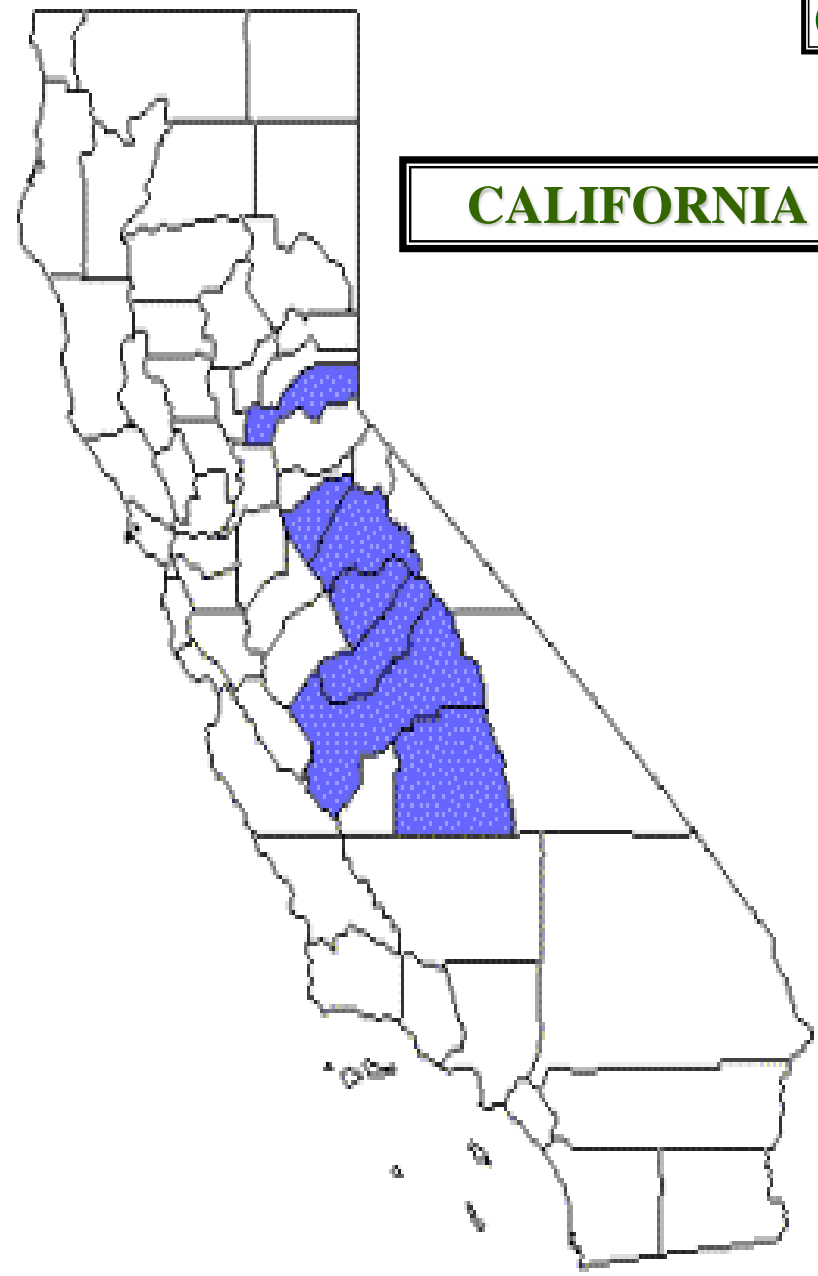
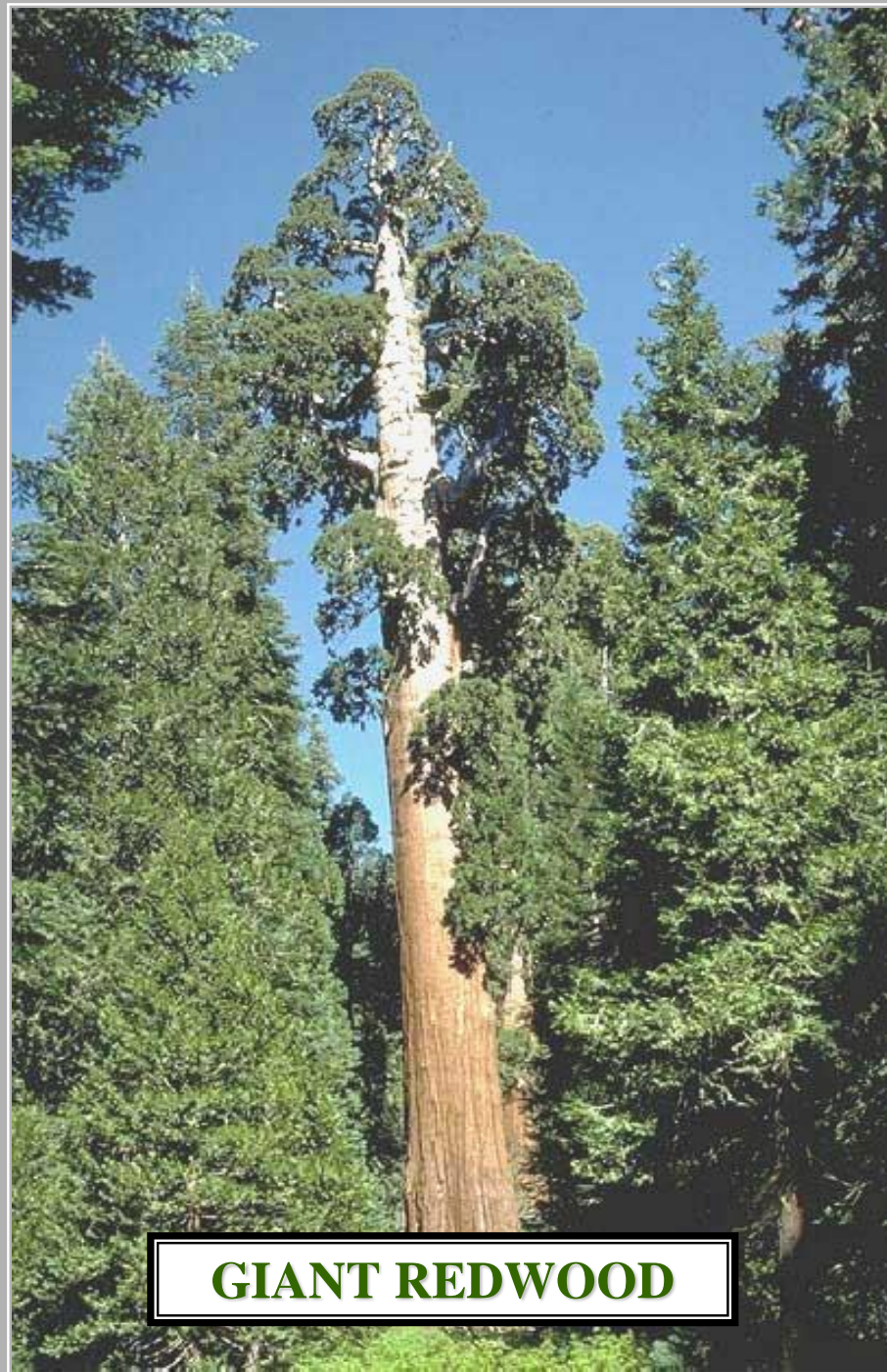


*SEQUIADENDRON
GIGANTEUM*

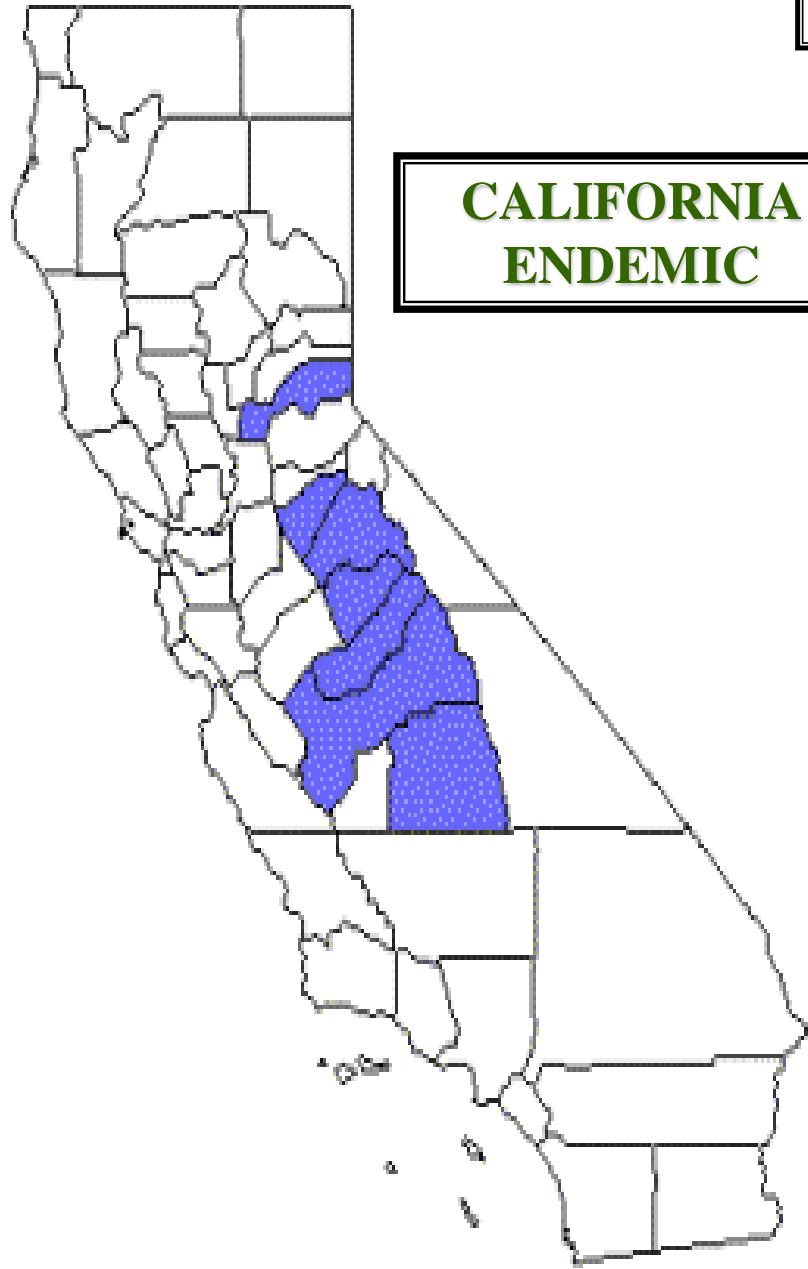
G



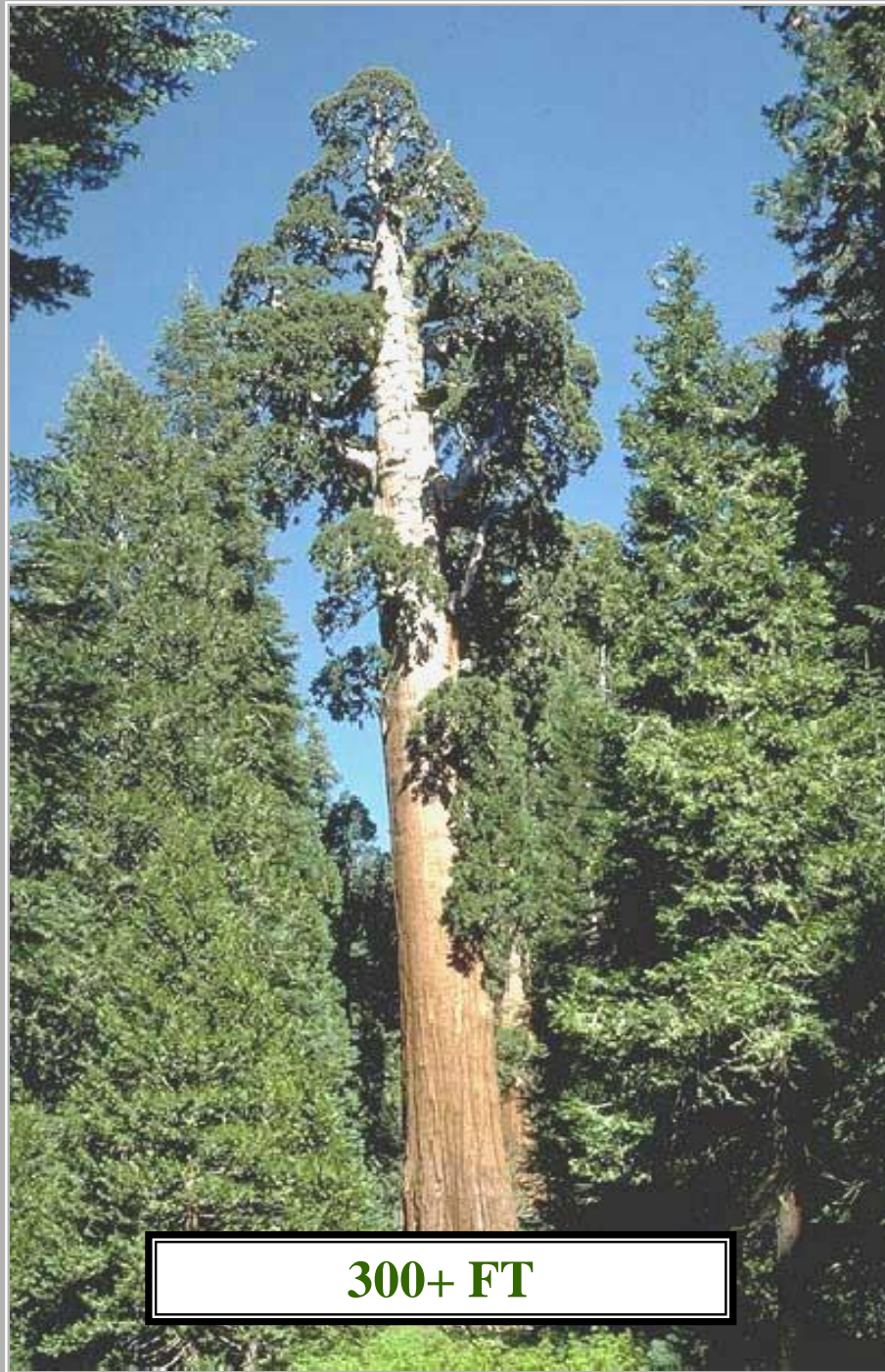
CALIFORNIA



GIANT REDWOOD



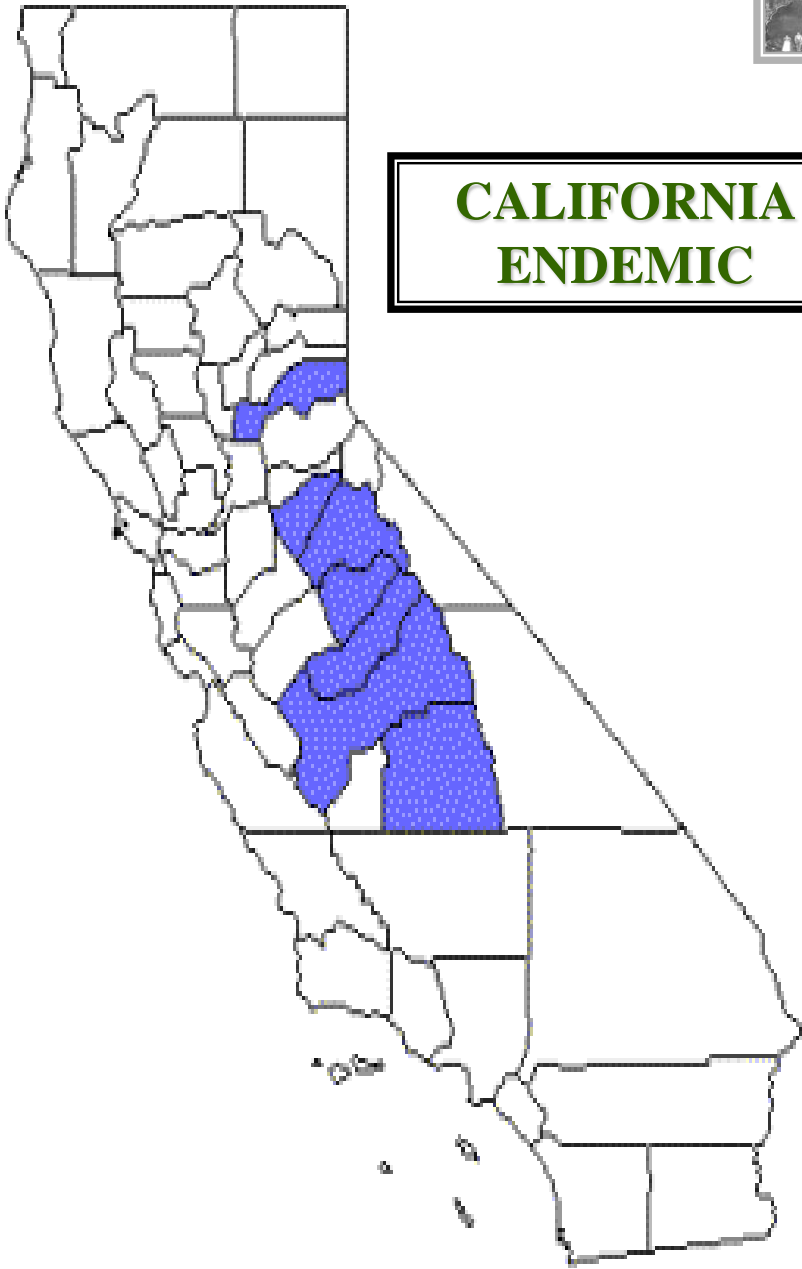
**CALIFORNIA
ENDEMIC**



300+ FT



**CALIFORNIA
ENDEMIC**



SEQUIADENDRON





OLDEST TRACHEOPHYTES



B

PINUS LONGAVA



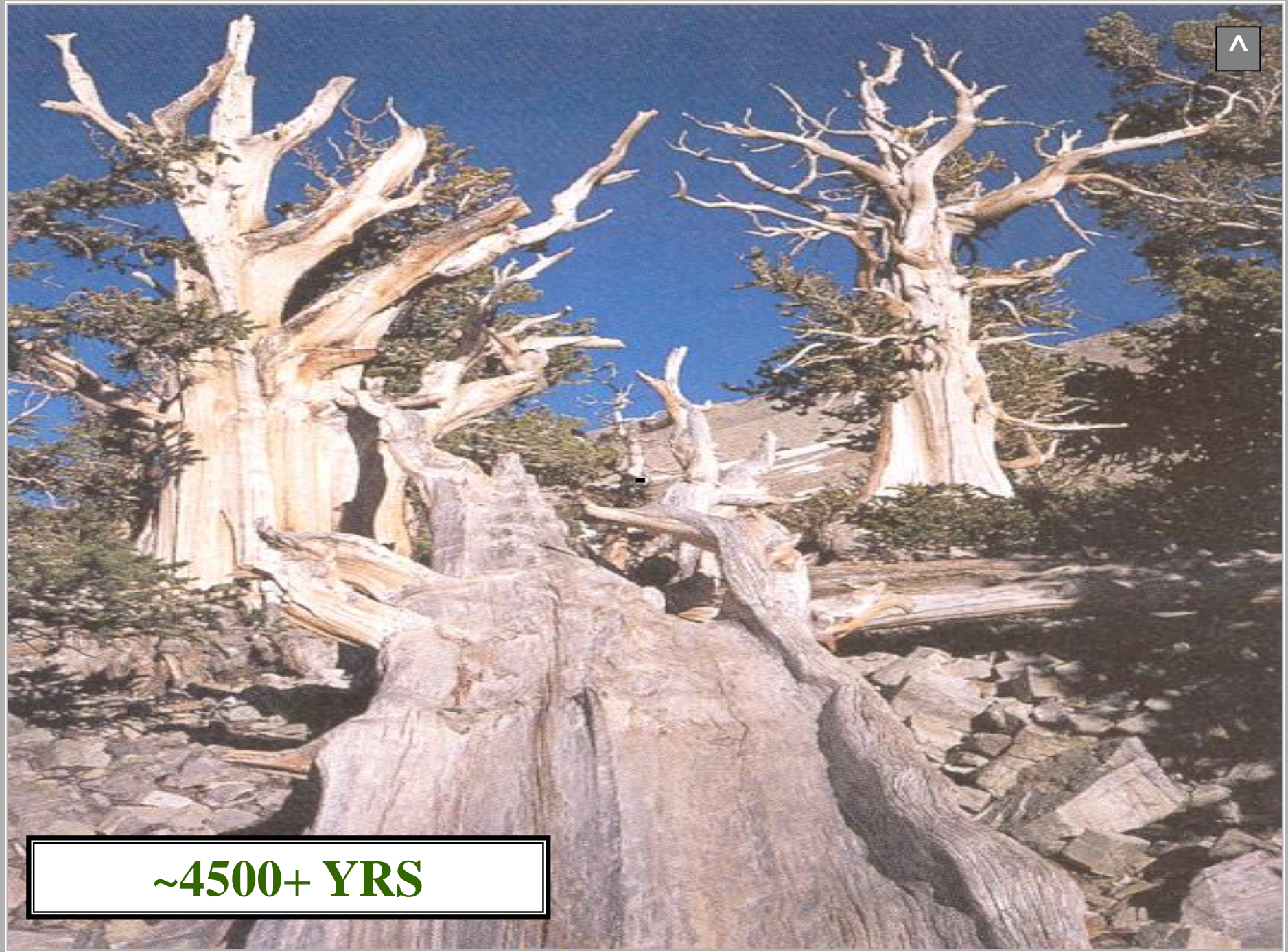
BRISTLECONE PINE



4



US ENDEMIC



~4500+ YRS

DENDROCHRONOLOGY

DENDROCHRONOLOGY



PINOPHYTA
DENDROCHRONOLOGY

**GROWTH RING
STUDIES**

PINOPHYTA
DENDROCHRONOLOGY



PINUS LONGAeva



**STUDY
CLIMATE PATTERNS**



D

DISTRIBUTION

A high-resolution satellite image of Earth from space, showing the curvature of the planet, blue oceans, white clouds, and brownish-green landmasses. The image is centered on the Atlantic Ocean, with parts of North and South America visible.

