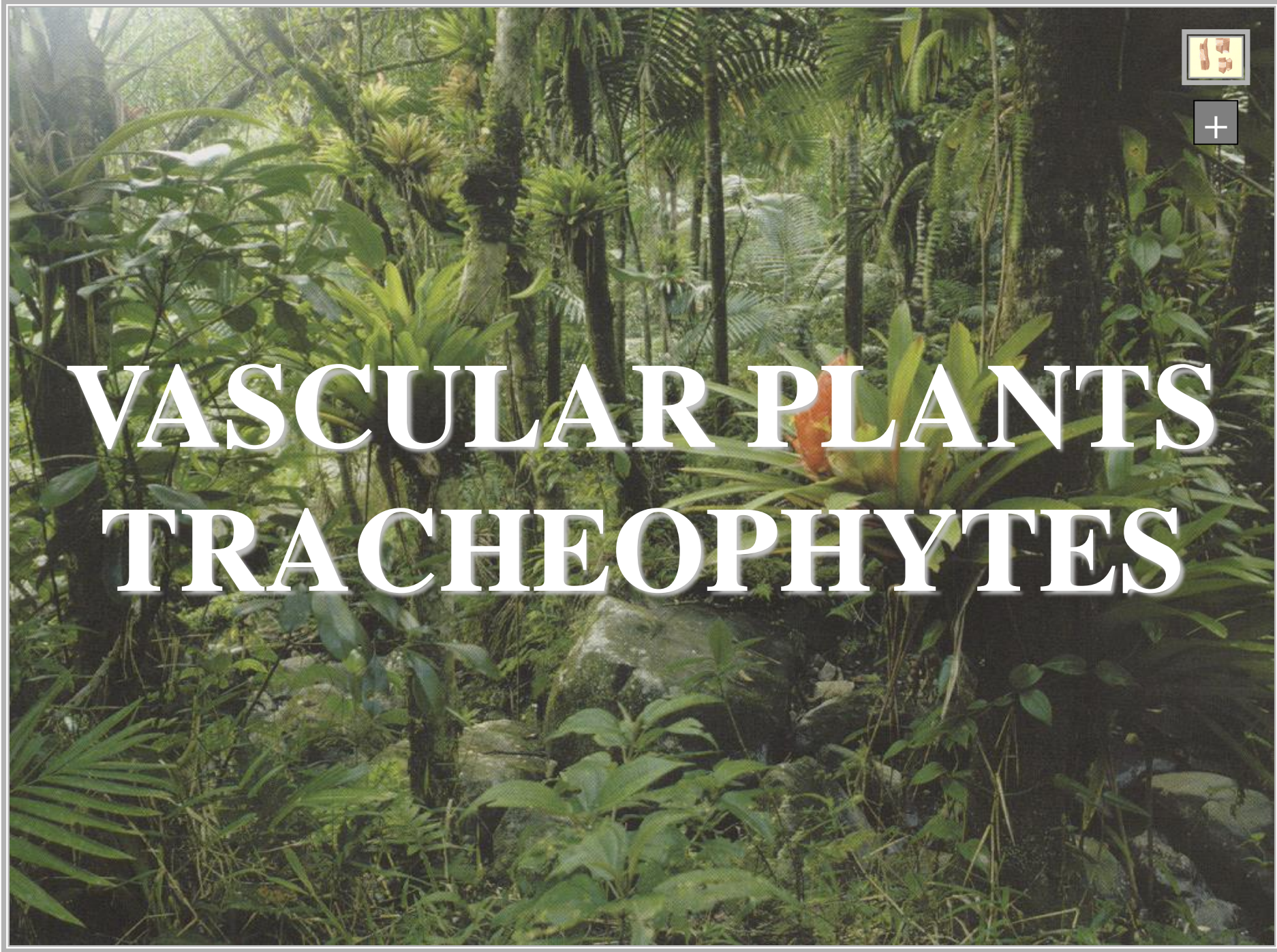
TRACHEIDS KNOWN TO MOST VASCULAR PLANTS

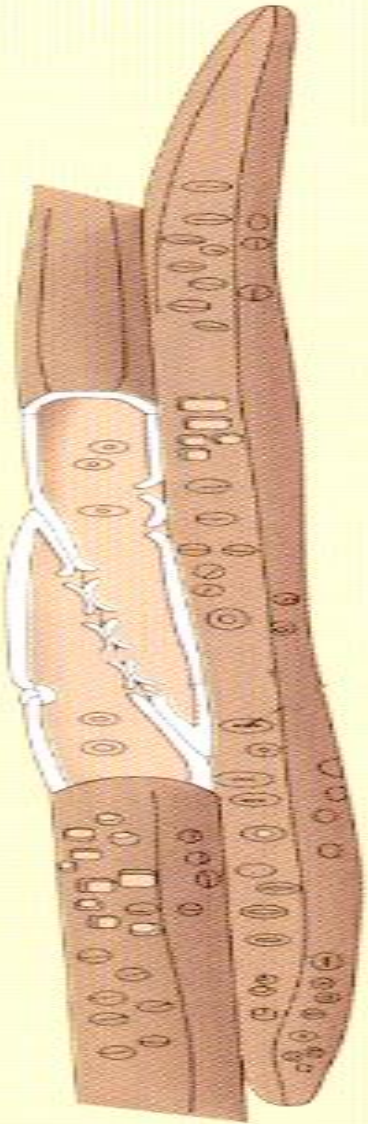
