

**SIEVE MEMBER  
COMPANION CELL**

**ASSOCIATED WITH SIEVE MEMBER**

---

**NUCLEATED**

---

**METABOLICALLY CONTROLS  
SIEVE MEMBER**

**SIEVE MEMBER  
COMPANION CELL**



C

[ ]



[ ]



**SUGAR**



**SIEVE MEMBER**



**SIEVE PLATE  
LARGE PORES**

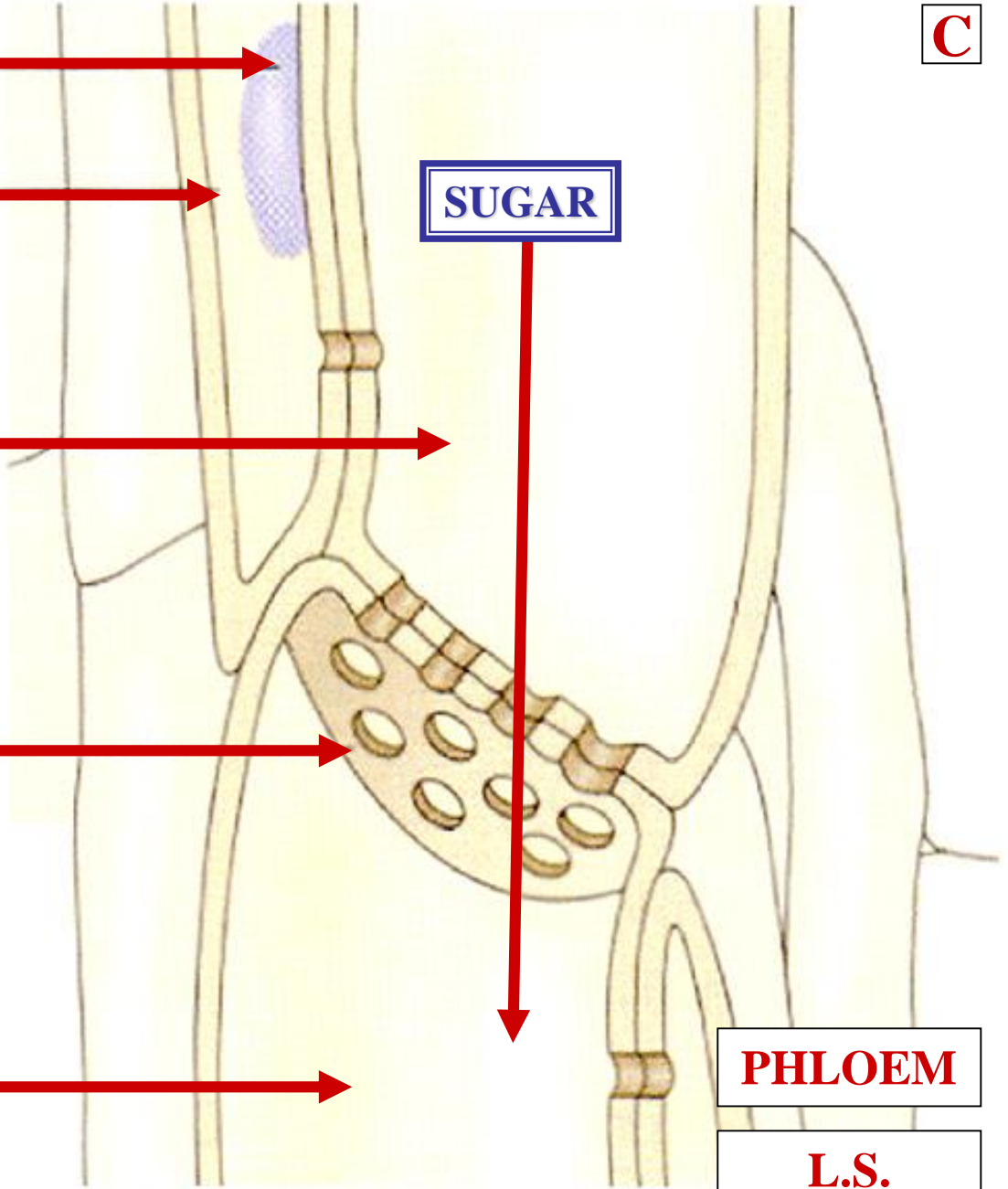


**SIEVE MEMBER**



**PHLOEM**

**L.S.**



N

[ ]