DOMINATELY TEMPERATE

EARTH

TAIGA FOREST

TAIGA FOREST

PINOPHYTA
TAIGA FOREST



DOMINANT
ARBORESCENT
SPRUCE & FIR

PINOPHYTA
TAIGA FOREST



TAIGA FOREST



TAIGA FOREST SPRUCE & FIR FOREST





SPRUCE



SPRUCE



SPRUCE



FIR



FIR



FIR



FIR

L

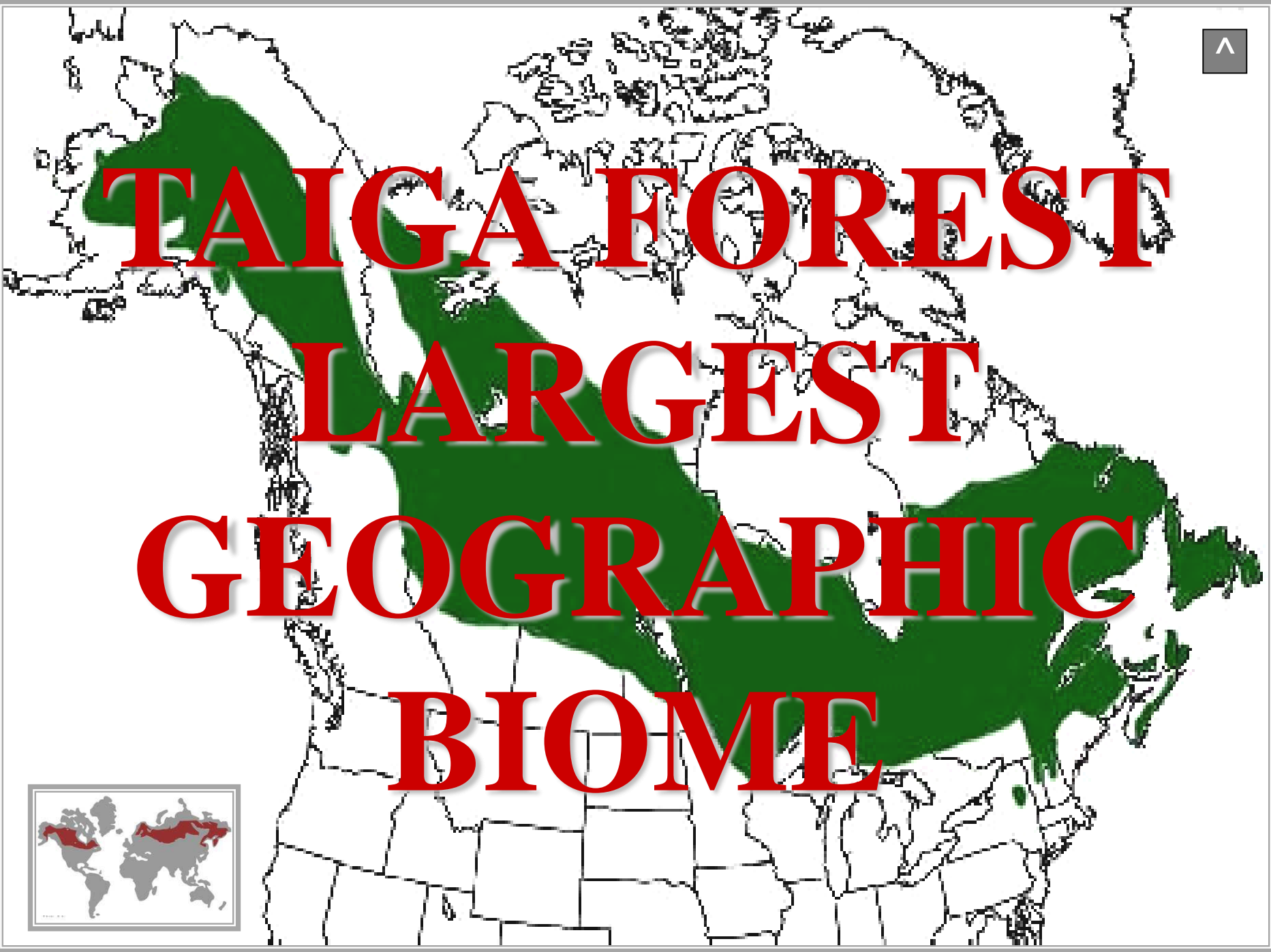
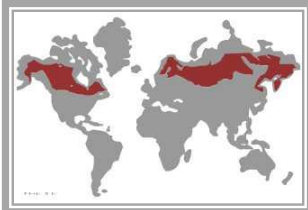
+

TAIGA FOREST





**TAIGA FOREST
LARGEST
GEOGRAPHIC
BIOME**



SOUTHERN PINE FOREST

**SOUTHERN
PINE FOREST**

PINOPHYTA



SOUTHERN PINE FOREST

DOMINANT

ARBORESCENT

LONGLEAF PINE

PINOPHYTA

SOUTHERN PINE FOREST

SOUTHERN PINE FOREST LONGLEAF PINE

LEAF OVER 12 INCHES IN LENGTH



SOUTHERN PINE FOREST

LONGLEAF PINE

SOUTHERN PINE FOREST

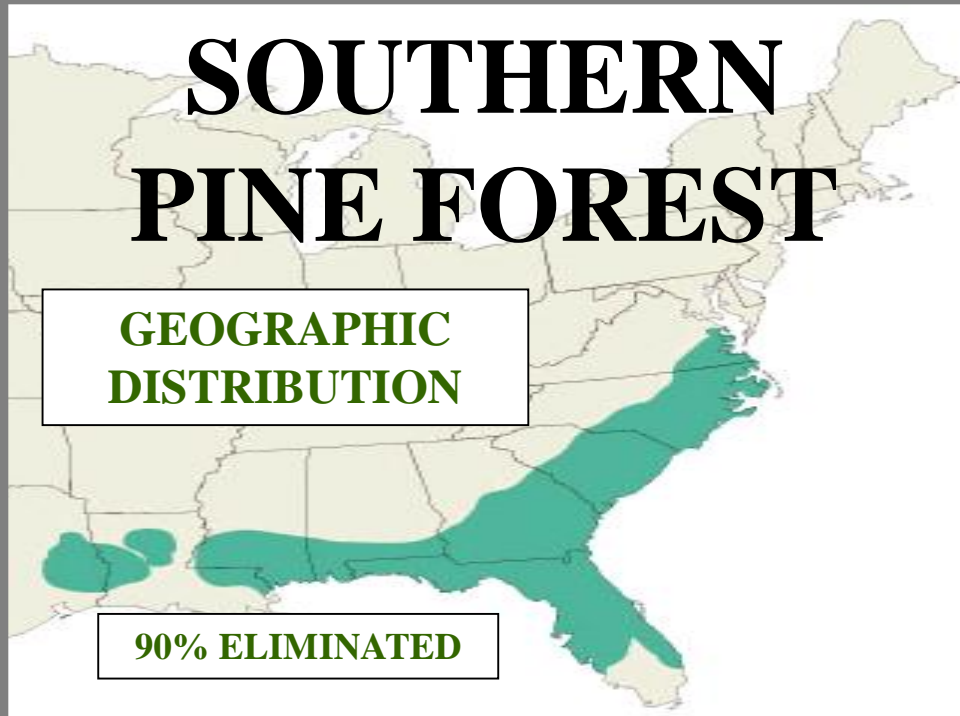
LONGLEAF PINE



SOUTHERN PINE FOREST

**GEOGRAPHIC
DISTRIBUTION**

90% ELIMINATED



SOUTHERN PINE FOREST

LONGLEAF PINE

SOUTHERN PINE FOREST

LONGLEAF PINE

L

+

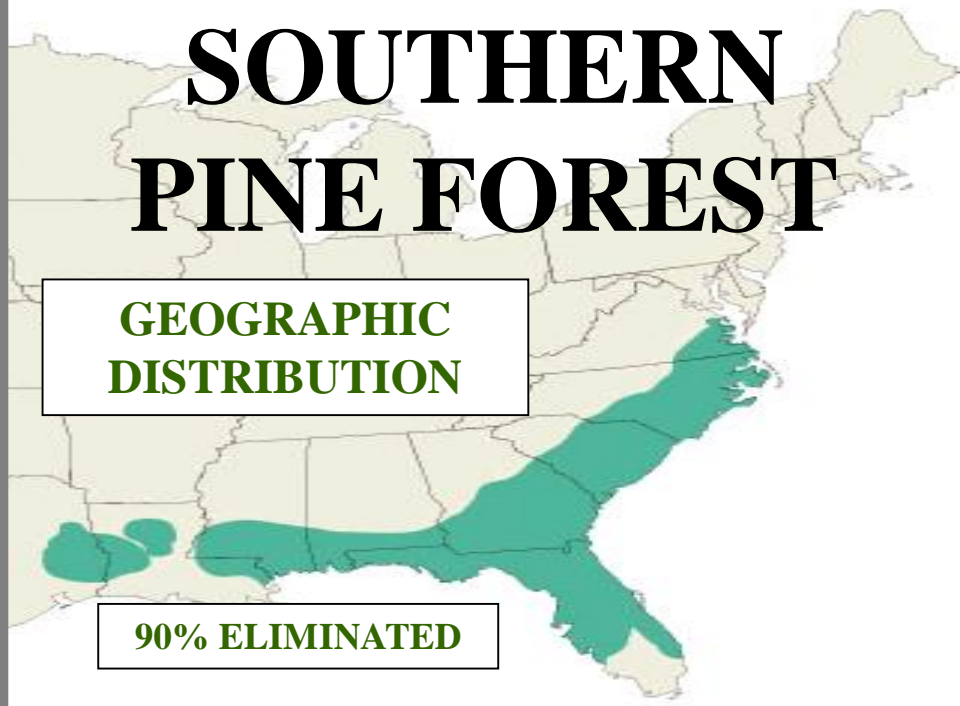


**RED-COCKADED
WOODPECKER
ENDANGERED**

SOUTHERN PINE FOREST

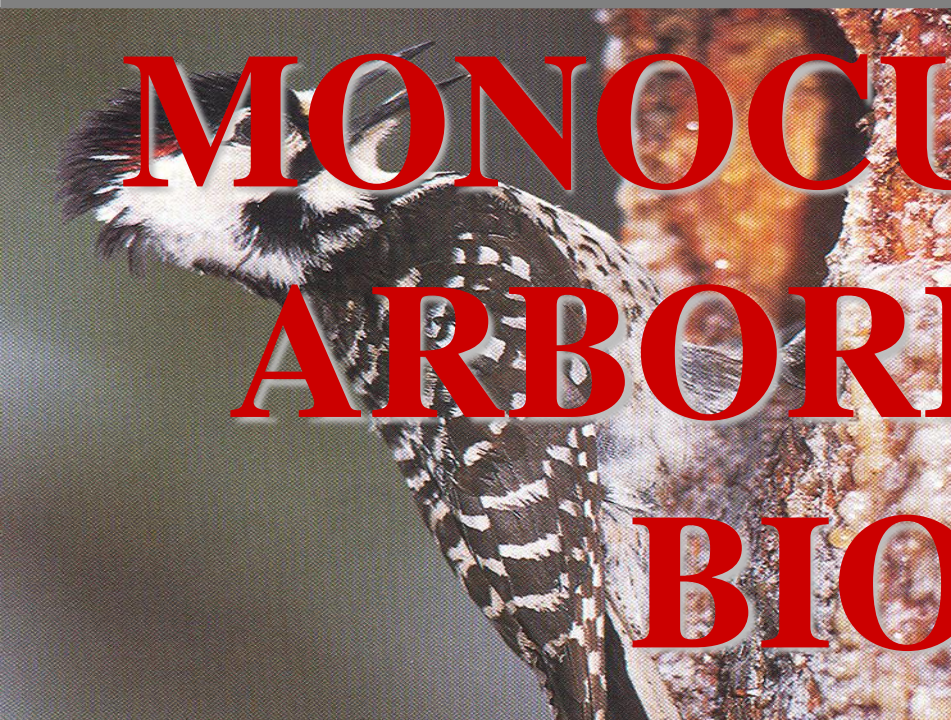
**GEOGRAPHIC
DISTRIBUTION**

90% ELIMINATED





**SOUTHERN
PINE FOREST
LARGEST**

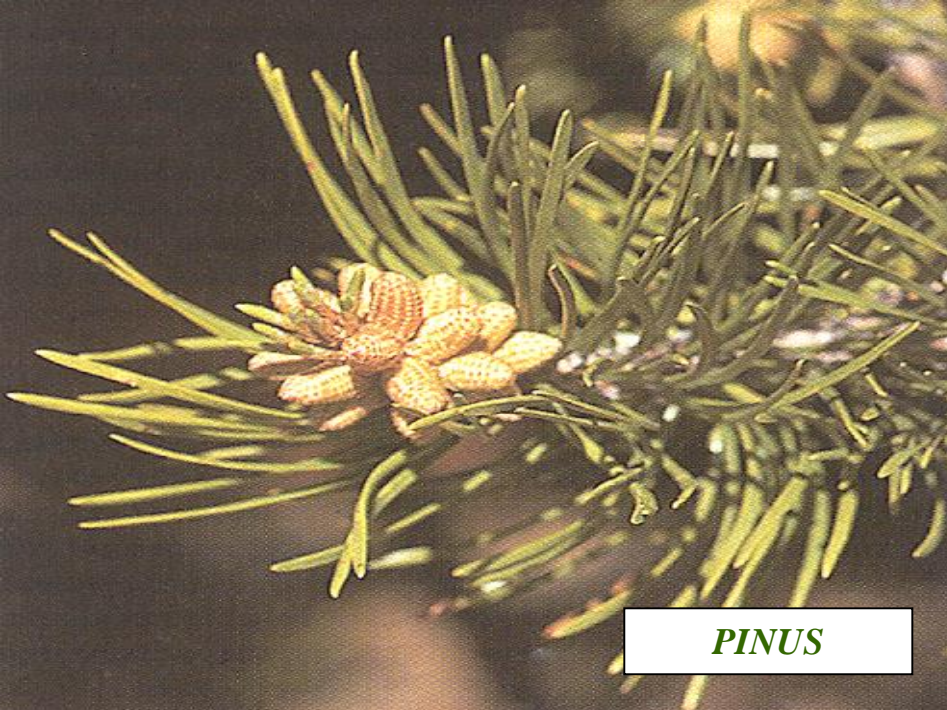
A photograph of a Southern Pine Forest landscape. The foreground is filled with dense, green and yellowish vegetation, likely a mix of grasses and small shrubs. In the background, a dense stand of tall, thin pine trees stretches across the horizon under a clear blue sky.

**MONOCULTURED
ARBORESCENT
BIOME**

A photograph of a woodpecker perched on a tree trunk. The woodpecker has black and white feathers and is facing left. The tree trunk is covered in rough, textured bark.