VASCULAR PLANTS

?

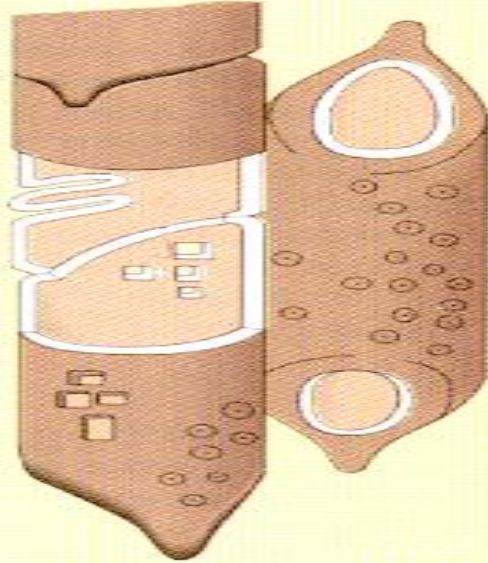
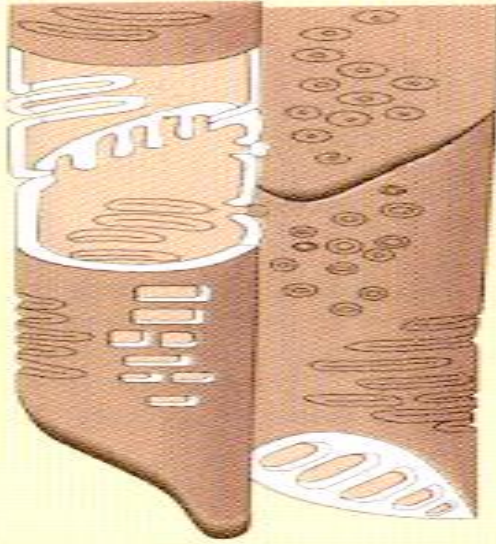