**CAMPANION CELL**

**SUGAR**

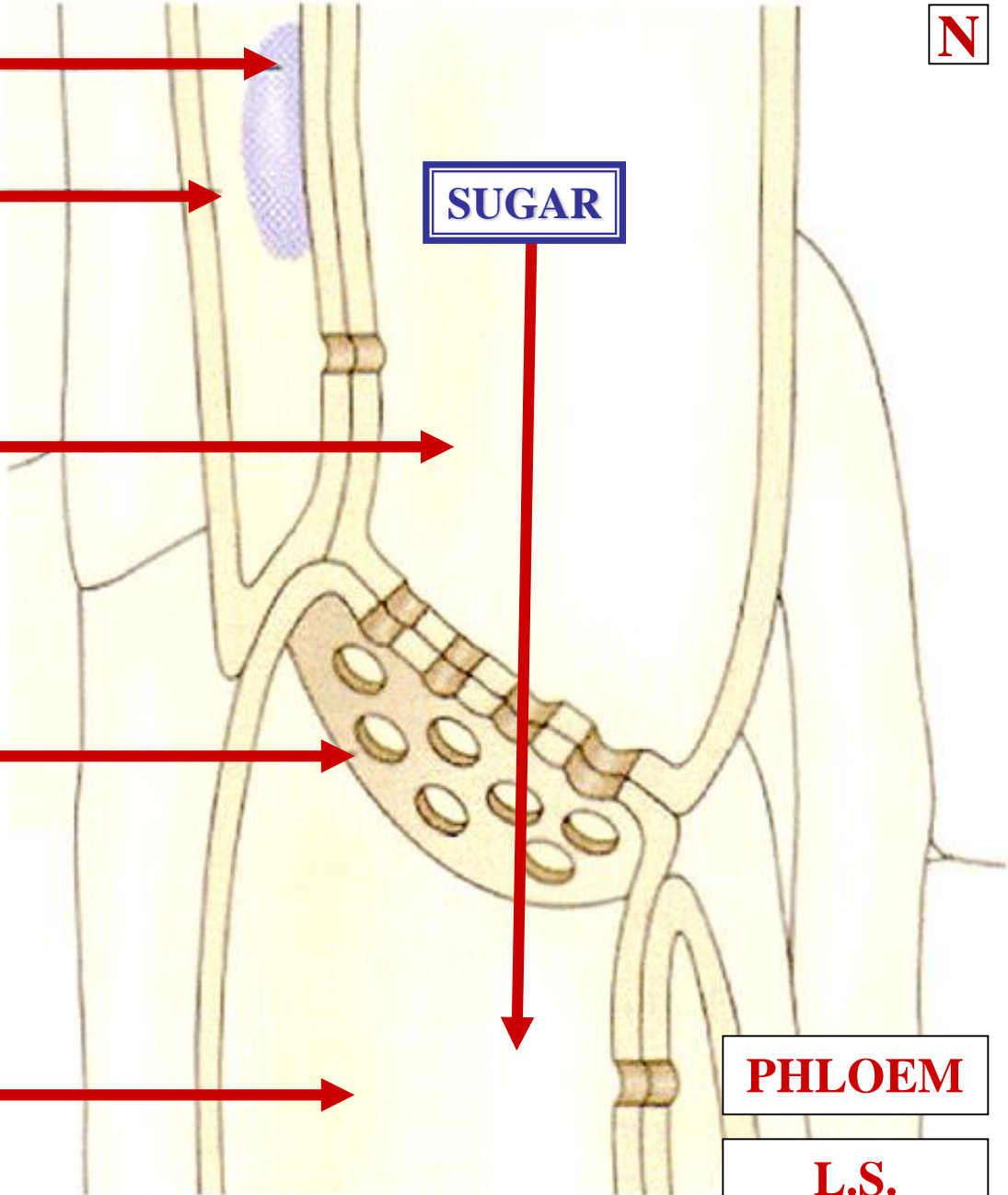
**SIEVE MEMBER**

**SIEVE PLATE  
LARGE PORES**

**SIEVE MEMBER**

**PHLOEM**

**L.S.**



**NUCLEUS**



**CAMPANION CELL**



**SUGAR**



**SIEVE MEMBER**



**SIEVE PLATE  
LARGE PORES**

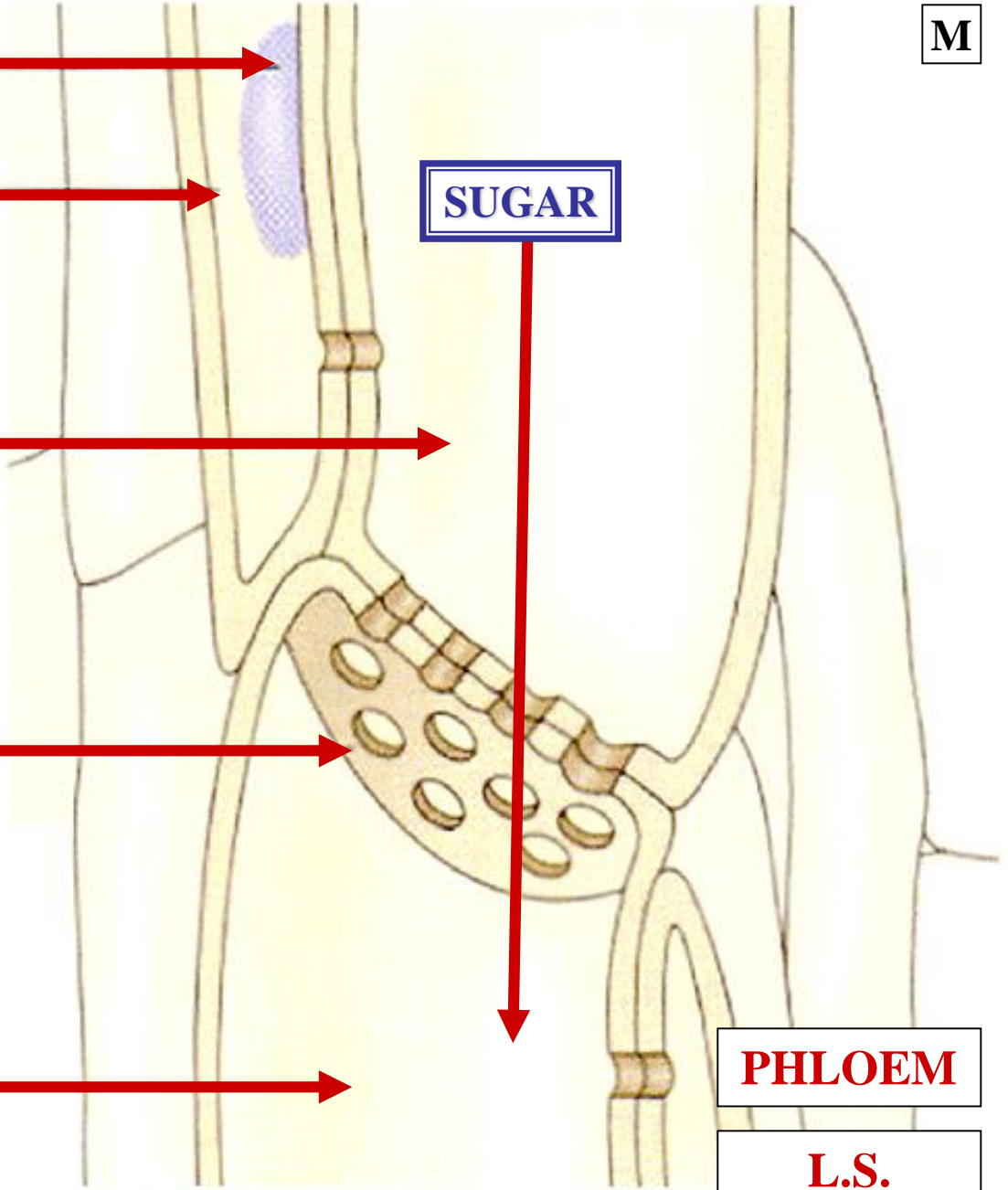


**SIEVE MEMBER**



**PHLOEM**

**L.S.**







**NUCLEUS**



**CAMPANION CELL**  
METABOLICALLY  