HABITAT



PINUS



XF

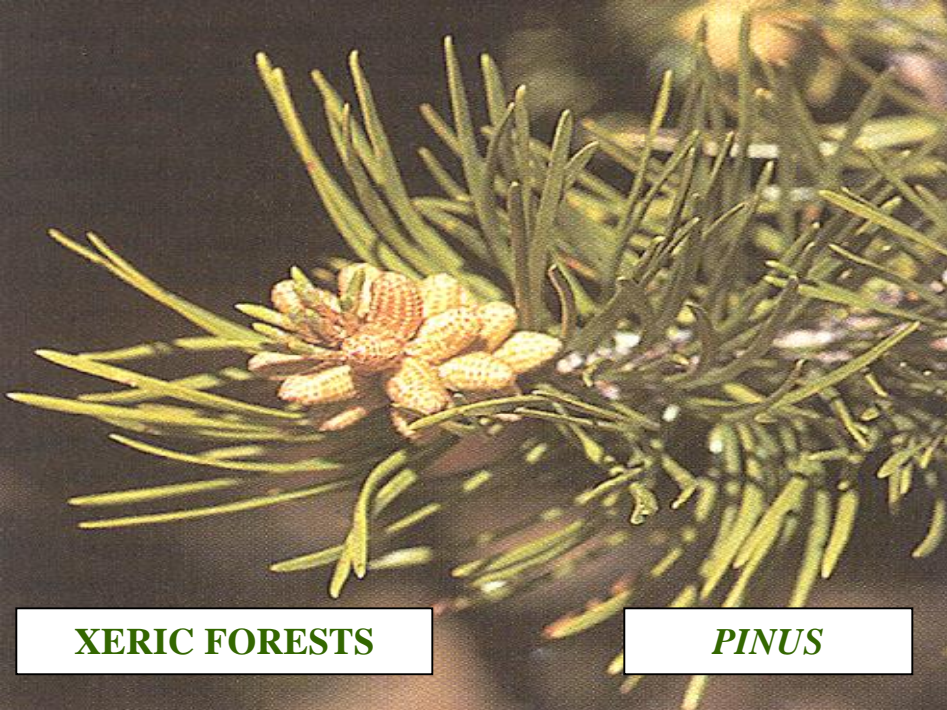
JUNIPERUS



TSUGA



TAXODIUM



XERIC FORESTS

PINUS



XG

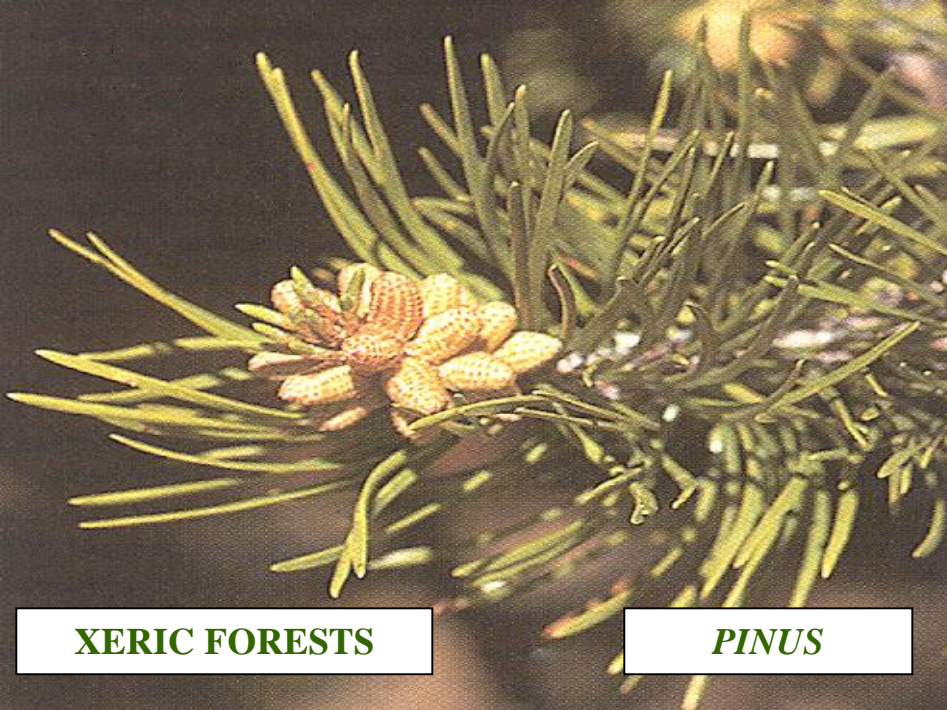
JUNIPERUS



TSUGA



TAXODIUM



XERIC FORESTS

PINUS



MF

XERIC GLADES

JUNIPERUS



TSUGA



TAXODIUM



XERIC FORESTS

PINUS



CS

XERIC GLADES

JUNIPERUS

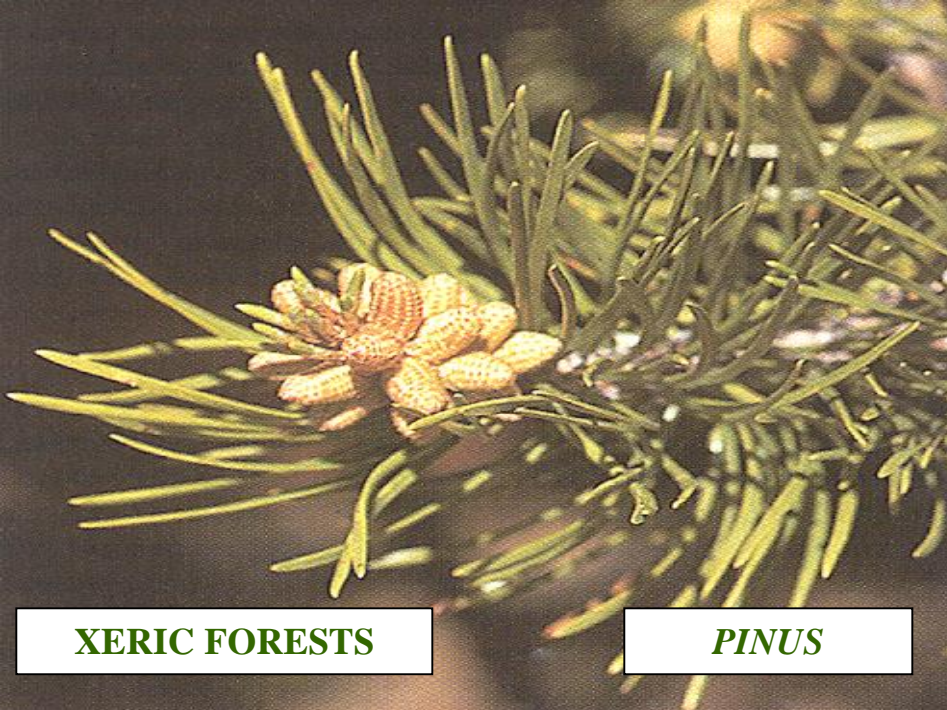


MESIC FORESTS

TSUGA



TAXODIUM



XERIC FORESTS

PINUS



XERIC GLADES

JUNIPERUS



MESIC FORESTS

TSUGA



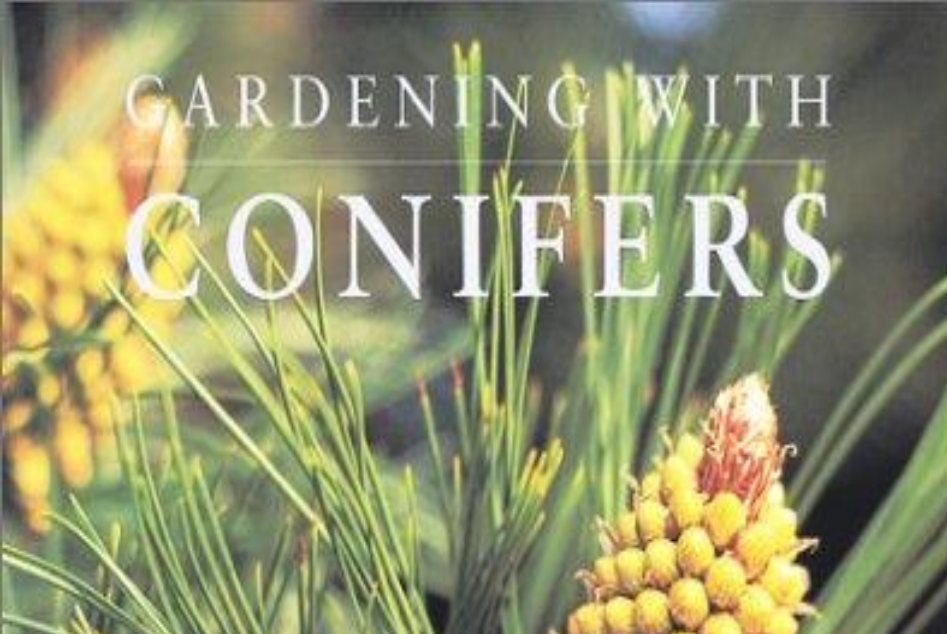
CYPRESS SWAMPS

TAXODIUM



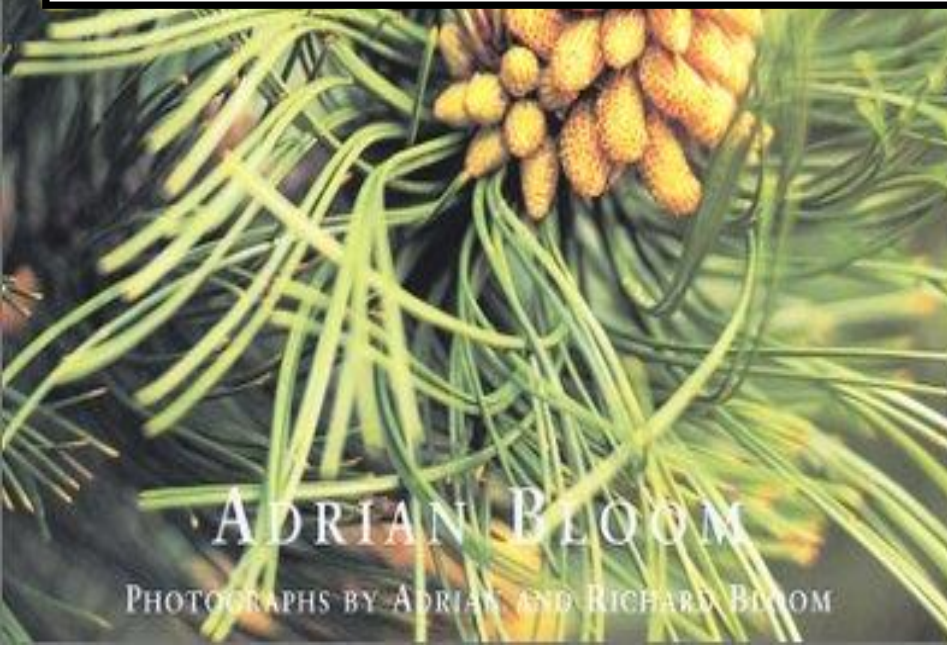
ECONOMIC IMPORTANCE

GARDENING WITH
CONIFERS



L

ORNAMENTALS



ADRIAN BLOOM

PHOTOGRAPHS BY ADRIAN AND RICHARD BLOOM





EXCELLENT LUMBER





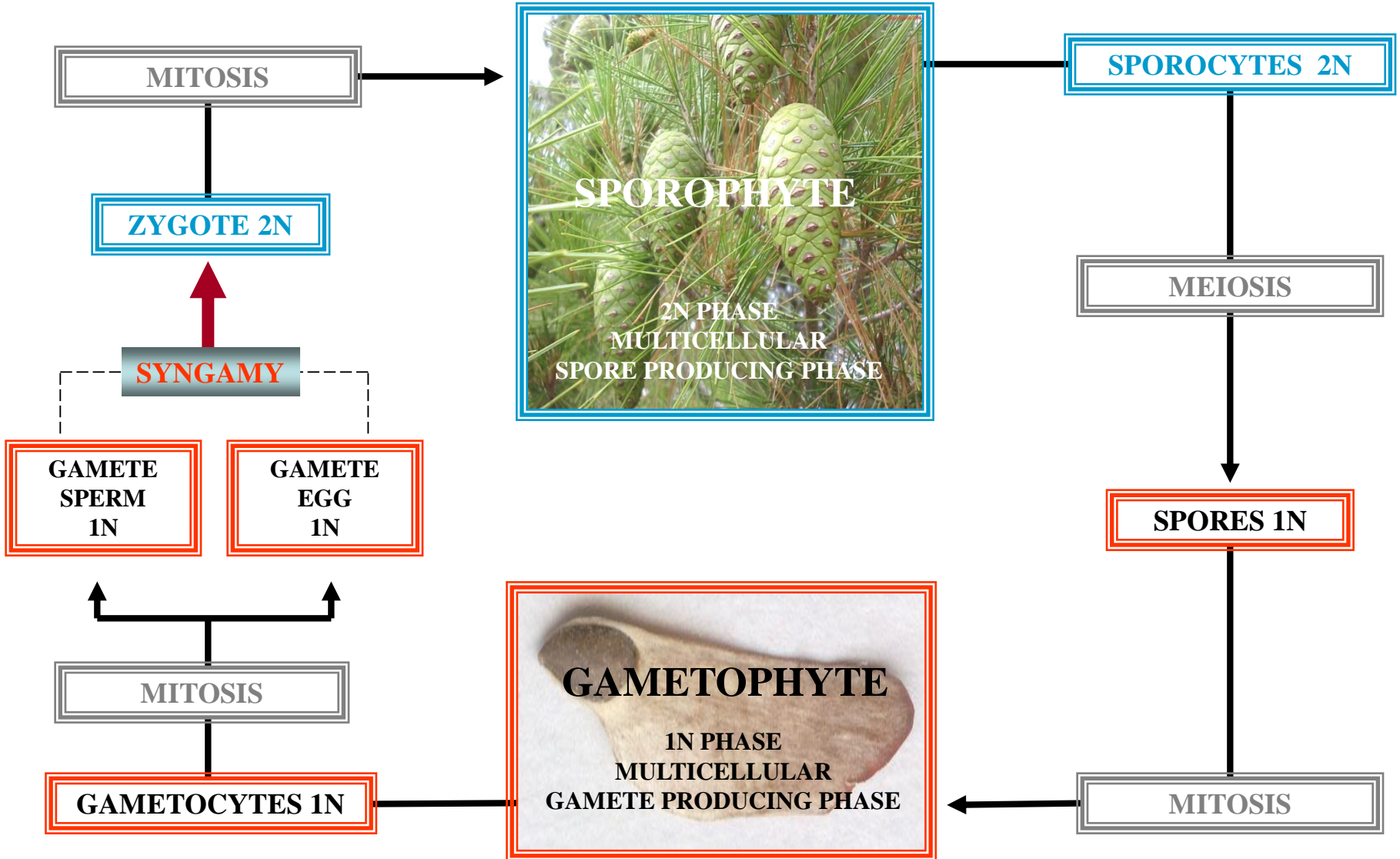
GENERAL CHARACTERS



PINUS
WILL BE USED TO
CHARACTERIZE
PINOPHYTA



PINOPHYTA LIFE CYCLE





SPOROPHYTE CHARACTERS



GROWTH FORM

A



EXCURRENT GROWTH FORM

PINUS

**APICAL
DOMINANCE
INDUCED**

PLANT HORMONE
AUXIN
INHIBITS

LATERAL STEM GROWTH



PLANT HORMONE
AUXIN
INHIBITS

LATERAL STEM GROWTH

PINUS

M

**HIGH
AUXIN
CONTENT**

**APICAL
DOMINANCE
INDUCED**

PLANT HORMONE
AUXIN
INHIBITS
LATERAL STEM GROWTH



PINUS

L

**HIGH
AUXIN
CONTENT**

**MODERATE
AUXIN
CONTENT**



**APICAL
DOMINANCE
INDUCED**

PLANT HORMONE