VASCULAR PLANTS TRACHEOPHYTES

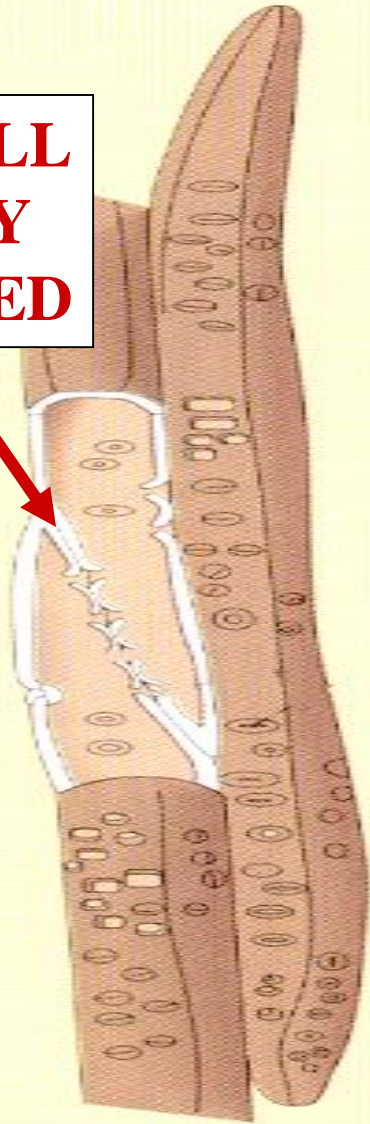




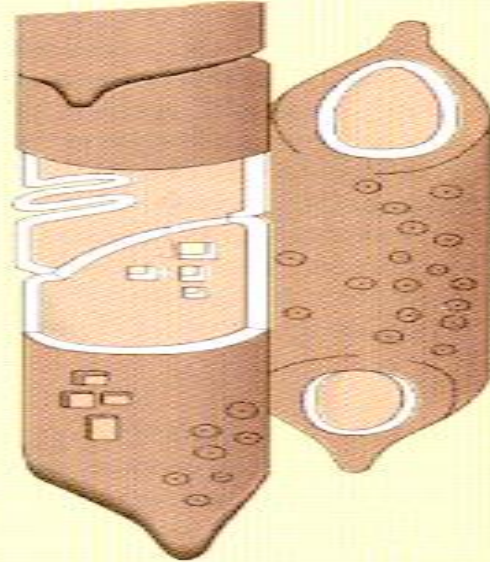
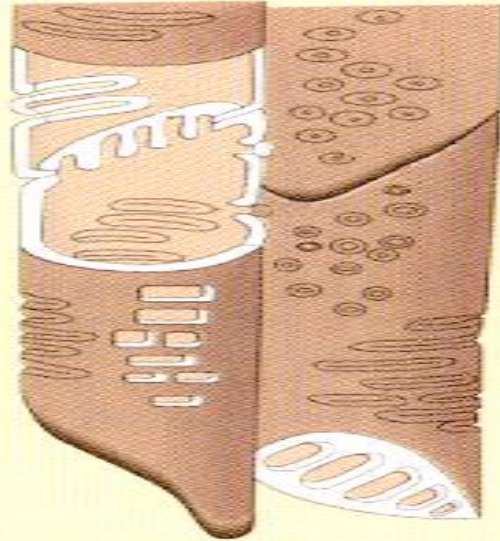
TRACHEID



**END WALL
HIGHLY
TAPPERED**



TRACHEID



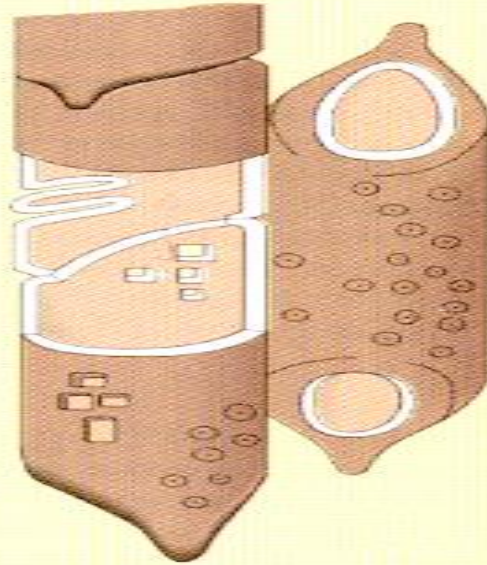
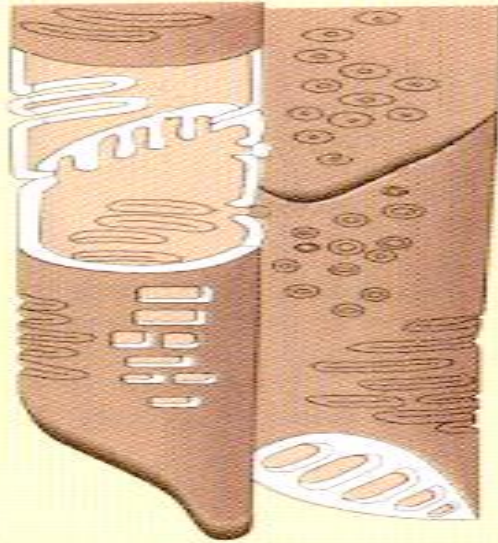
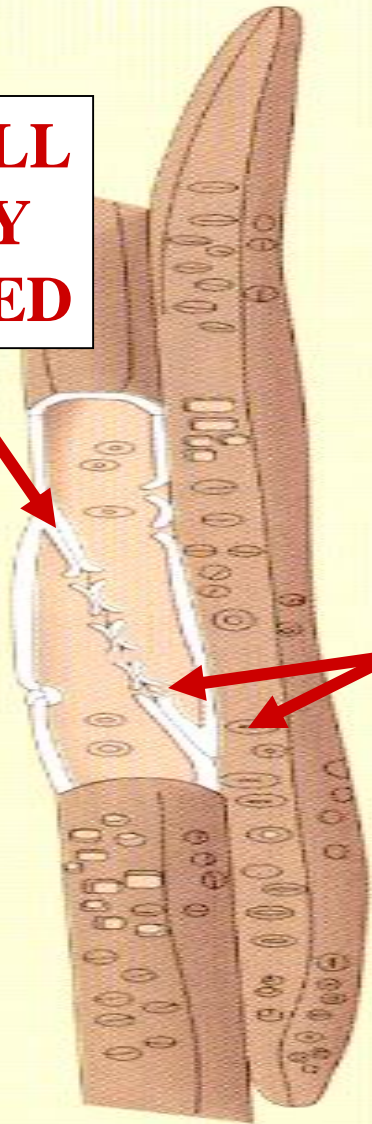
**END WALL
HIGHLY
TAPPERED**