CONTROLS SIEVE MEMBER



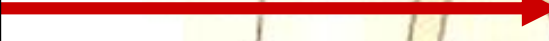
**SUGAR**



**SIEVE MEMBER**



**SIEVE PLATE**  
LARGE PORES

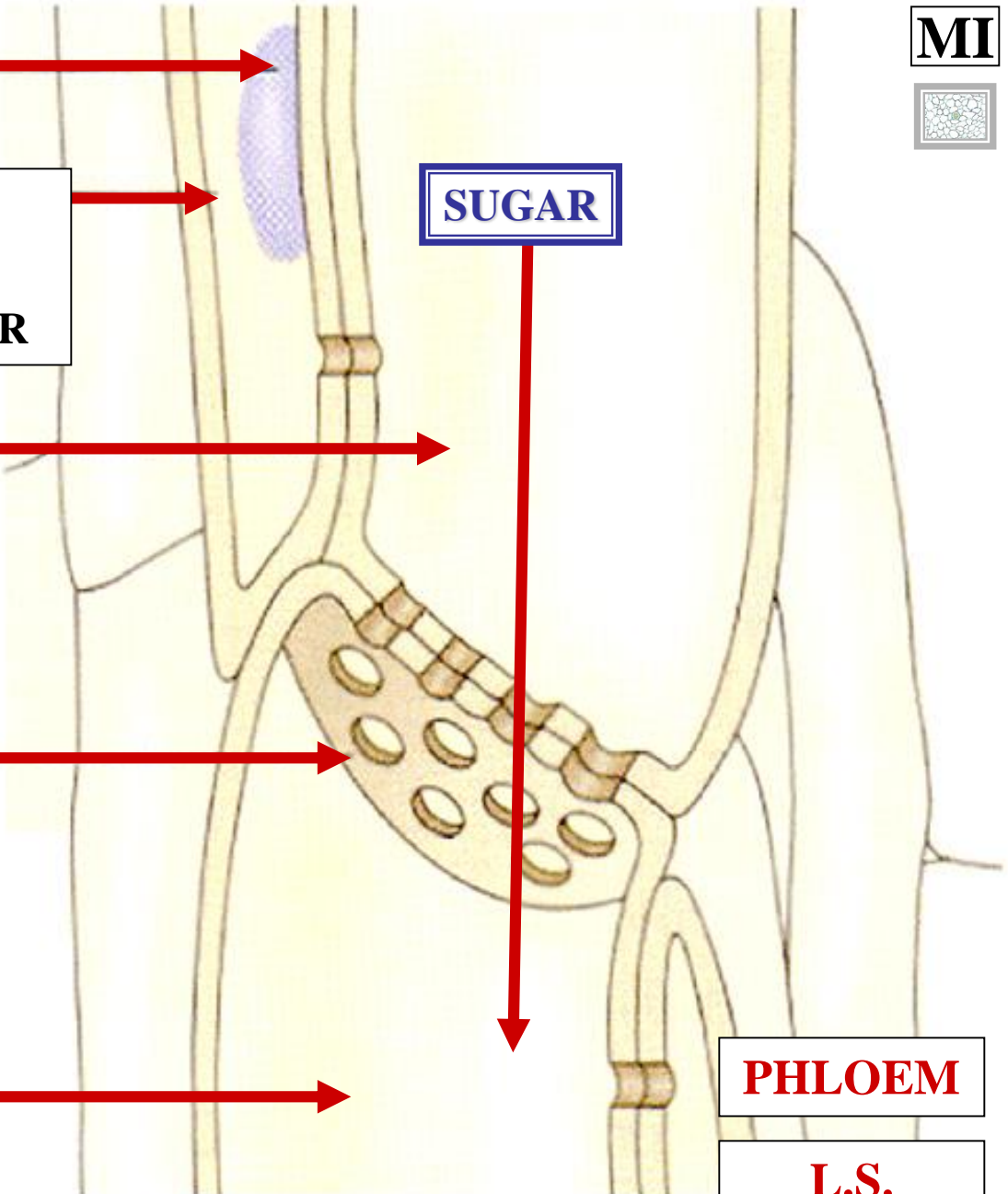


**SIEVE MEMBER**



**PHLOEM**

**L.S.**





**SIEVE MEMBER  
COMPANION CELL  
MICROGRAPHS  
C.S.**

**SP**



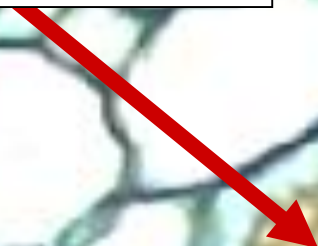
**SIEVE MEMBER**

A micrograph of a plant stem cross-section. The image shows a network of large, roughly hexagonal cells with thick, dark cell walls. In the center, a single cell is highlighted with a red bracket and labeled 'SIEVE MEMBER'. This cell contains a dense, circular cluster of small, golden-brown granules. The surrounding cells are mostly empty, with some showing faint cytoplasmic details. The overall appearance is that of a vascular bundle in a stem.