AUXIN
INHIBITS
LATERAL STEM GROWTH

PINUS

+

**HIGH
AUXIN
CONTENT**

**MODERATE
AUXIN
CONTENT**

**LOW
AUXIN
CONTENT**



**APICAL
DOMINANCE
INDUCED**

PLANT HORMONE
AUXIN
INHIBITS
LATERAL STEM GROWTH

PINUS



E

**HIGH
AUXIN
CONTENT**

**LOW
STEM
GROWTH**

**MODERATE
AUXIN
CONTENT**

**MODERATE
STEM
GROWTH**

**LOW
AUXIN
CONTENT**

**HIGH
STEM
GROWTH**





EXCURRENT GROWTH FORM

PINUS



PINUS



CONIFER FOREST



STEM



STEM MORPHOLOGY



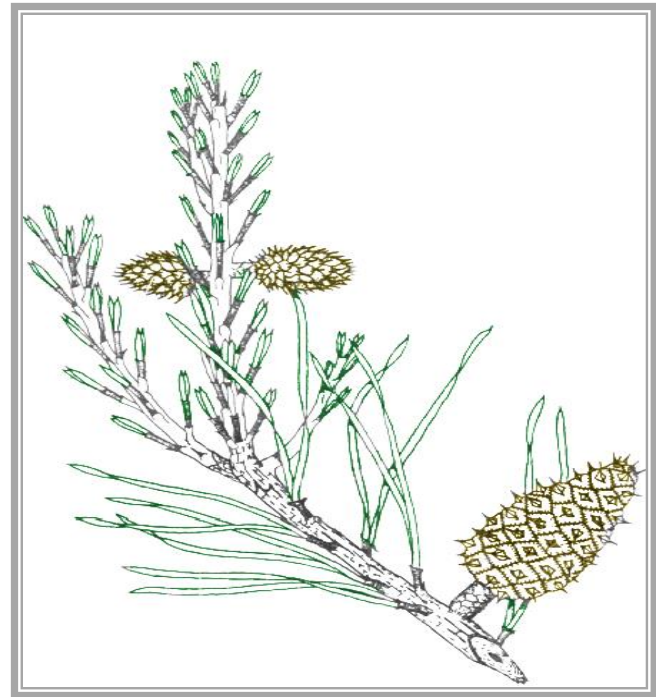
D

DIMORPHIC SHOOTS

PINUS



DIMORPHIC SHOOTS



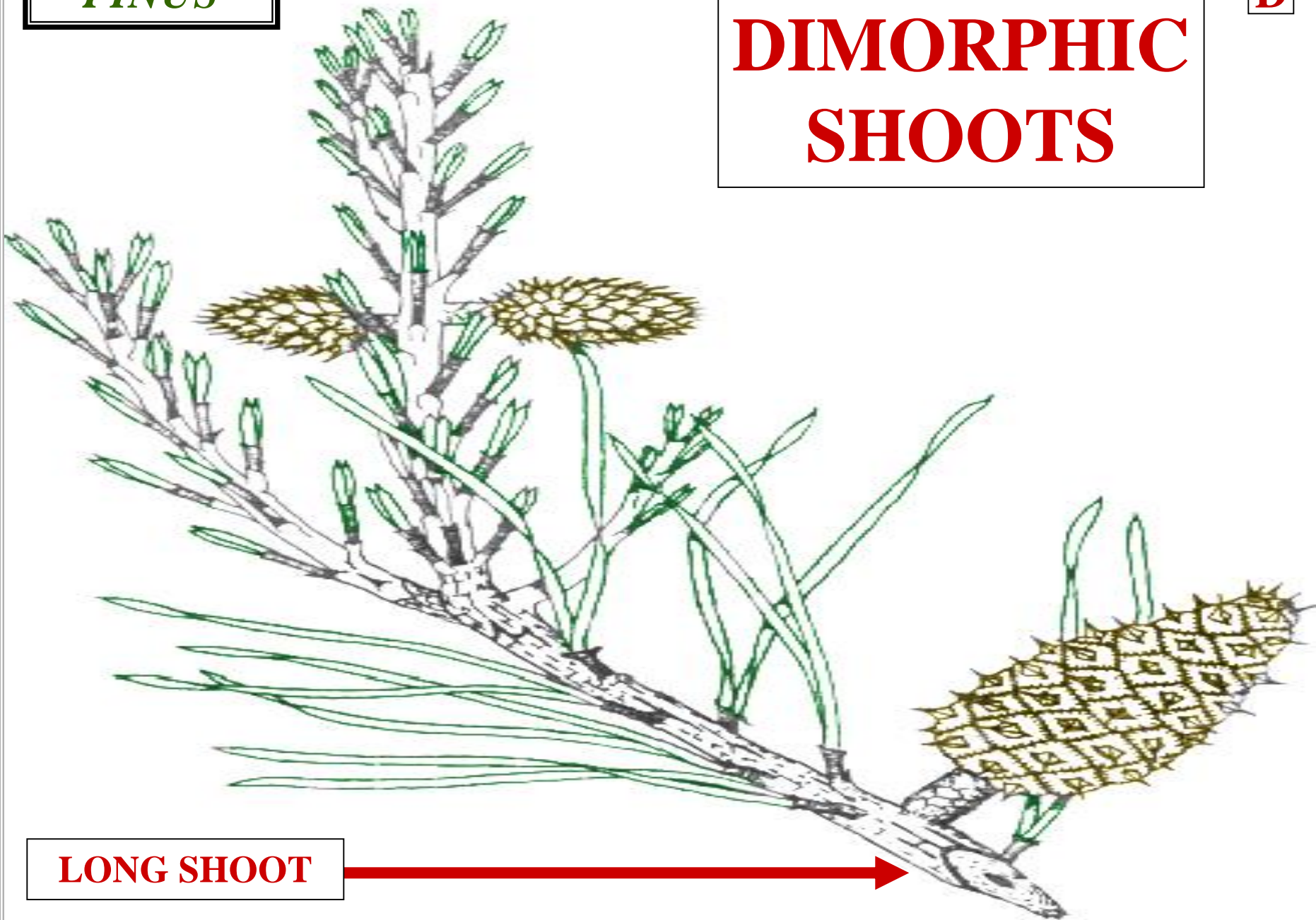


DIMORPHIC LONG SHOOTS

PINUS

D

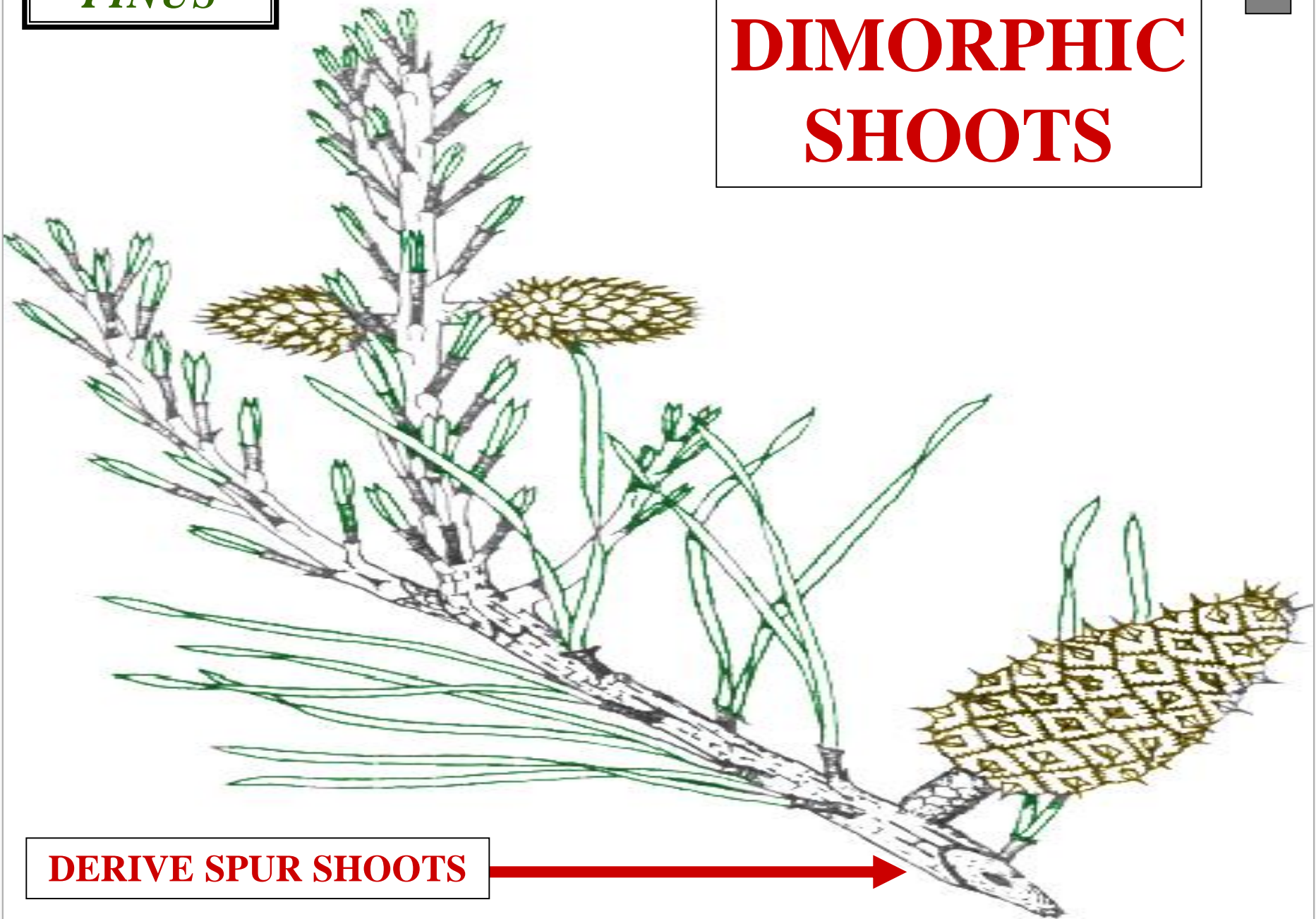
DIMORPHIC SHOOTS



LONG SHOOT

PINUS

DIMORPHIC SHOOTS



DERIVE SPUR SHOOTS



DIMORPHIC SPUR SHOOTS

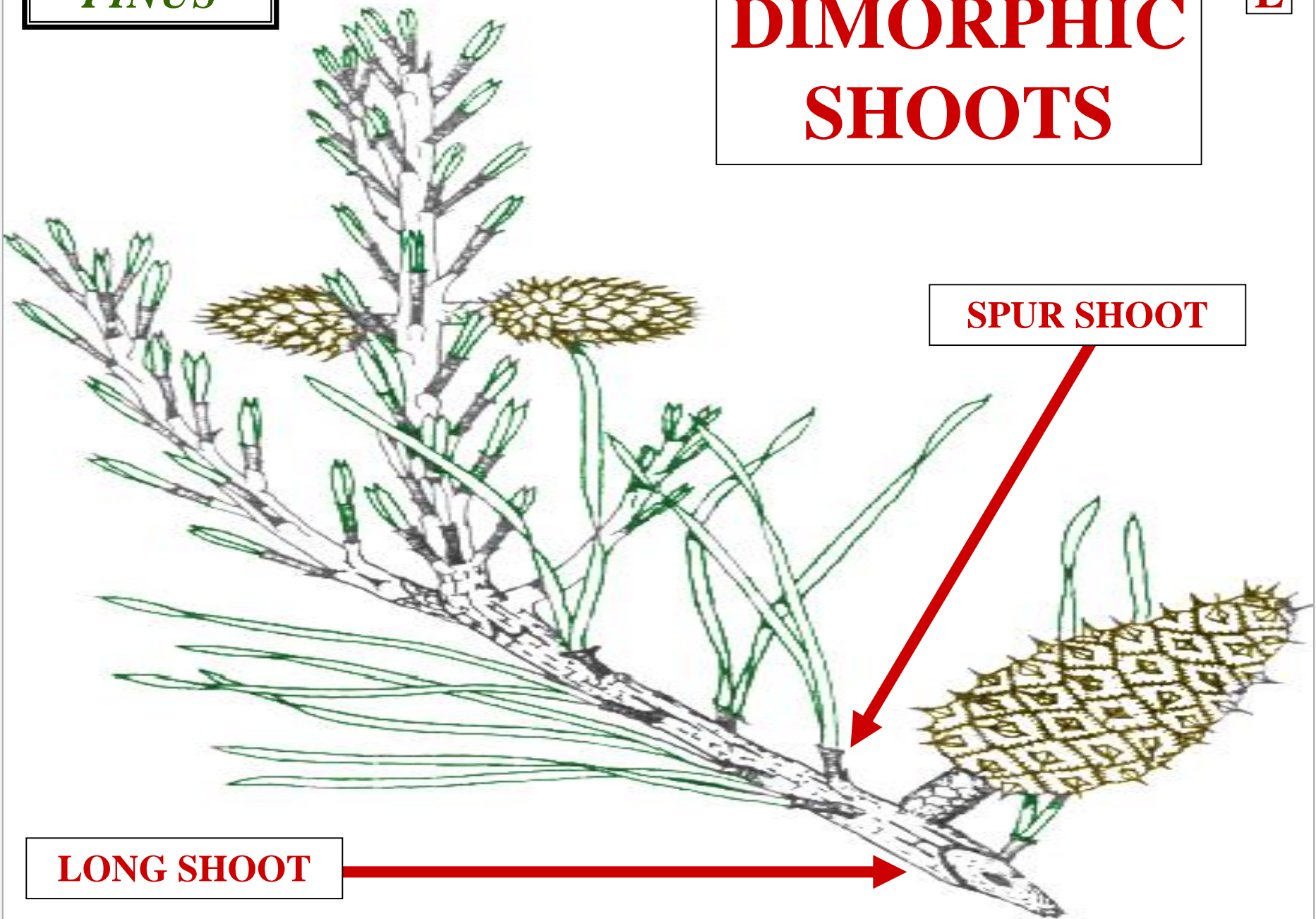
PINUS

DIMORPHIC SHOOTS

L

SPUR SHOOT

LONG SHOOT



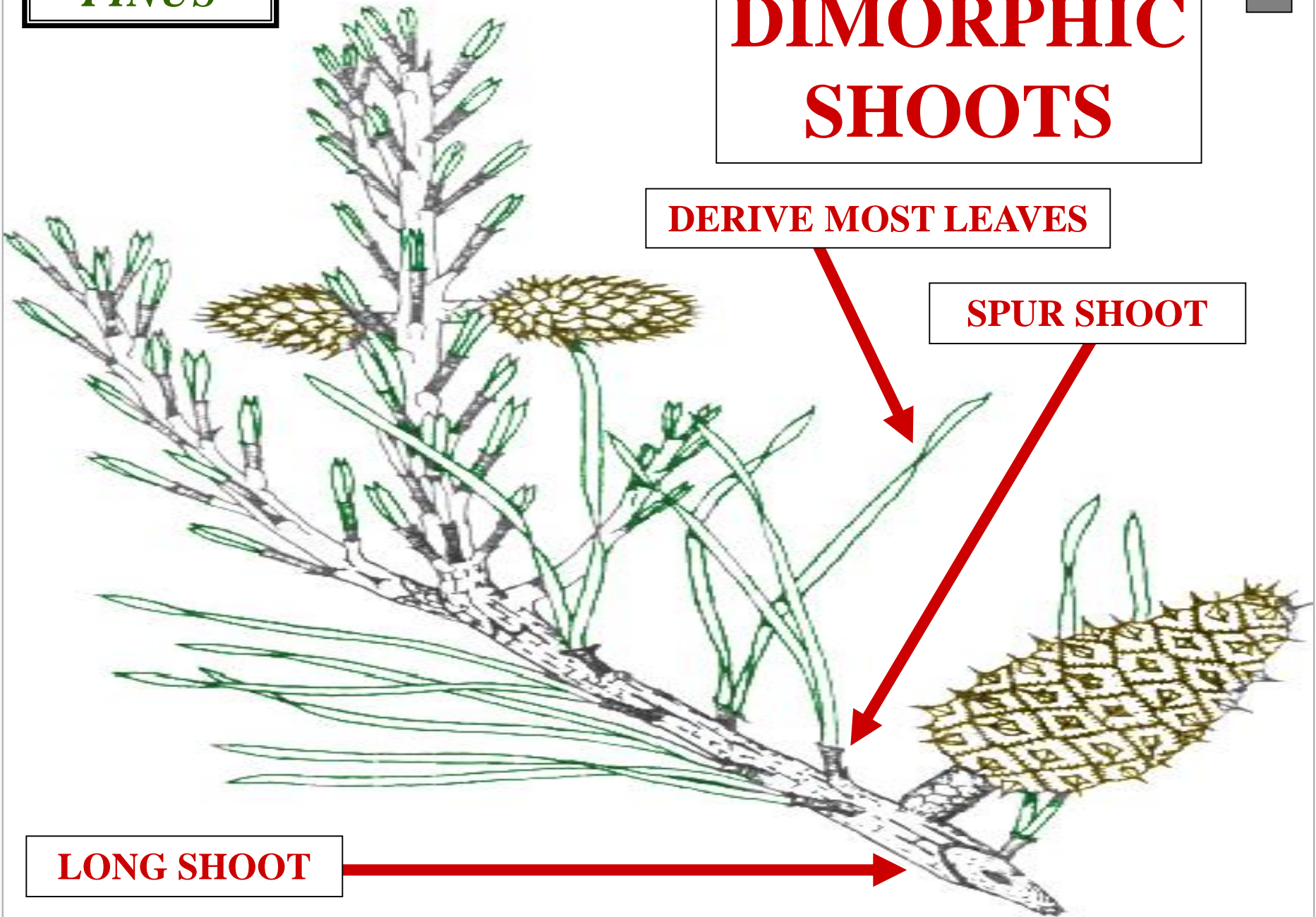
PINUS



DIMORPHIC SHOOTS

DERIVE MOST LEAVES

SPUR SHOOT



LONG SHOOT



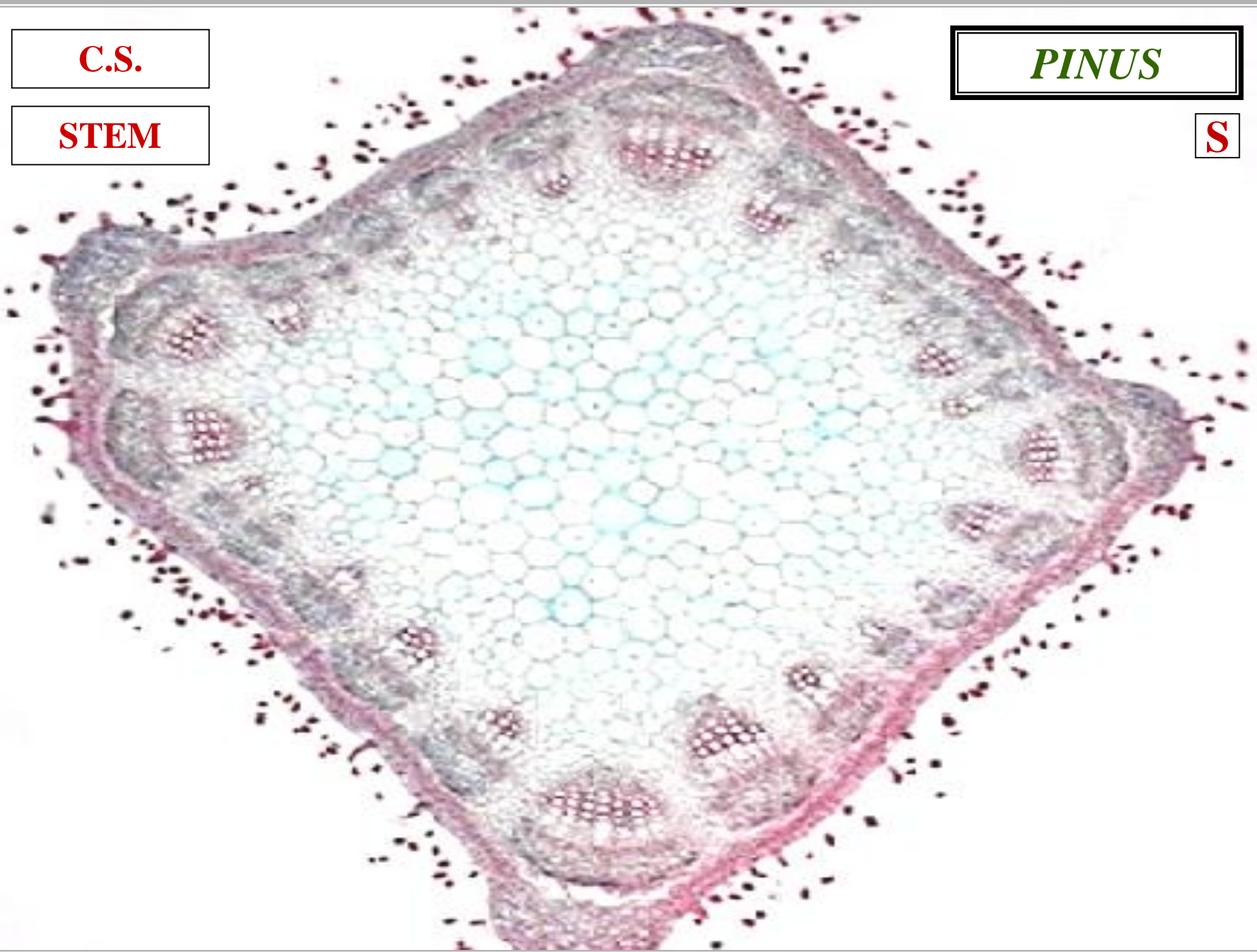
STEM STELE

C.S.

STEM

PINUS

S



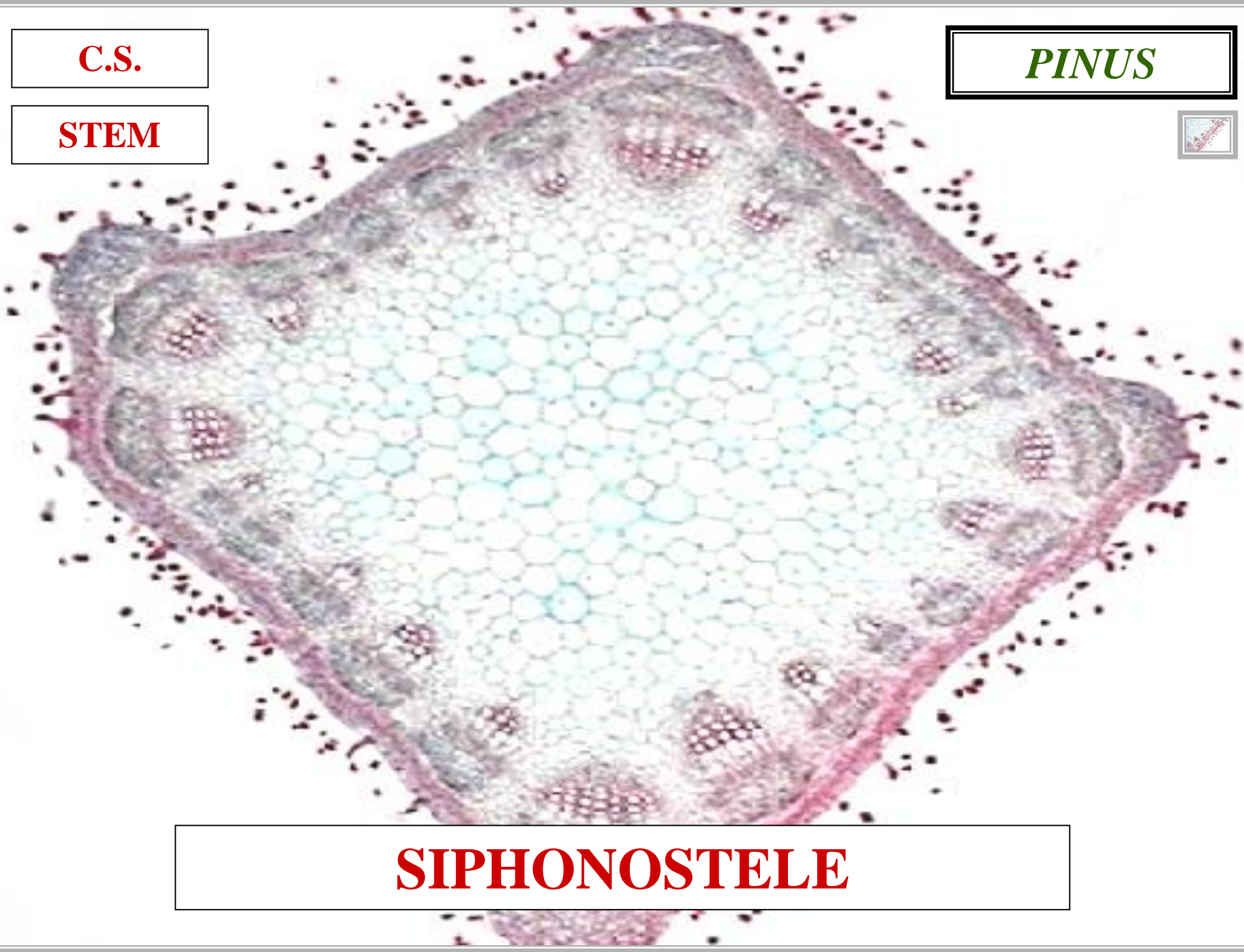
C.S.

STEM

PINUS



SIPHONOSTELE



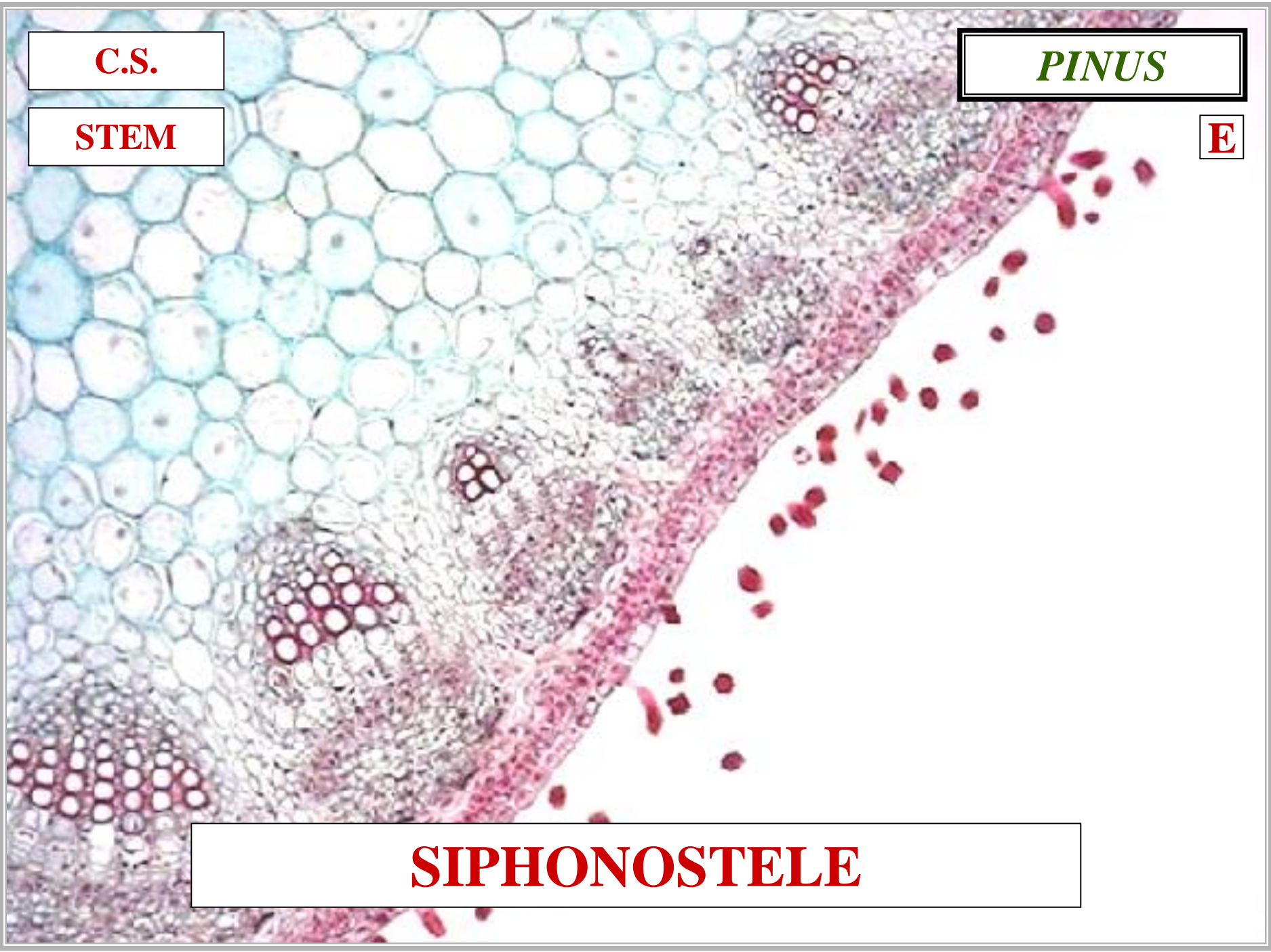
C.S.

STEM

PINUS

E

SIPHONOSTELE



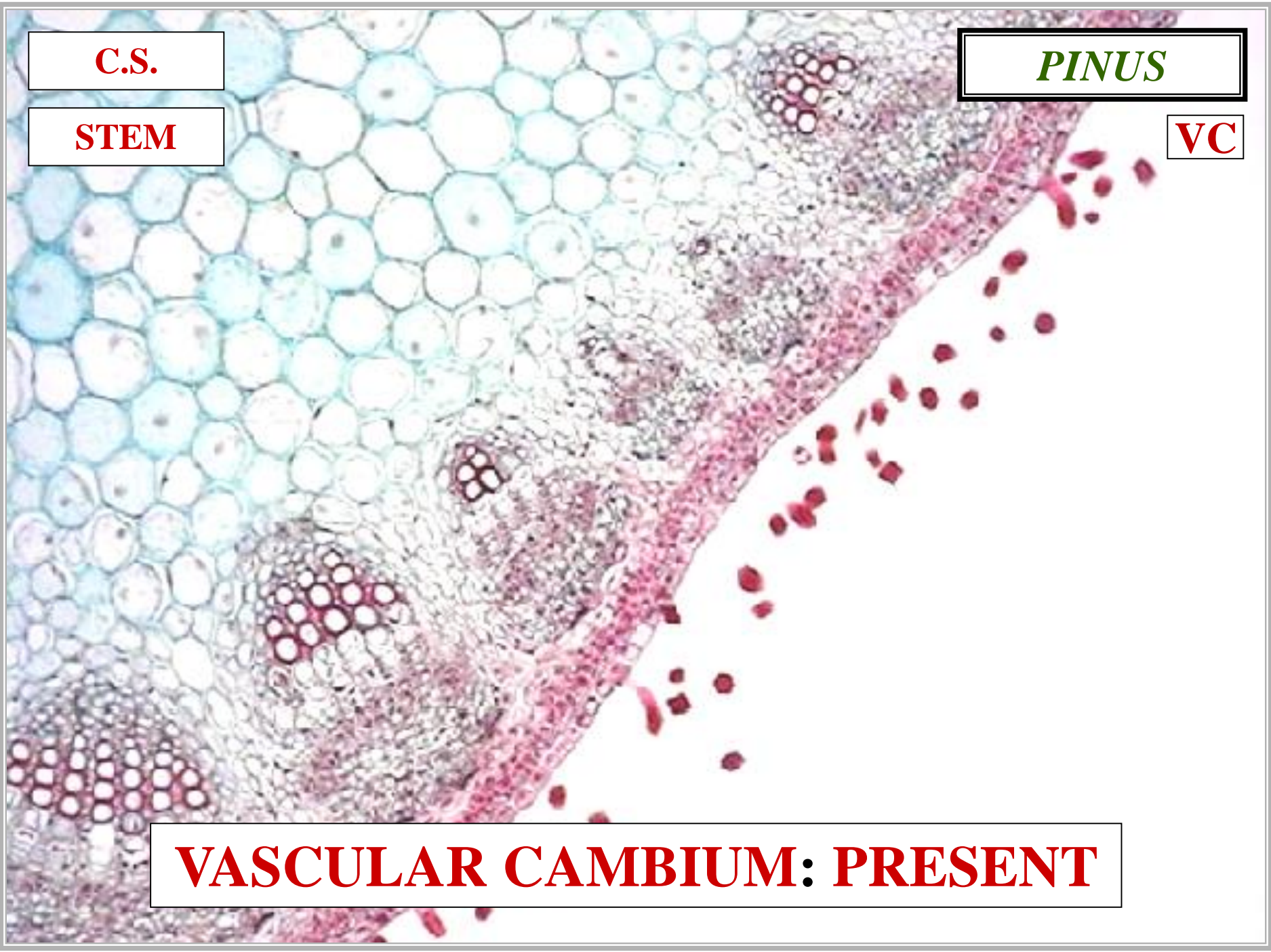
C.S.

STEM

PINUS

VC

VASCULAR CAMBIUM: PRESENT



C.S.