PITS



TRACHEID

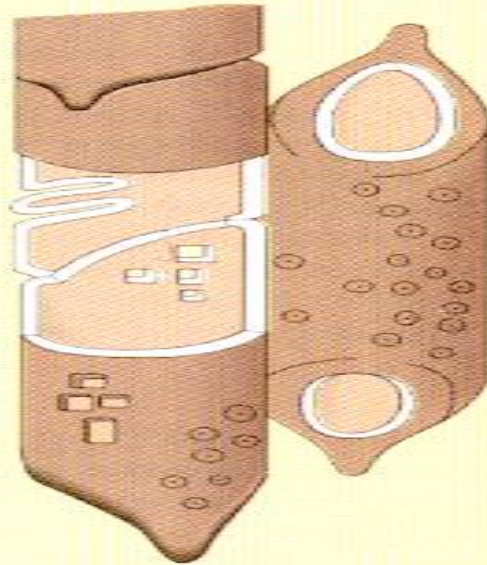
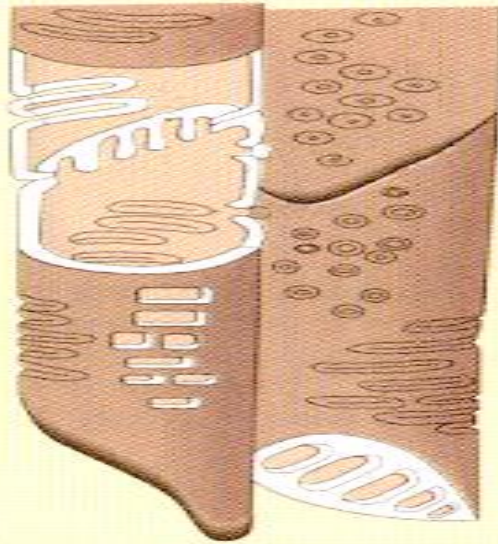
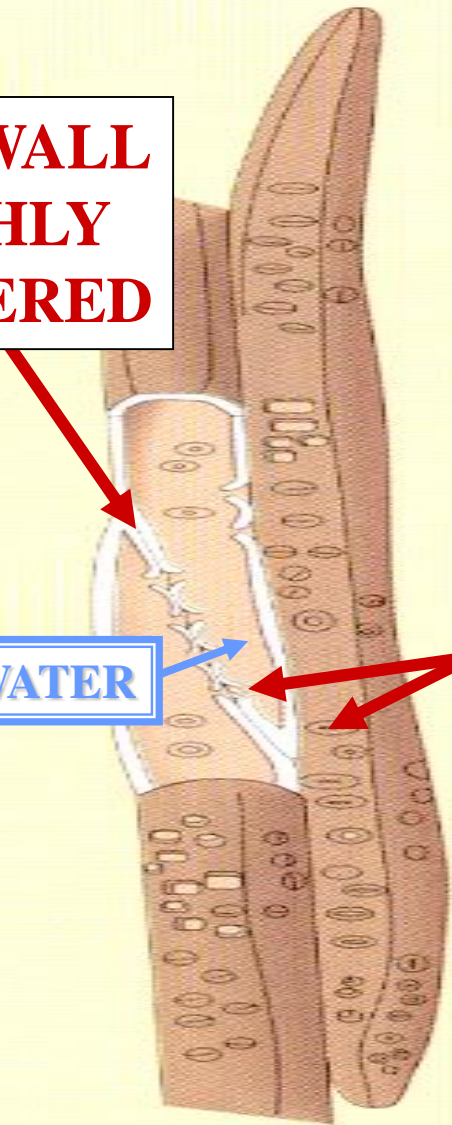


**END WALL
HIGHLY
TAPPERED**

WATER

PITS

TRACHEID



VESSEL MEMBER

TRACHEARY ELEMENT VESSEL MEMBER



KNOWN VARIOUS VASCULAR PLANTS

**TRACHEARY ELEMENT
VESSEL MEMBER**