**PHLOEM**

**C.S.**

**SIEVE PLATE  
LARGE PORES**

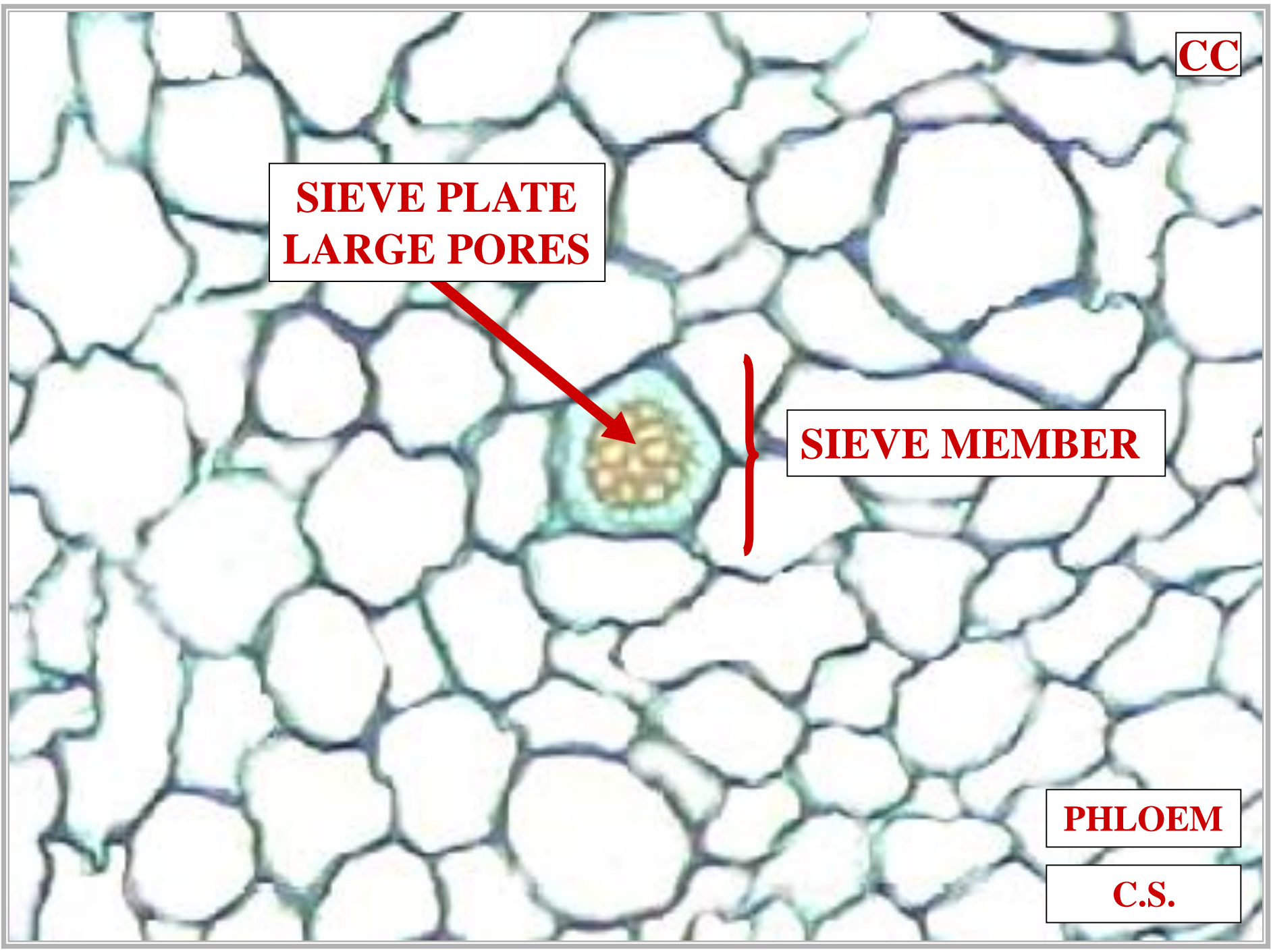


**SIEVE MEMBER**



**PHLOEM**

**C.S.**







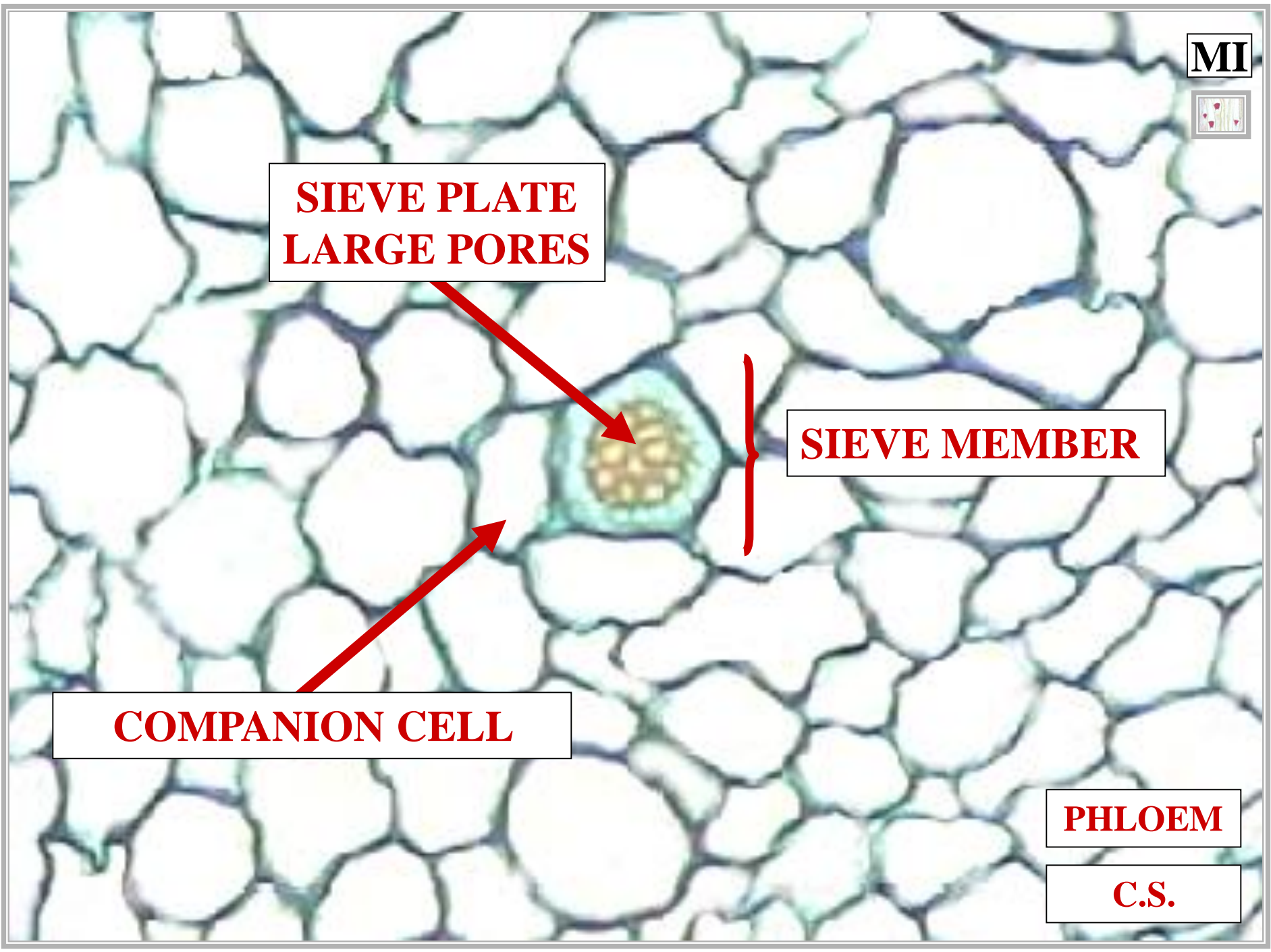
**SIEVE PLATE  
LARGE PORES**