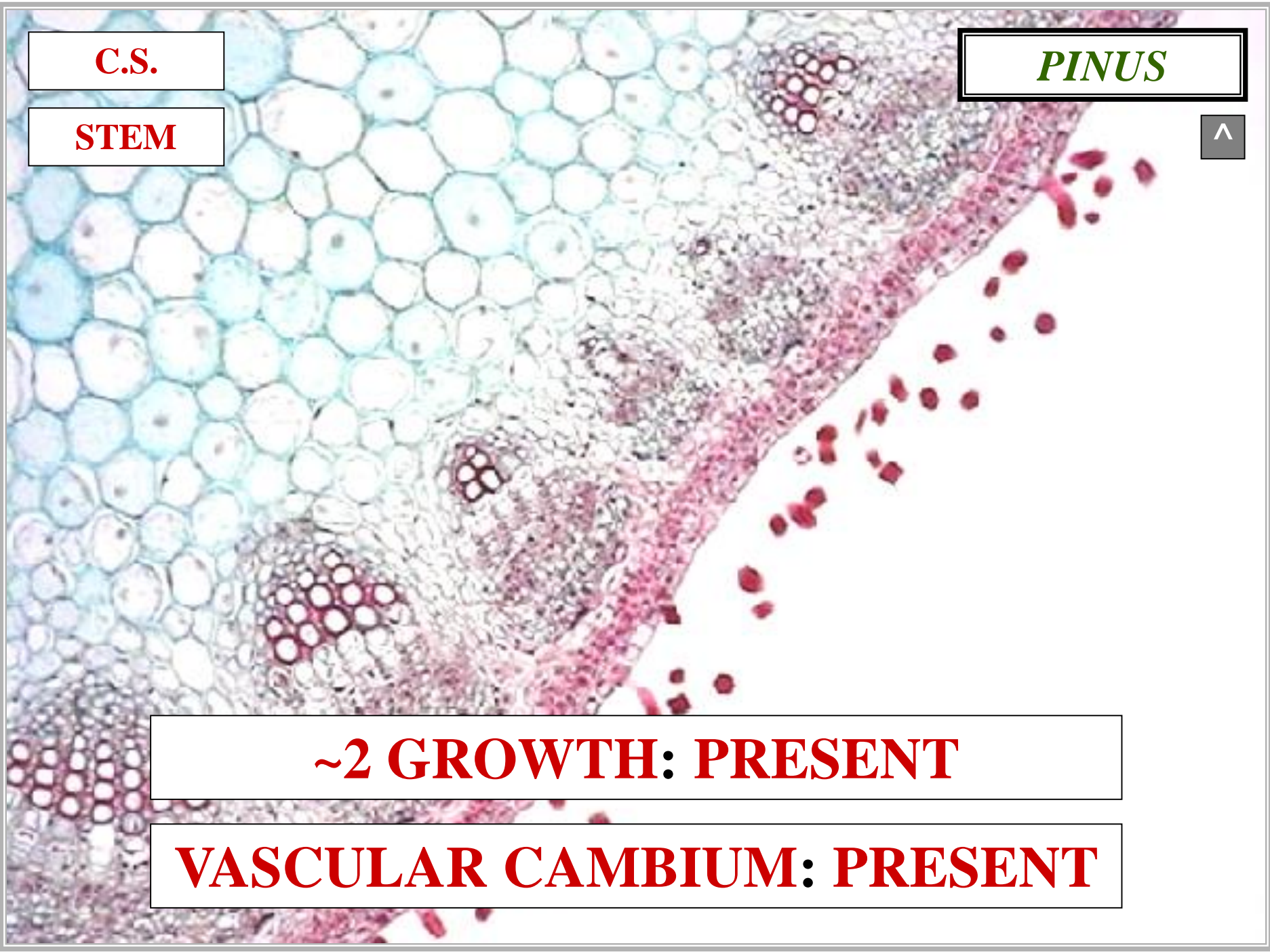
STEM

PINUS



~2 GROWTH: PRESENT

VASCULAR CAMBIUM: PRESENT





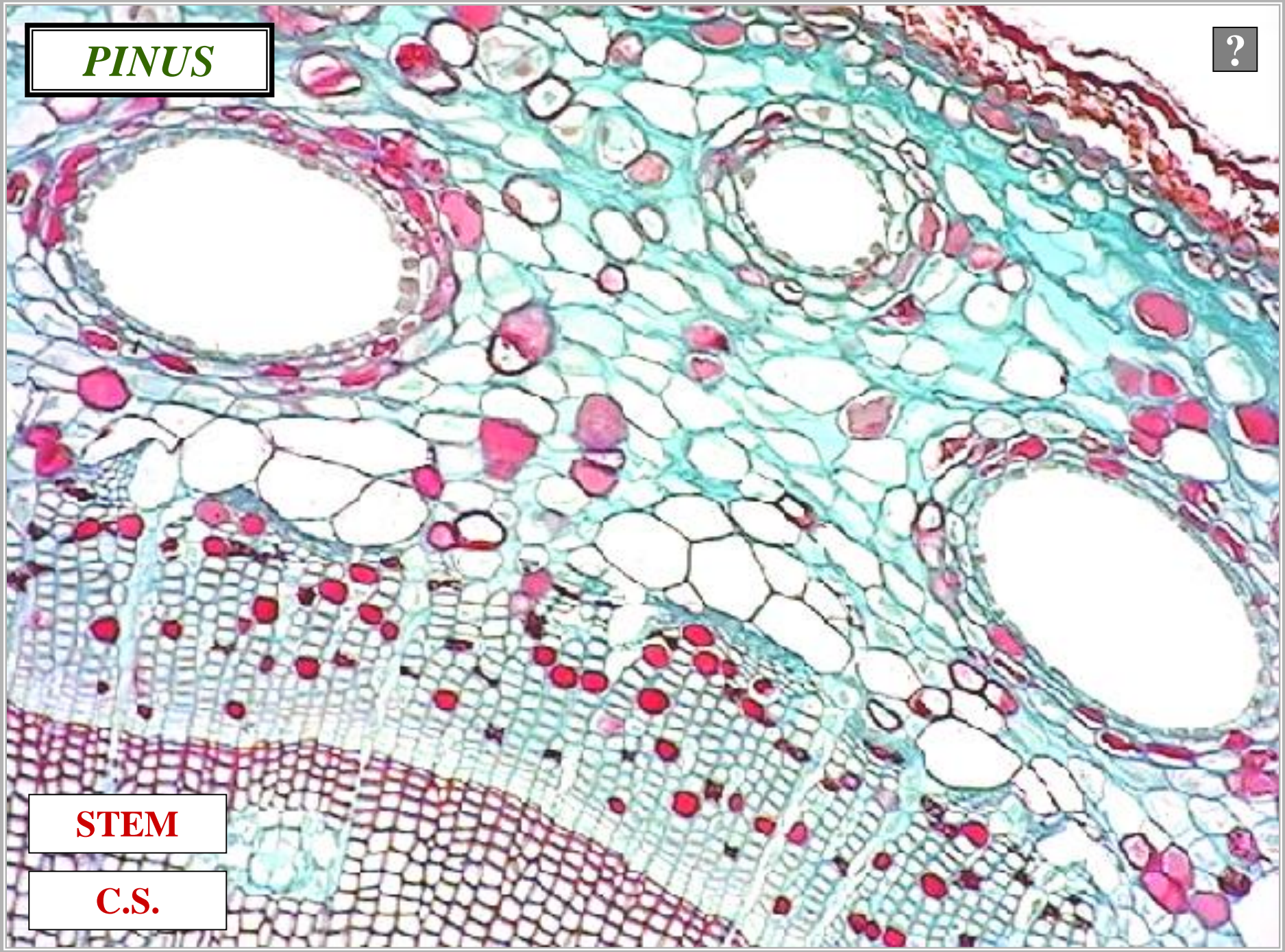
SECONDARY GROWTH ANATOMY

PINUS

?

STEM

C.S.



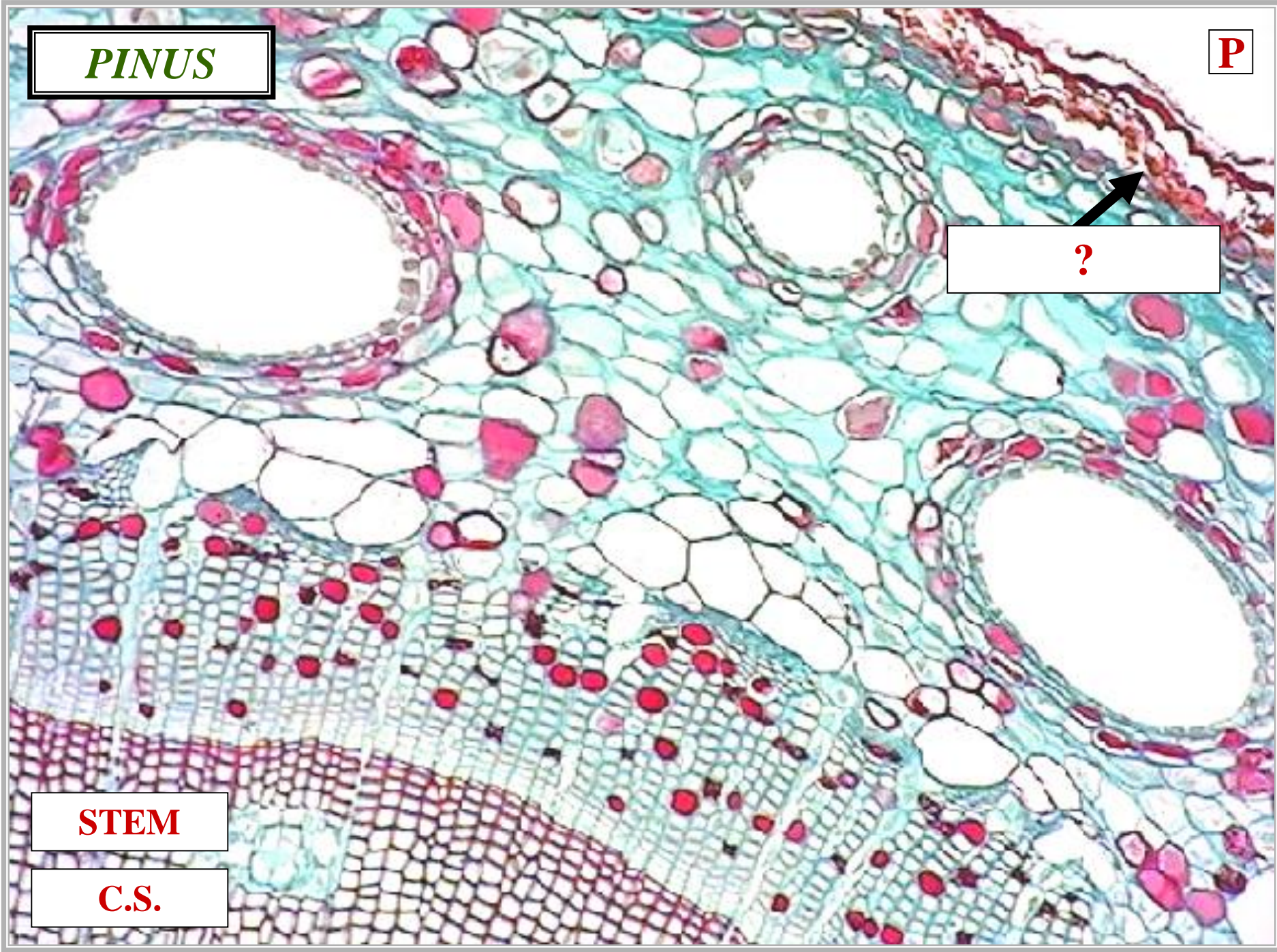
PINUS

P

?

STEM

C.S.



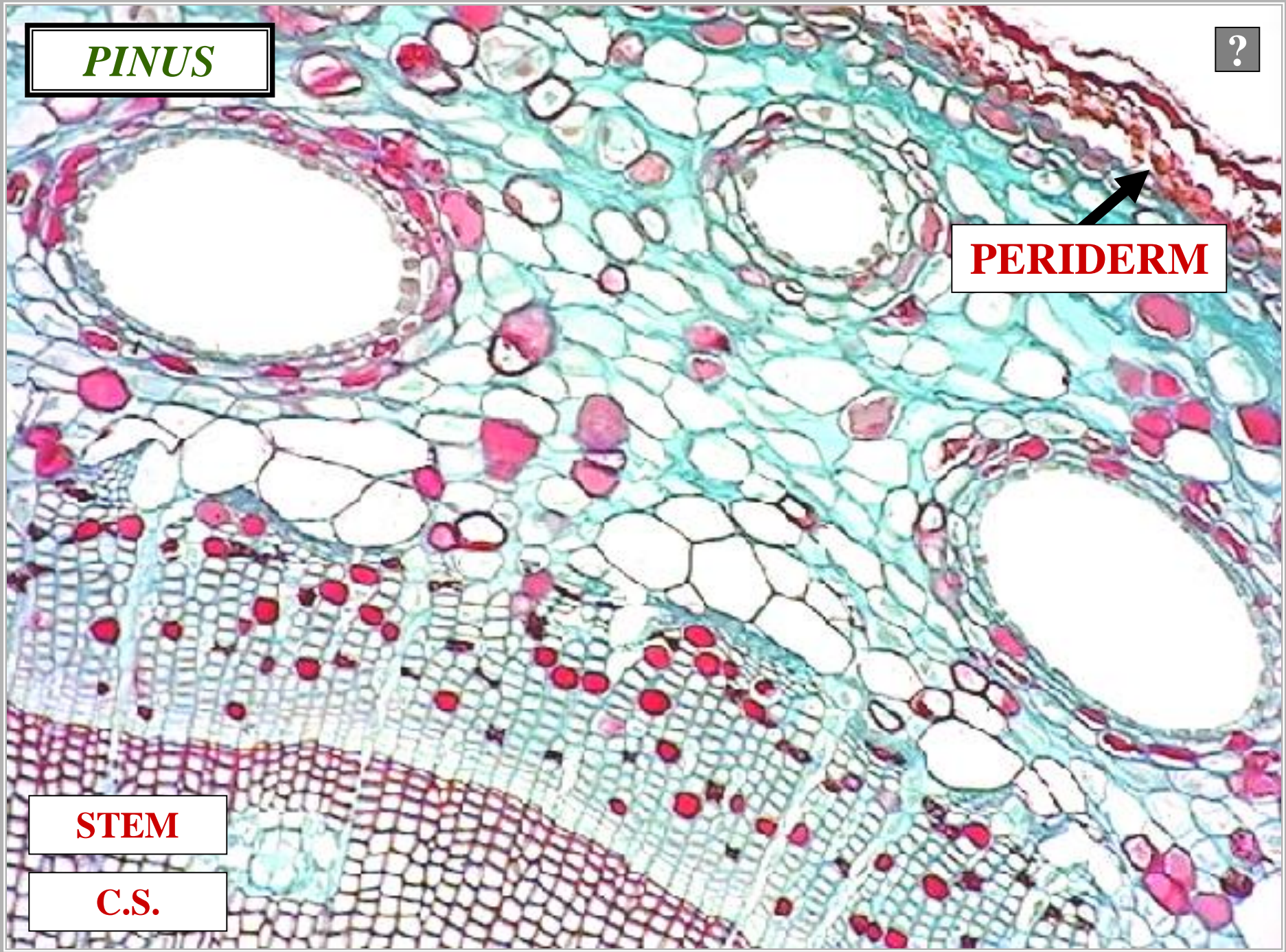
PINUS

?

PERIDERM

STEM

C.S.



PINUS

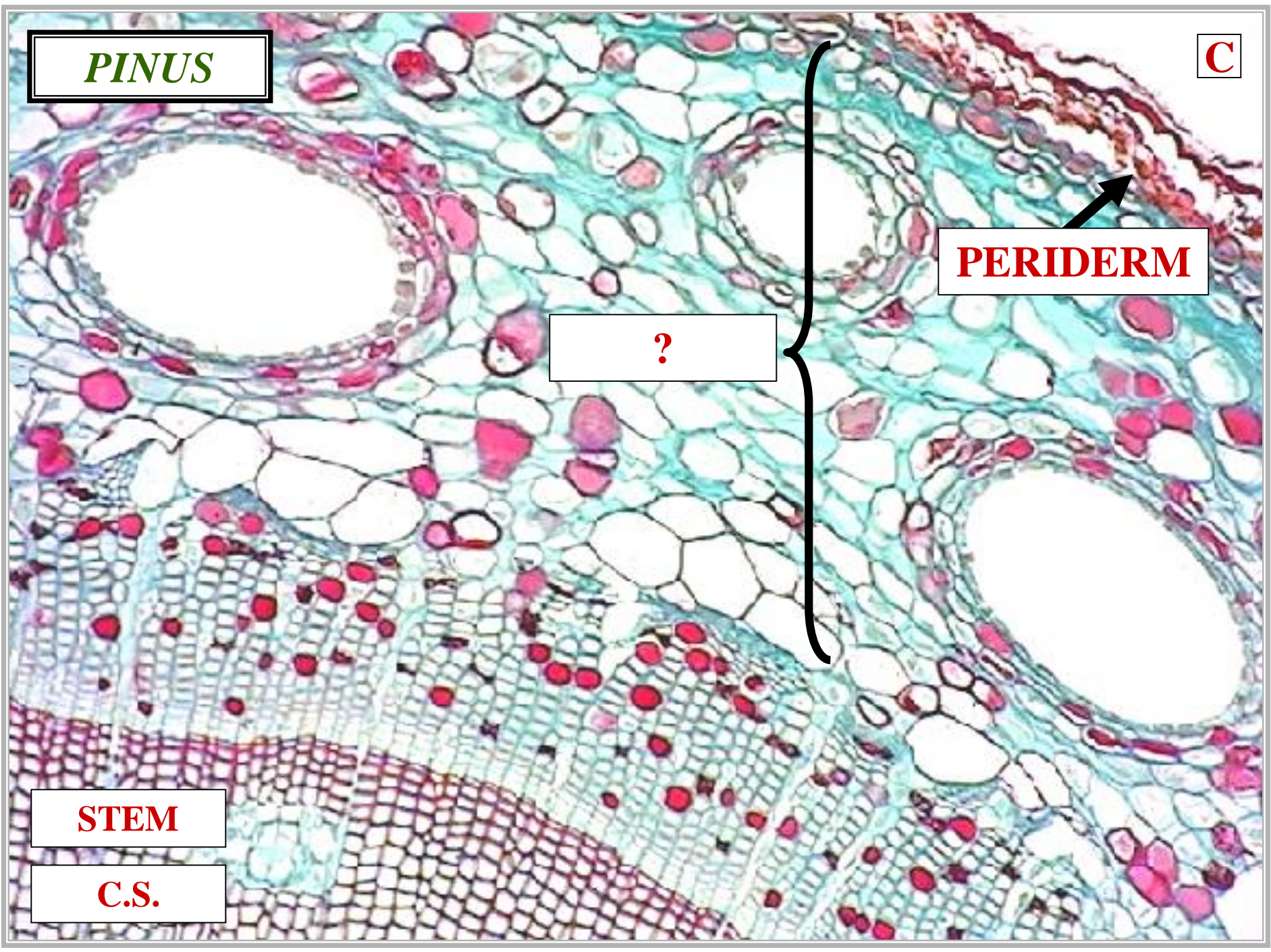
C

PERIDERM

?

STEM

C.S.



PINUS

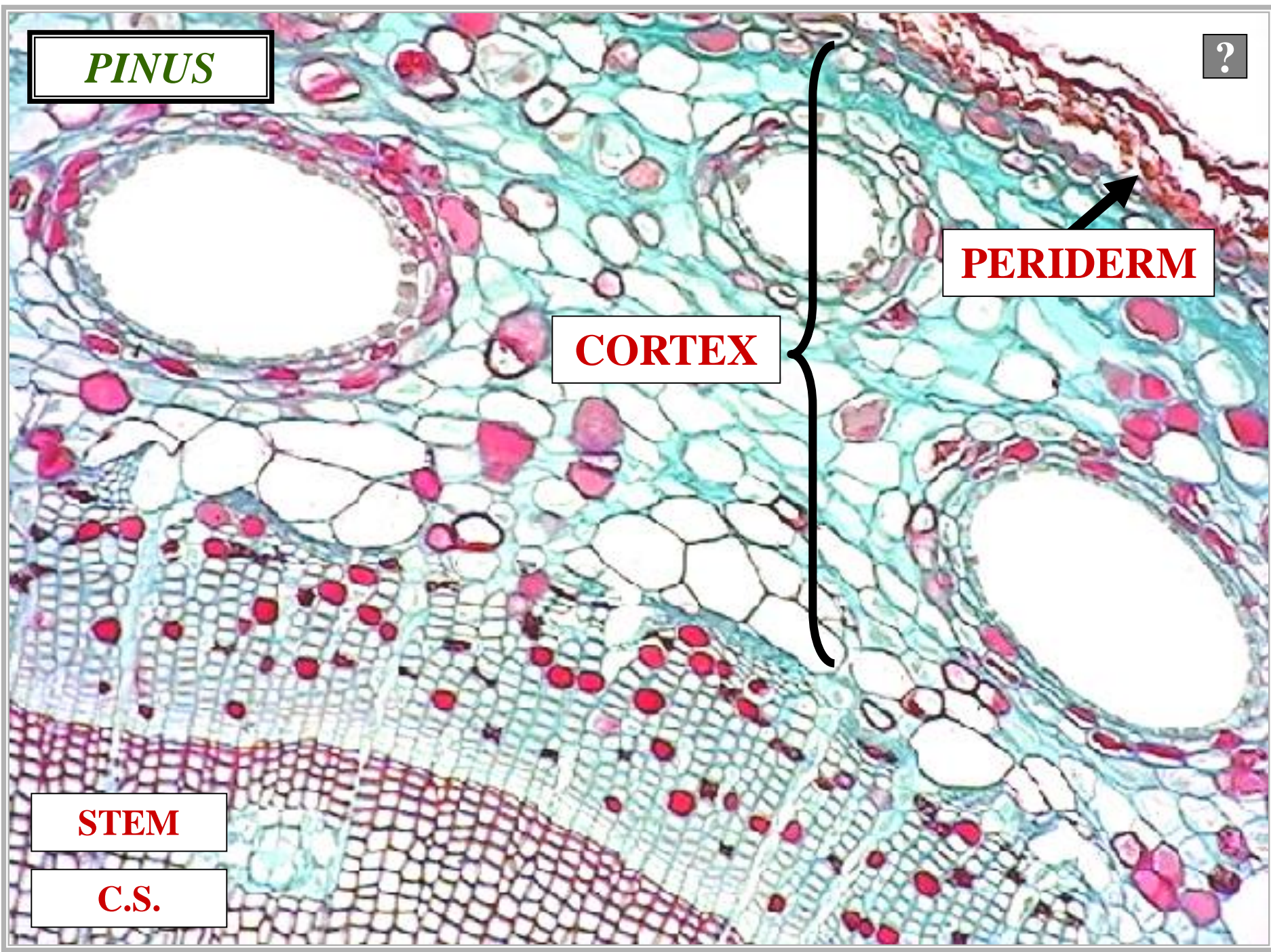
?

PERIDERM

CORTEX

STEM

C.S.



PINUS

?

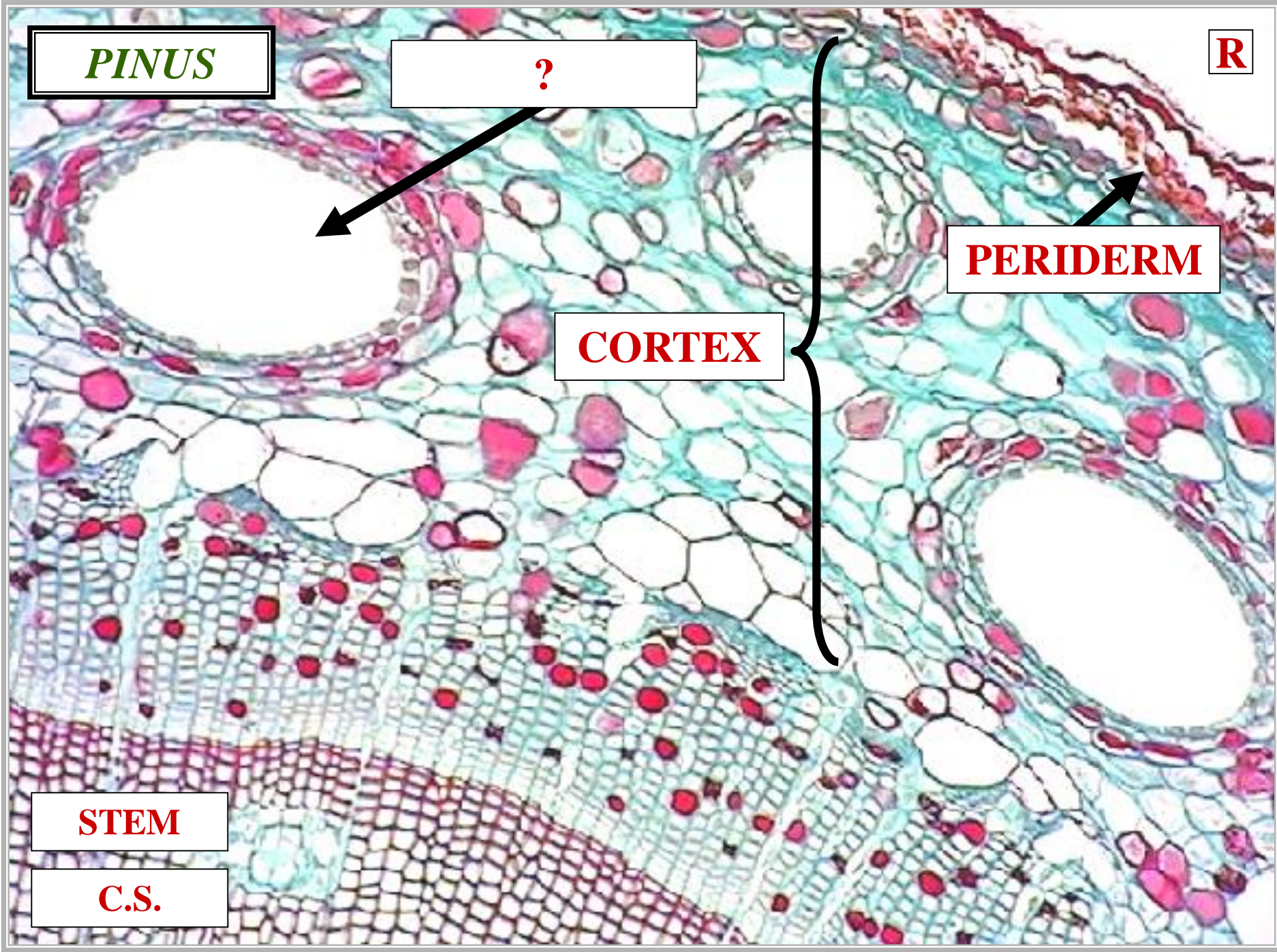
R

PERIDERM

CORTEX

STEM

C.S.



?

PINUS

RESIN DUCT



PERIDERM

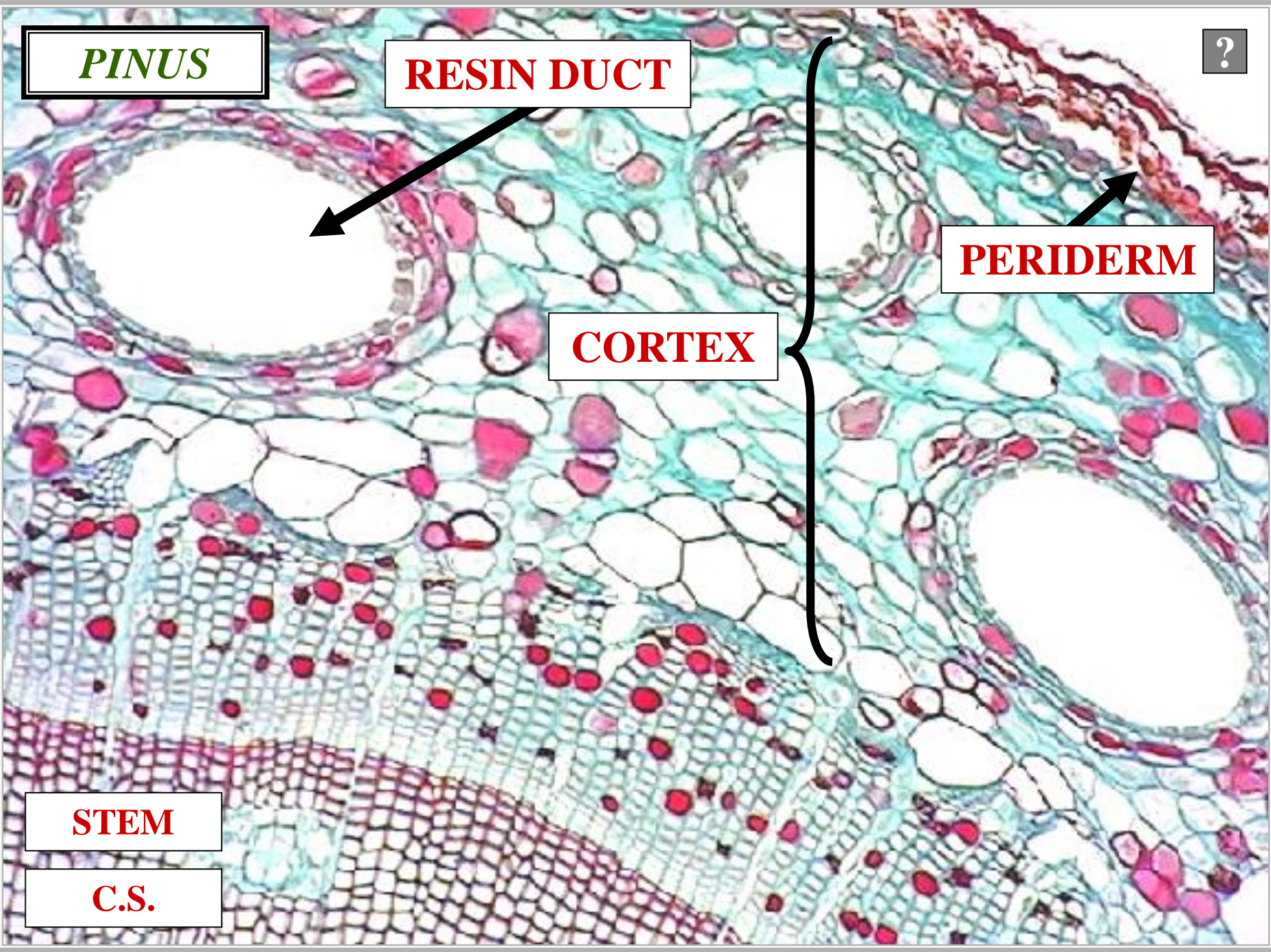


CORTEX



STEM

C.S.



PINUS

RESIN DUCT



PERIDERM



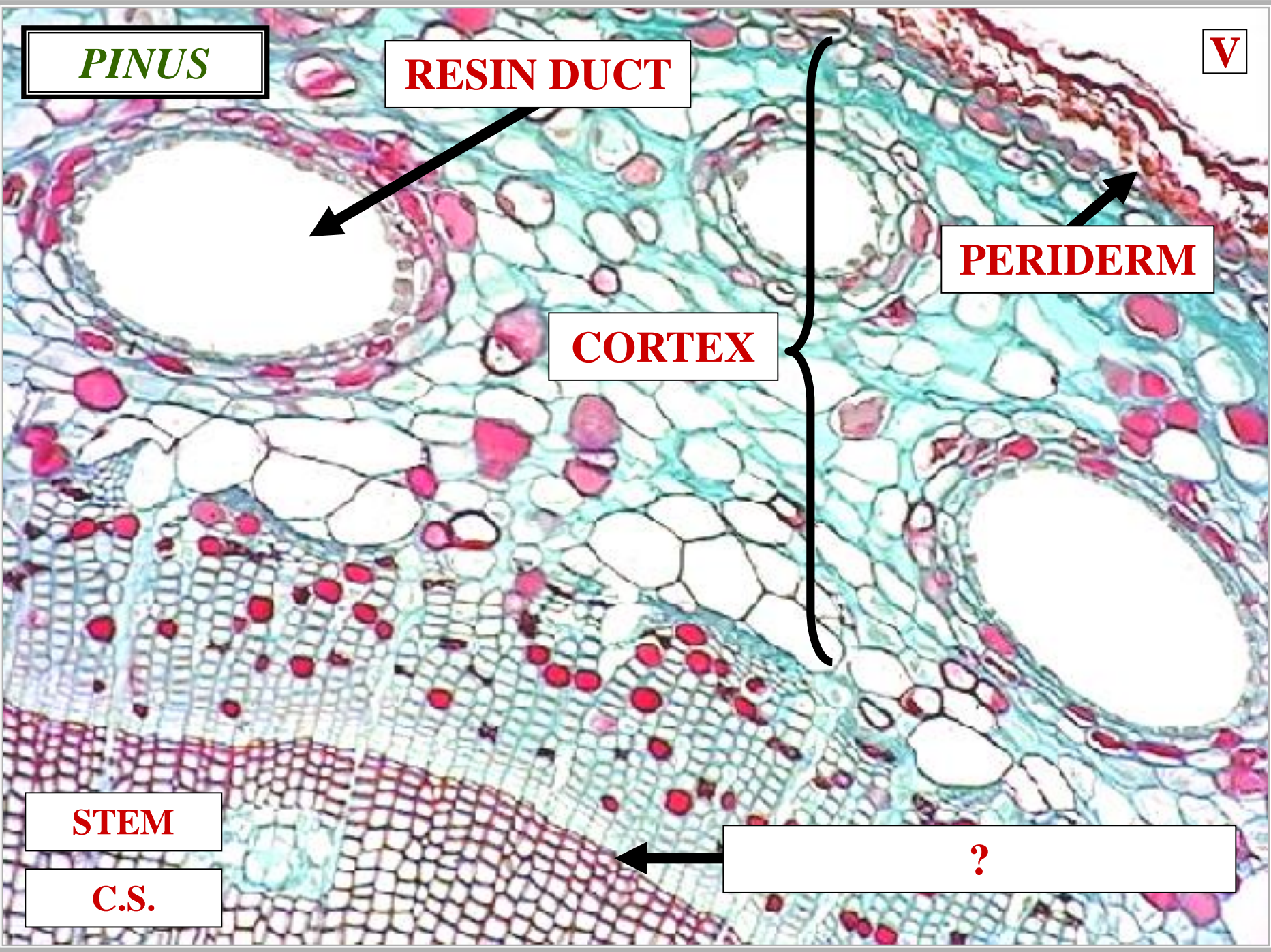
CORTEX



STEM

C.S.

?



?

PINUS

RESIN DUCT



PERIDERM



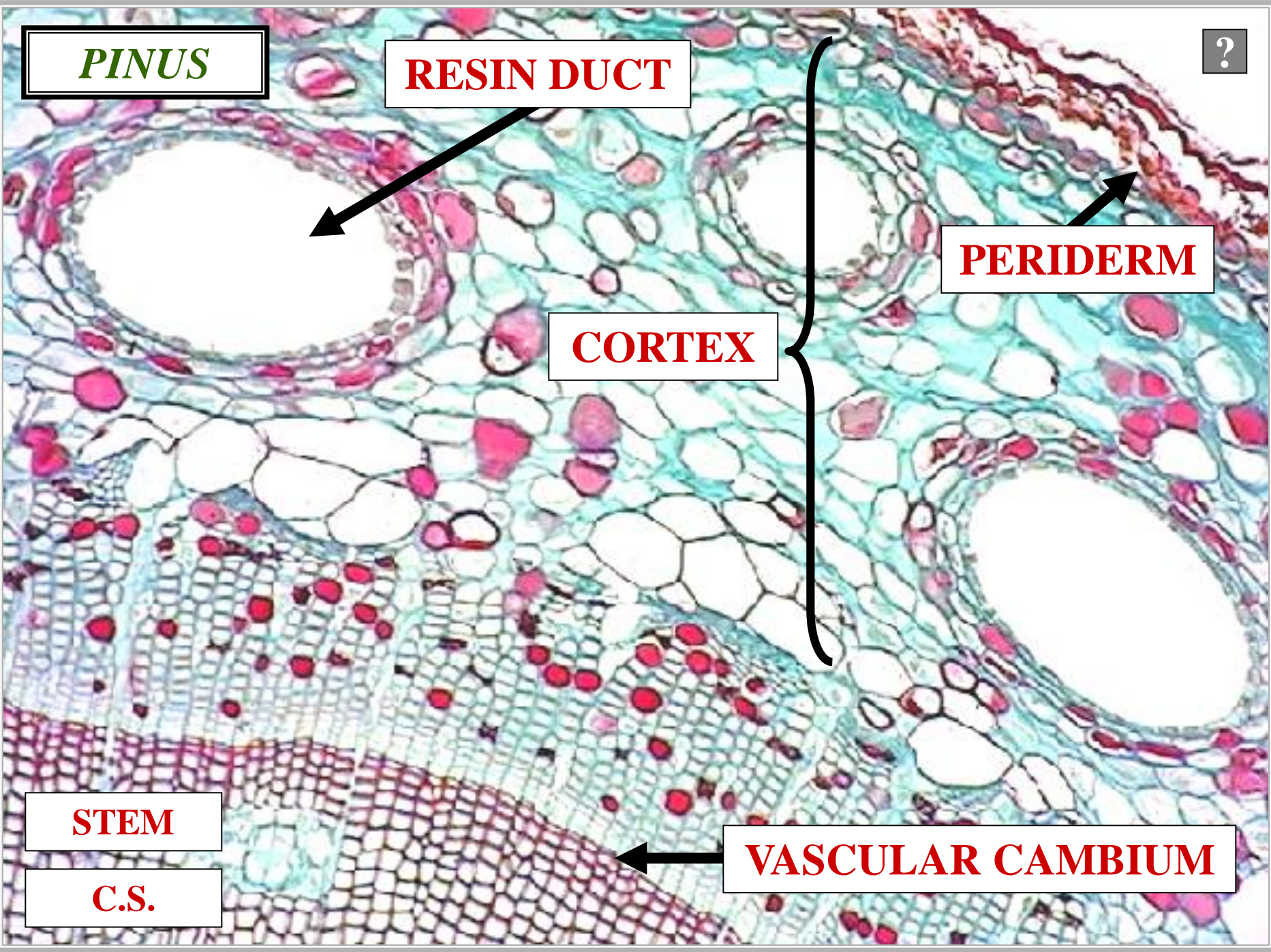
CORTEX



STEM

C.S.

VASCULAR CAMBIUM



PINUS

RESIN DUCT

P

PERIDERM

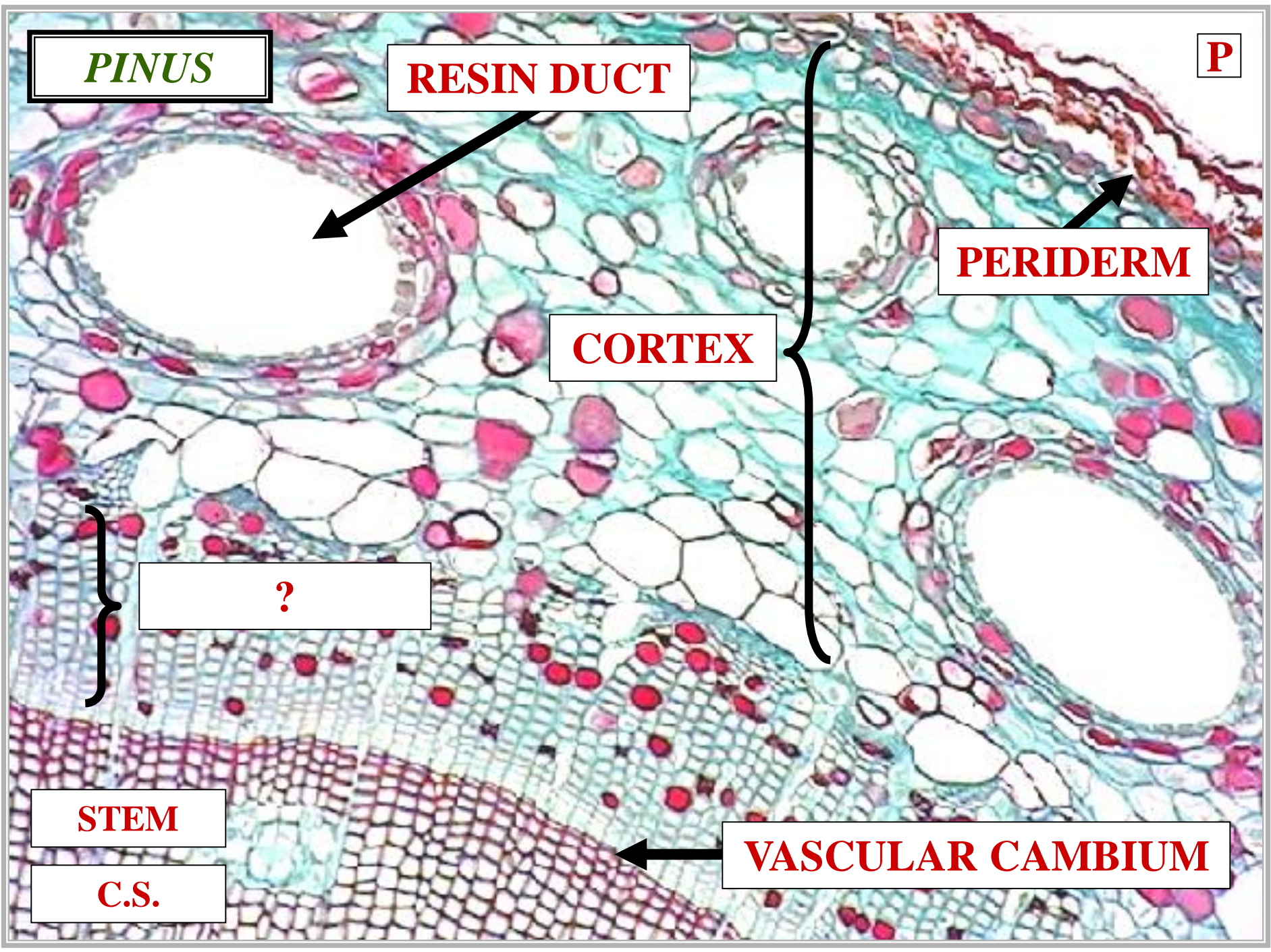
CORTEX

?

STEM

C.S.

VASCULAR CAMBIUM



?

PINUS

RESIN DUCT

PERIDERM

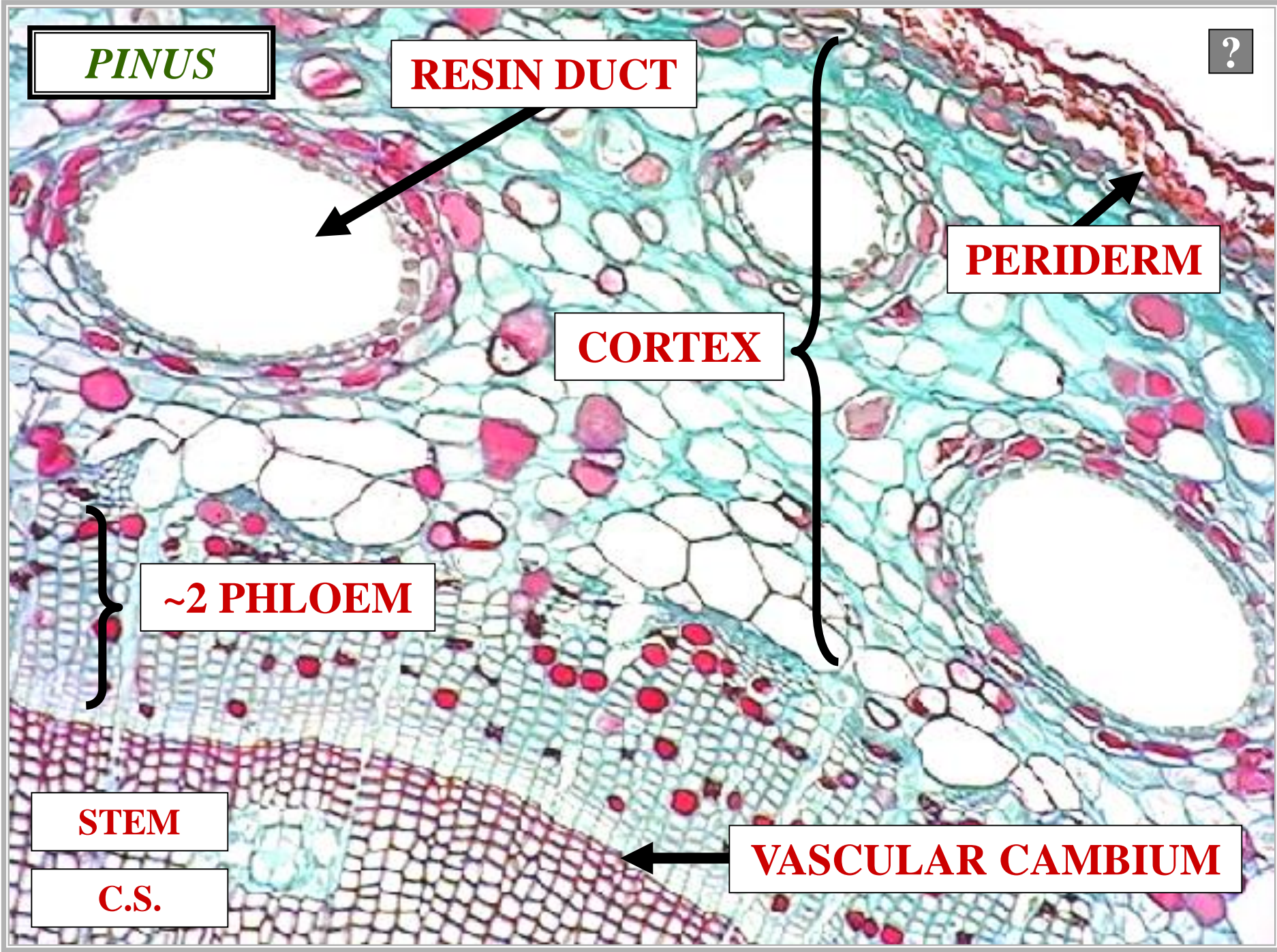
CORTEX

~2 PHLOEM

STEM

C.S.

VASCULAR CAMBIUM



X

PINUS

RESIN DUCT

PERIDERM

CORTEX

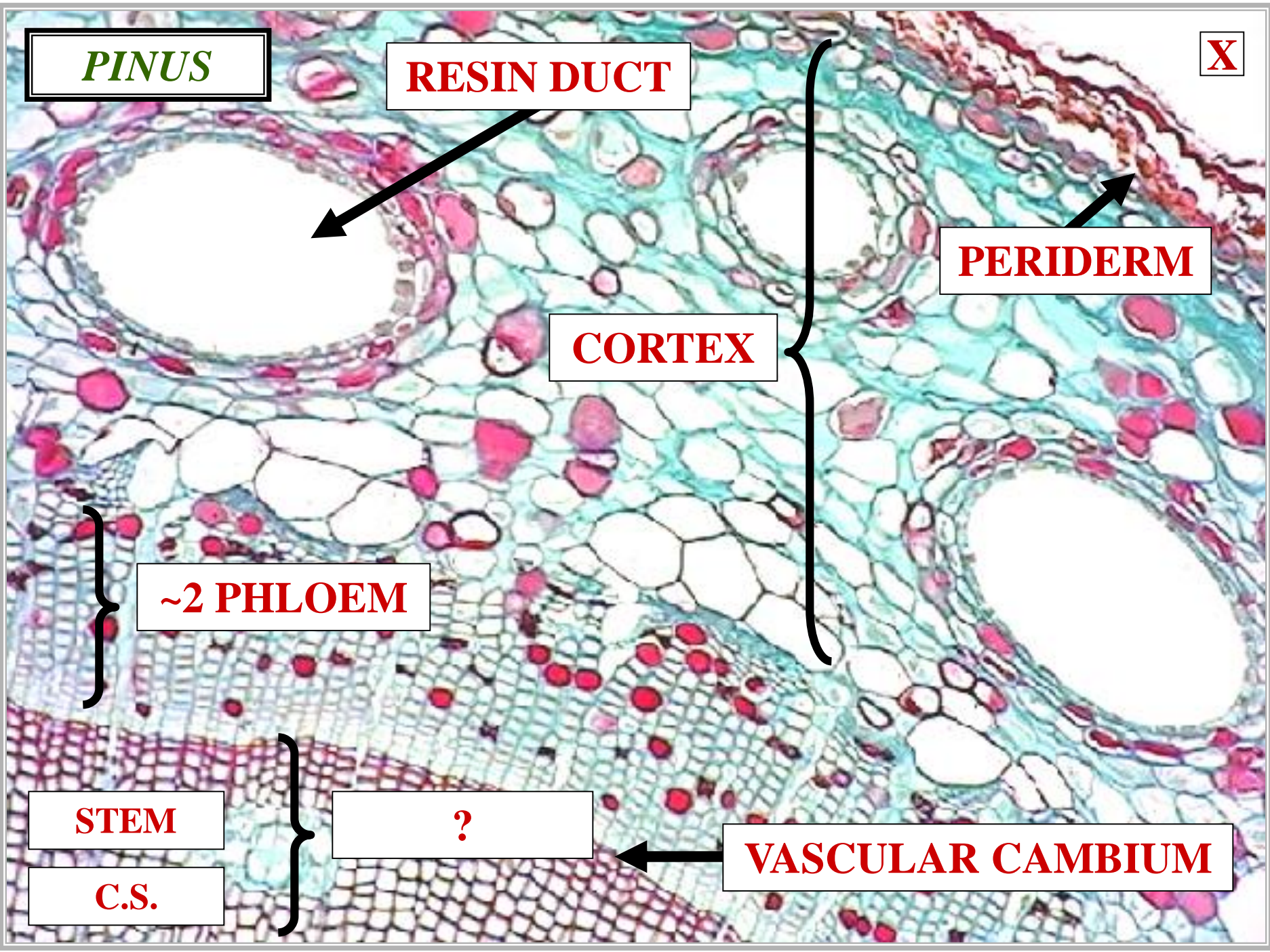
~2 PHLOEM

STEM

C.S.