**SIEVE MEMBER**

**COMPANION CELL**

**PHLOEM**

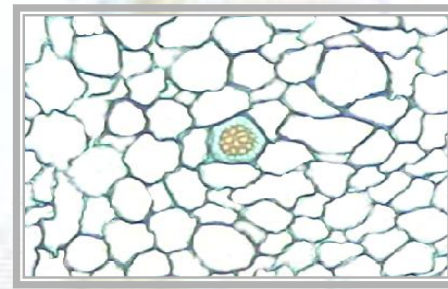
**C.S.**





**SIEVE MEMBER  
COMPANION CELL  
MICROGRAPHS  
L.S.**

**SP**



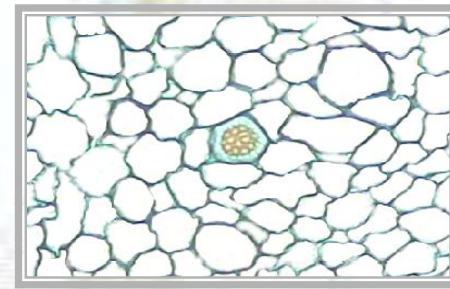
**SIEVE MEMBER**

**PHLOEM**

**L.S.**



**SIEVE PLATE  
LARGE PORES**

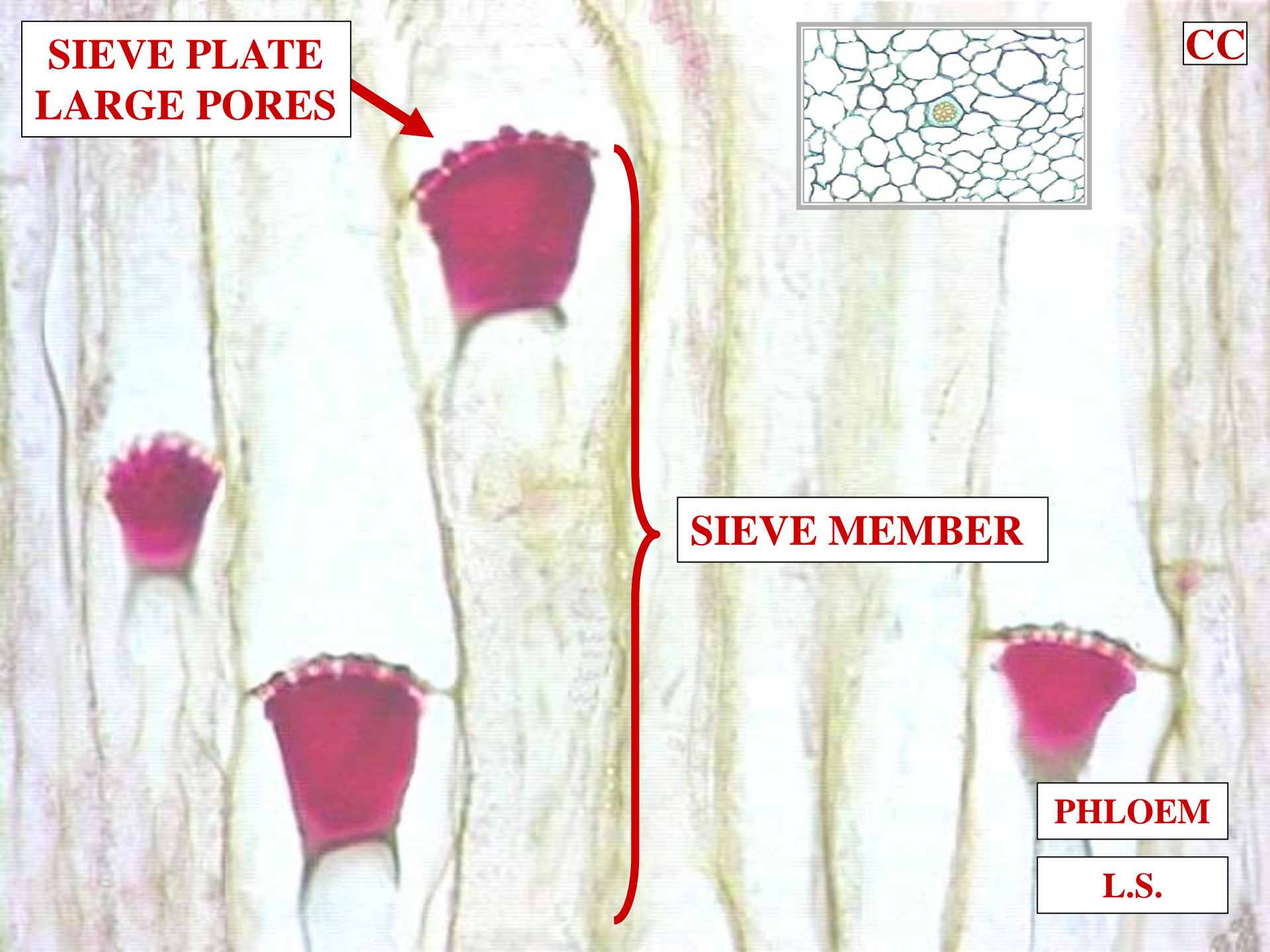


**CC**

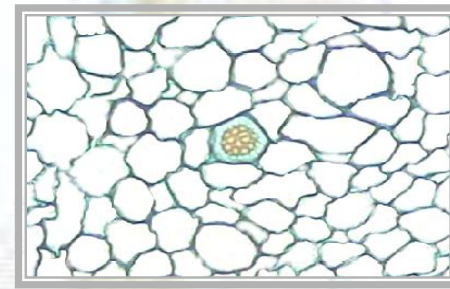