?

VASCULAR CAMBIUM



PINUS

RESIN DUCT

PERIDERM

CORTEX

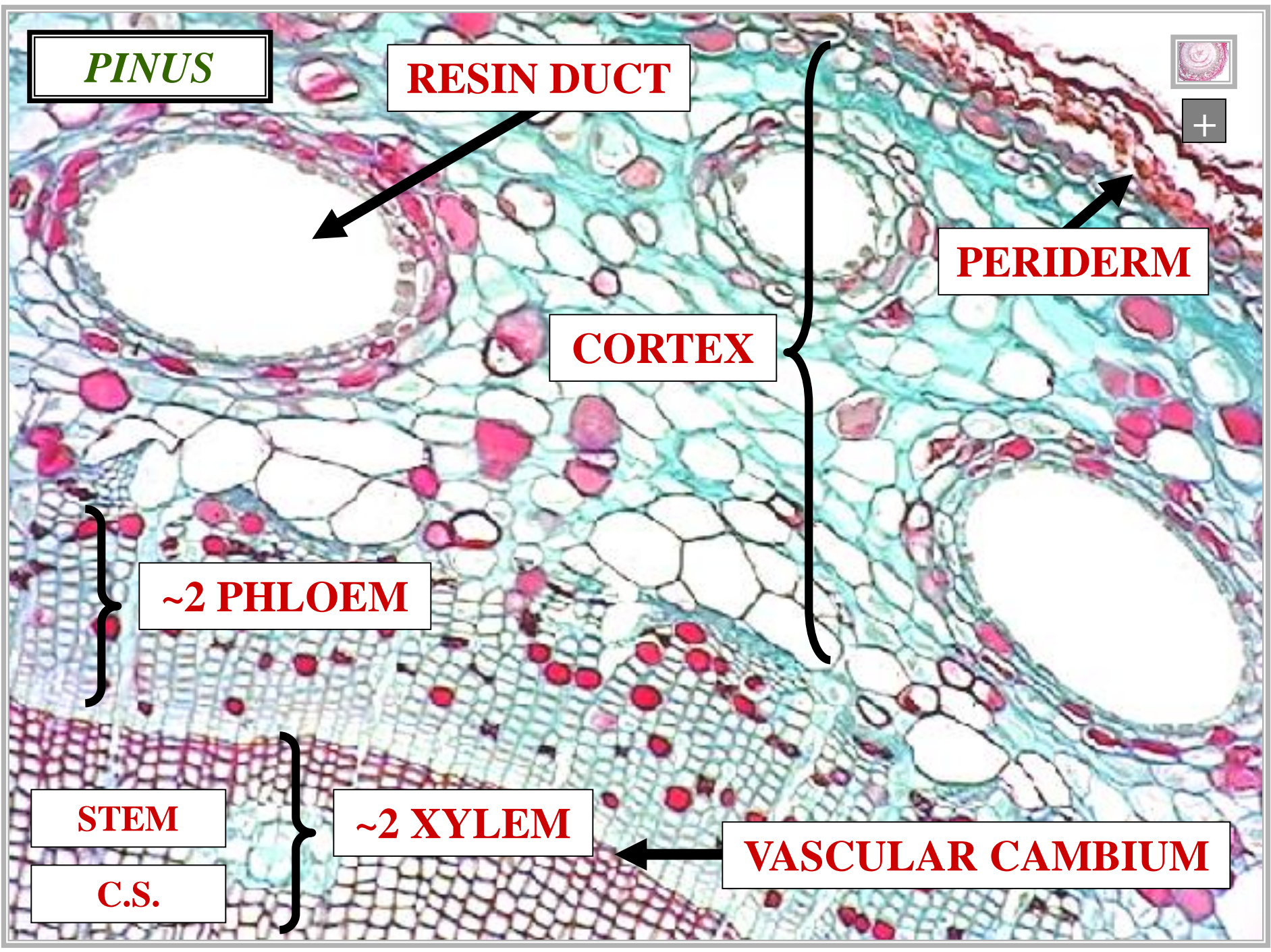
~2 PHLOEM

STEM

~2 XYLEM

VASCULAR CAMBIUM

C.S.



PINUS

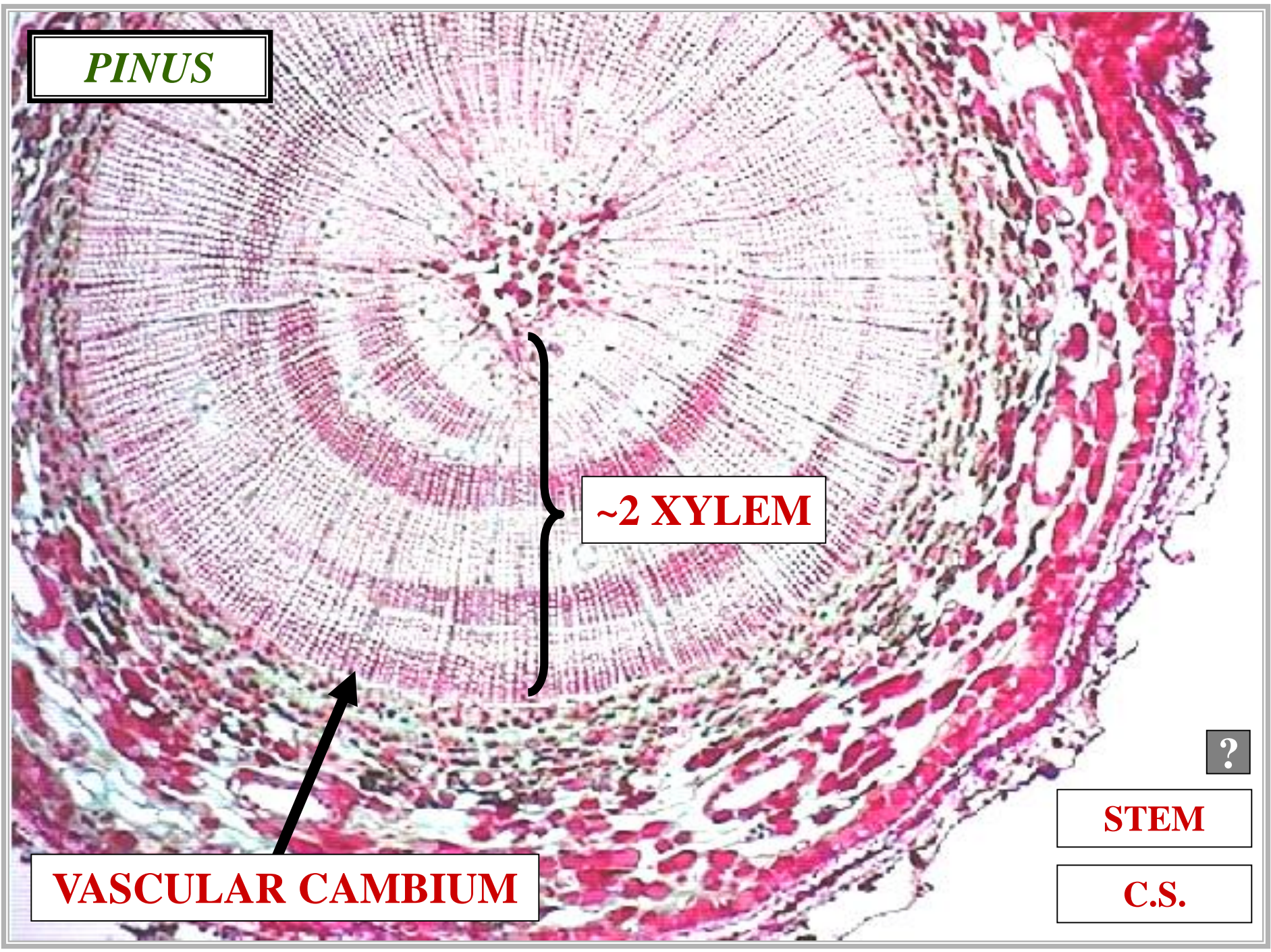
~2 XYLEM

VASCULAR CAMBIUM

STEM

C.S.

?



PINUS

?

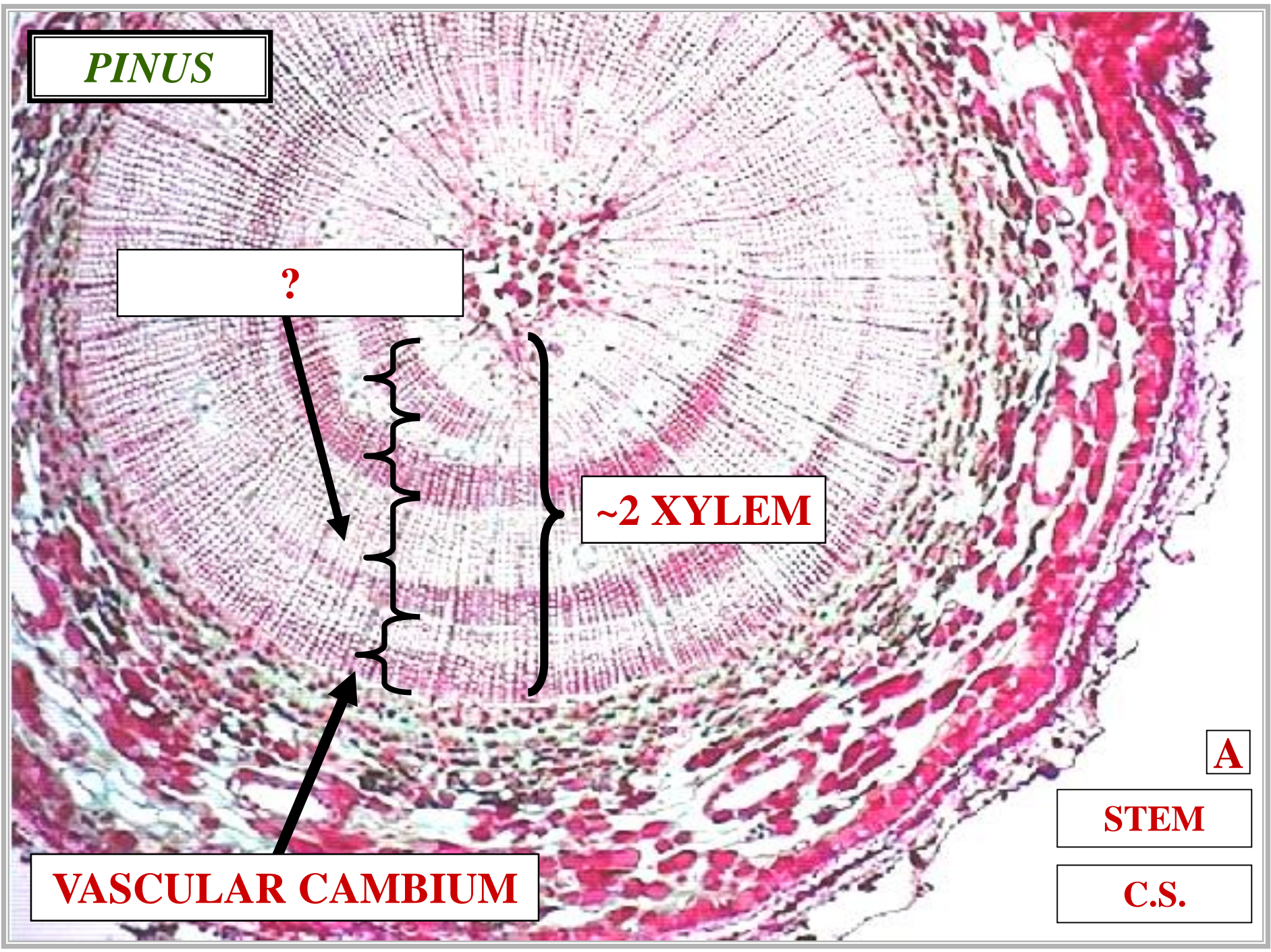
~2 XYLEM

VASCULAR CAMBIUM

A

STEM

C.S.



PINUS

ANNUAL RING

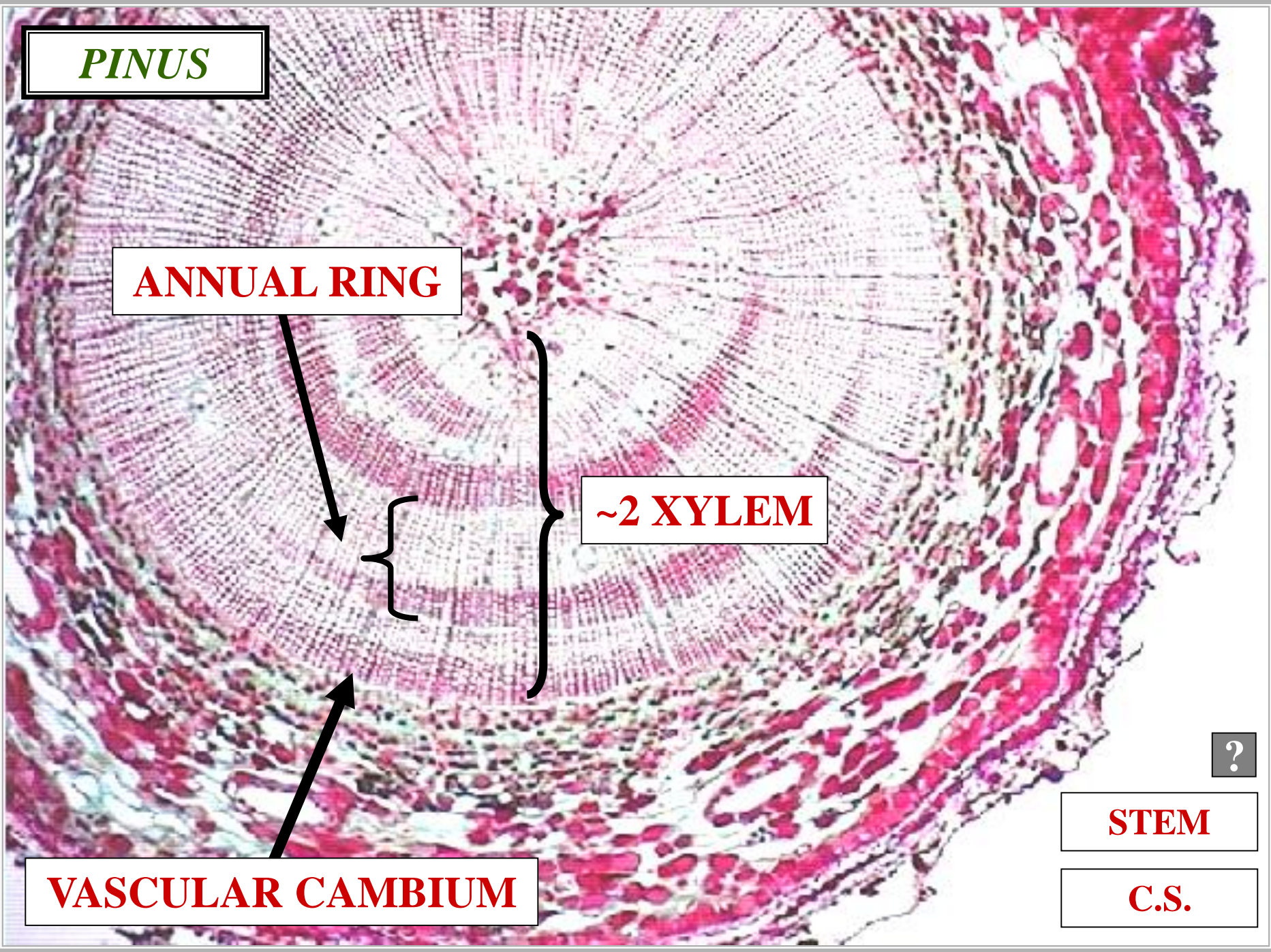
~2 XYLEM

VASCULAR CAMBIUM

?

STEM

C.S.



PINUS

?

ANNUAL RING

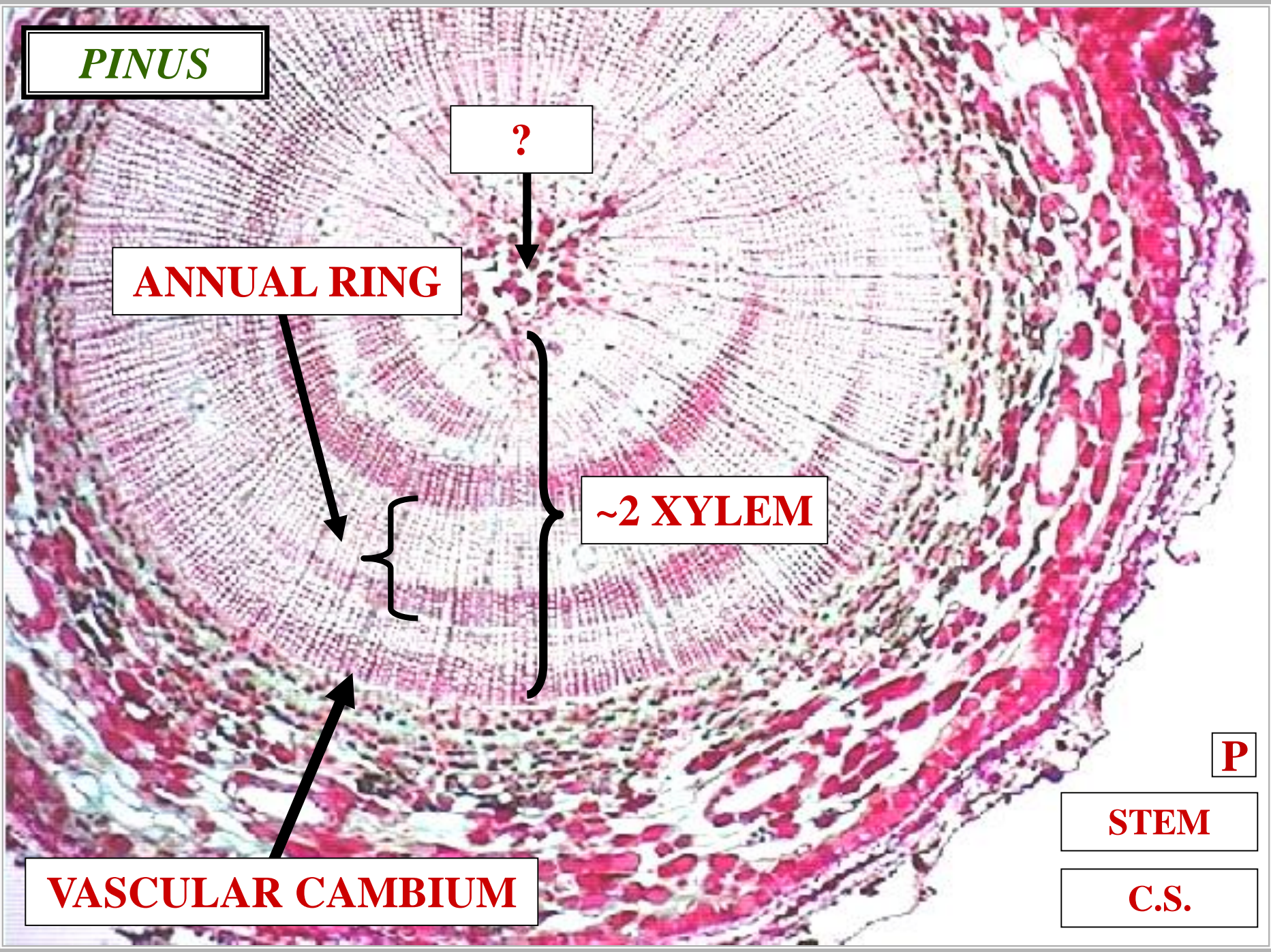
~2 XYLEM

VASCULAR CAMBIUM

P

STEM

C.S.



PINUS

PITH

ANNUAL RING

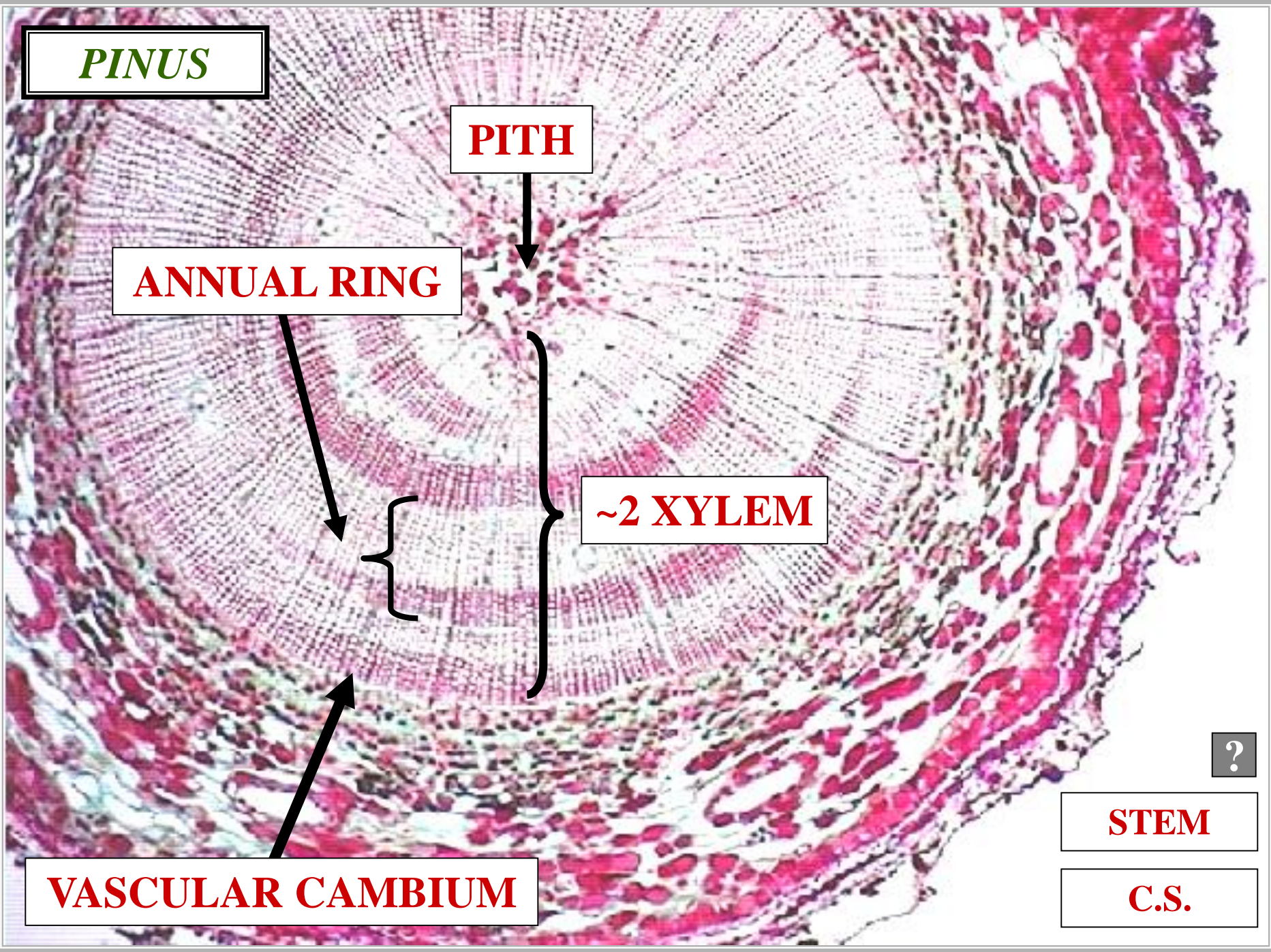
~2 XYLEM

VASCULAR CAMBIUM

?

STEM

C.S.



PINUS

PITH

ANNUAL RING

?

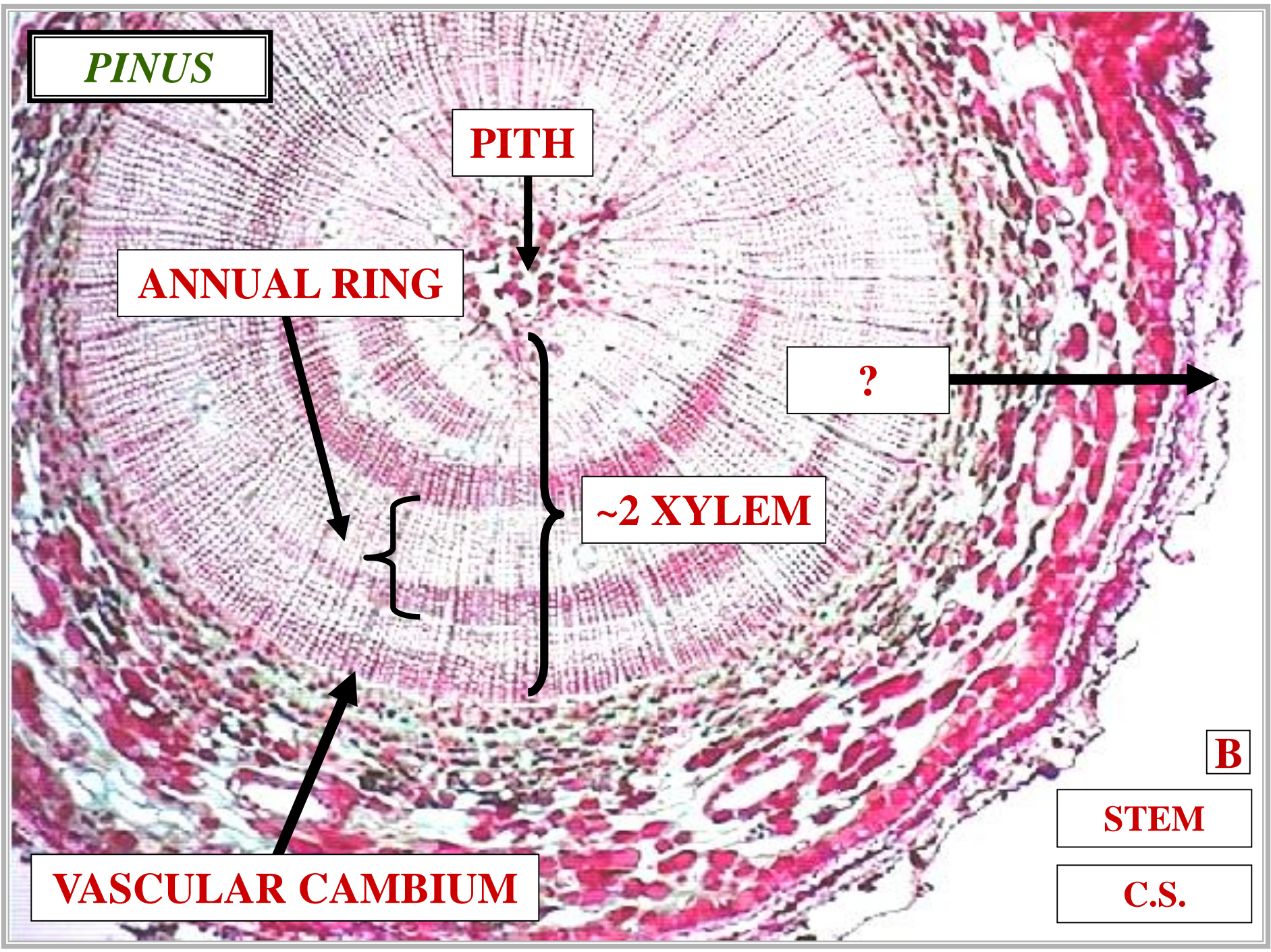
~2 XYLEM

VASCULAR CAMBIUM

B

STEM

C.S.



PINUS

PITH

ANNUAL RING

BARK

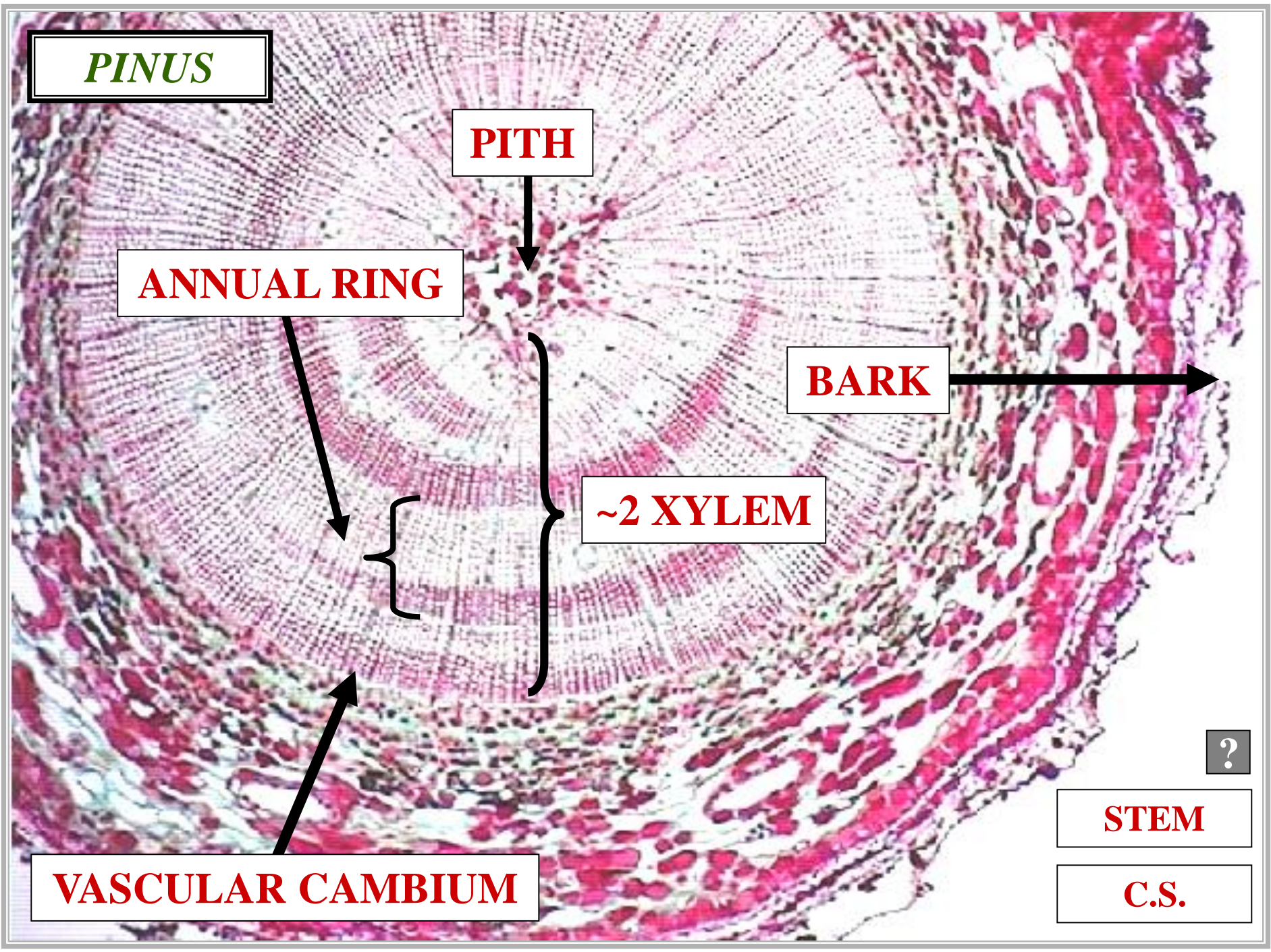
~2 XYLEM

VASCULAR CAMBIUM

?

STEM

C.S.



PINUS

PITH

ANNUAL RING

?

BARK

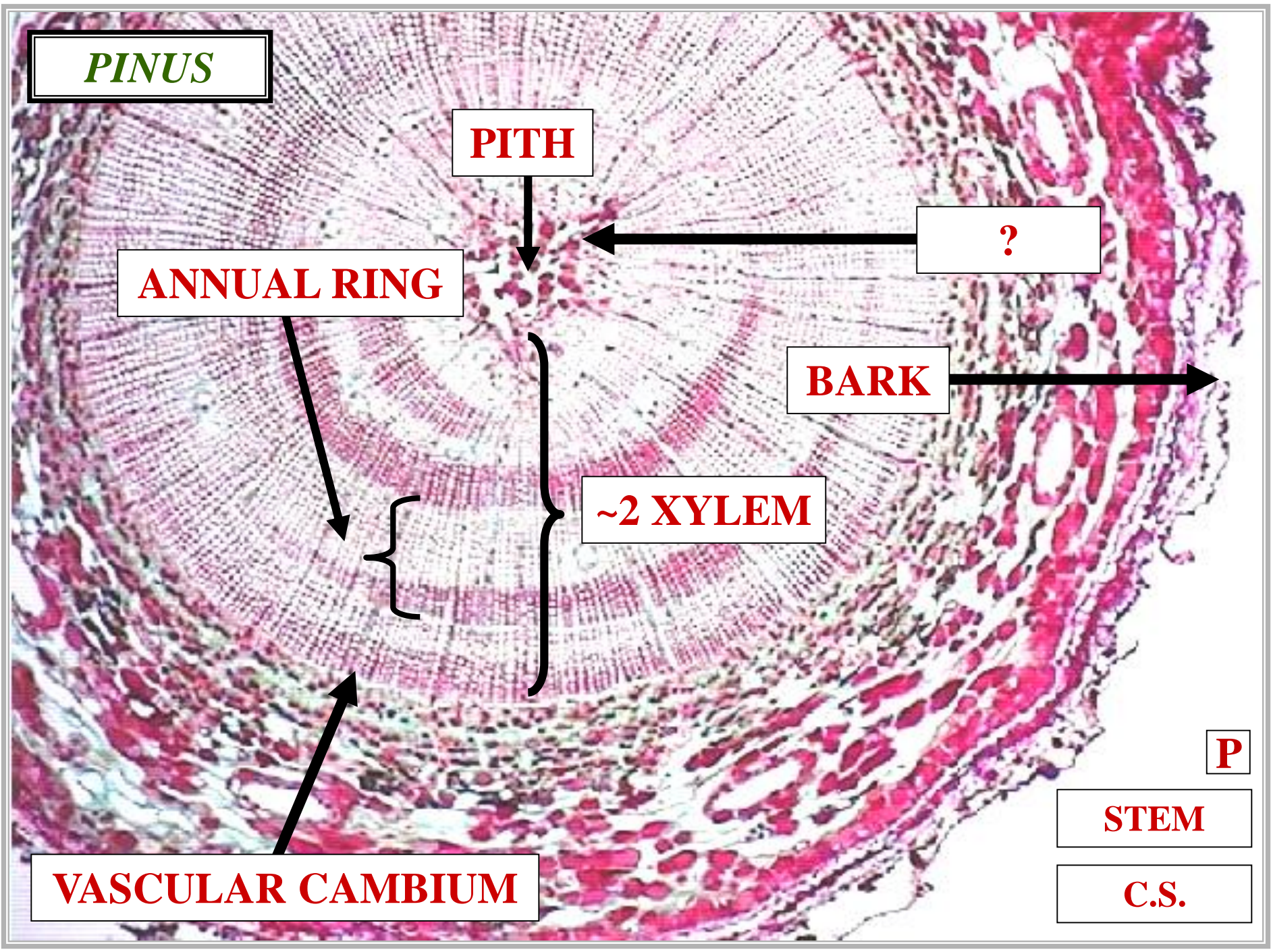
~2 XYLEM

VASCULAR CAMBIUM

P

STEM

C.S.



PINUS

PITH

WOOD

ANNUAL RING

BARK

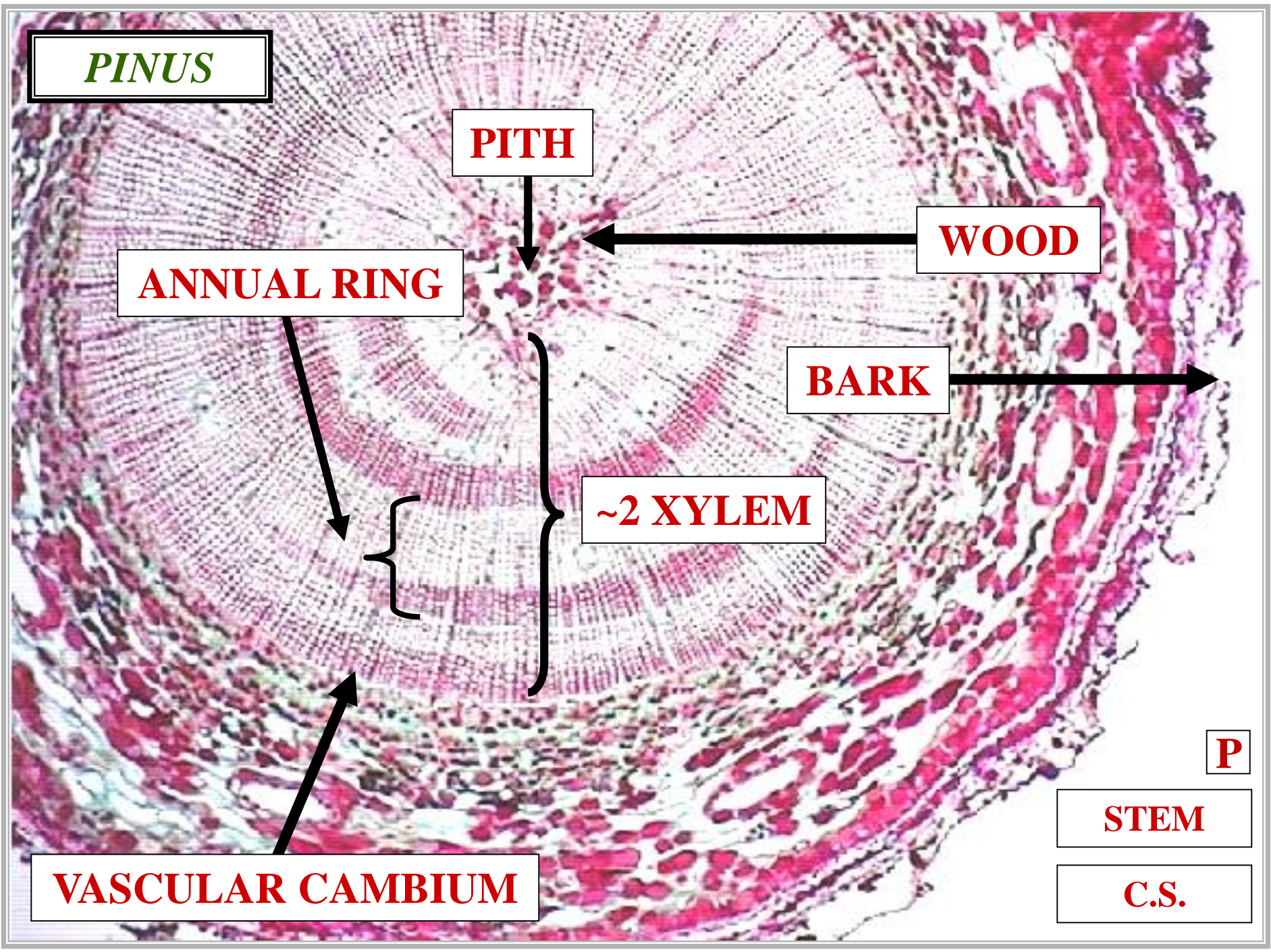
~2 XYLEM

VASCULAR CAMBIUM

P

STEM

C.S.



PINUS

PITH

WOOD

ANNUAL RING

BARK

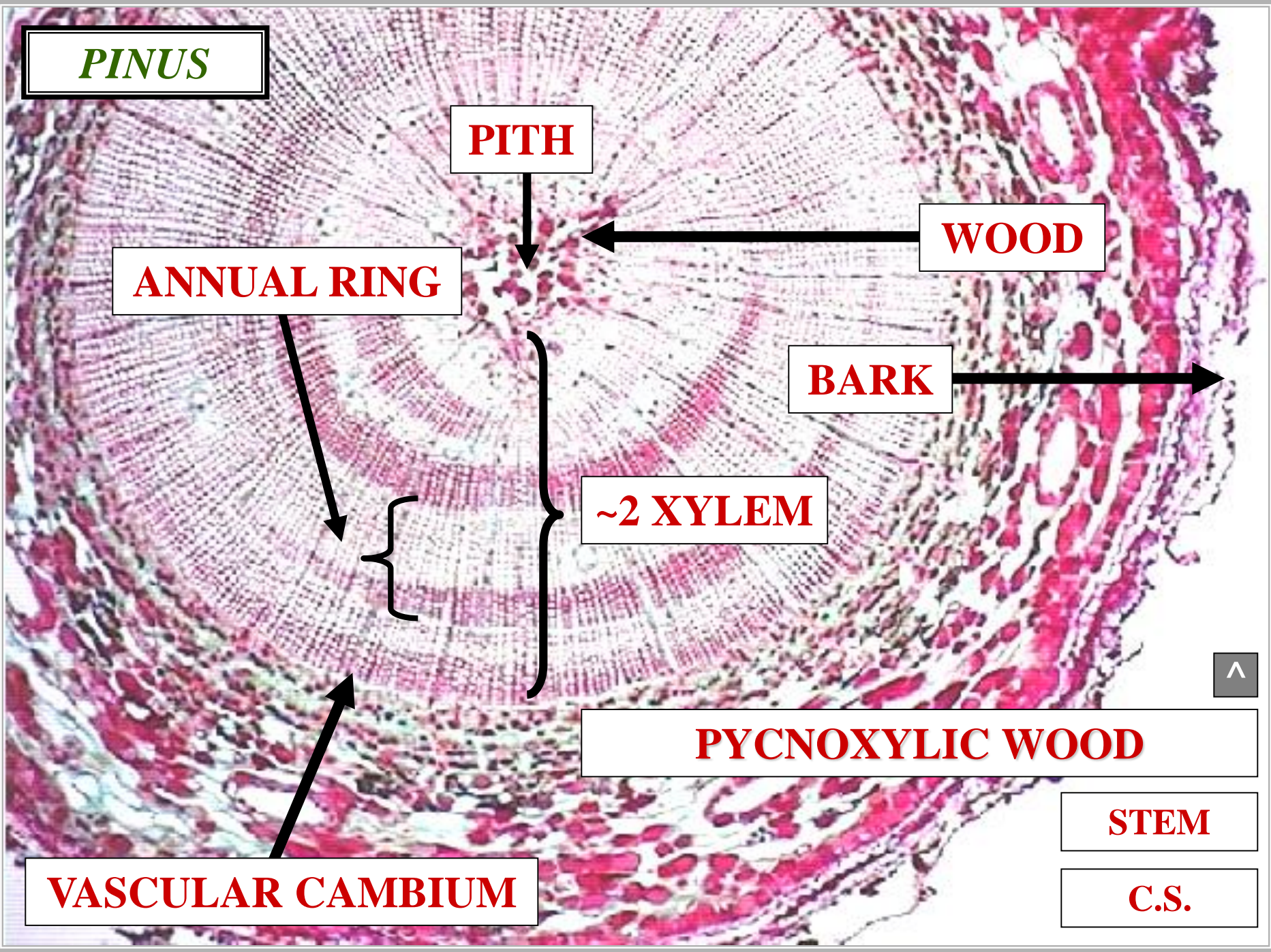
~2 XYLEM

PYCNOXYLIC WOOD

VASCULAR CAMBIUM

STEM

C.S.





LEAF