**SIEVE MEMBER**

**PHLOEM**

**L.S.**



**SIEVE PLATE  
LARGE PORES**



\$

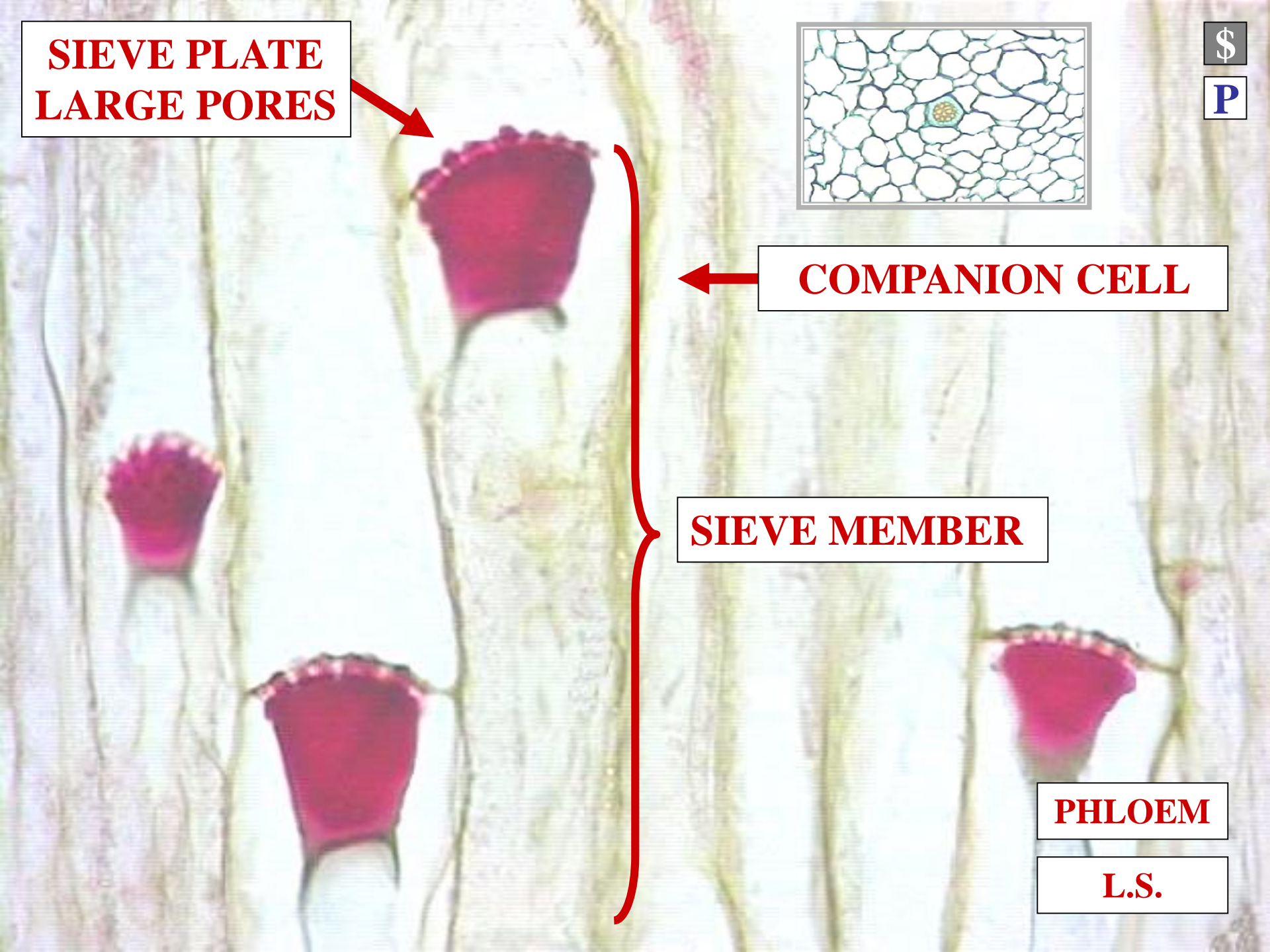
P

**COMPANION CELL**

**SIEVE MEMBER**

**PHLOEM**

**L.S.**





# **PHLOEM TISSUE SUMMARY**

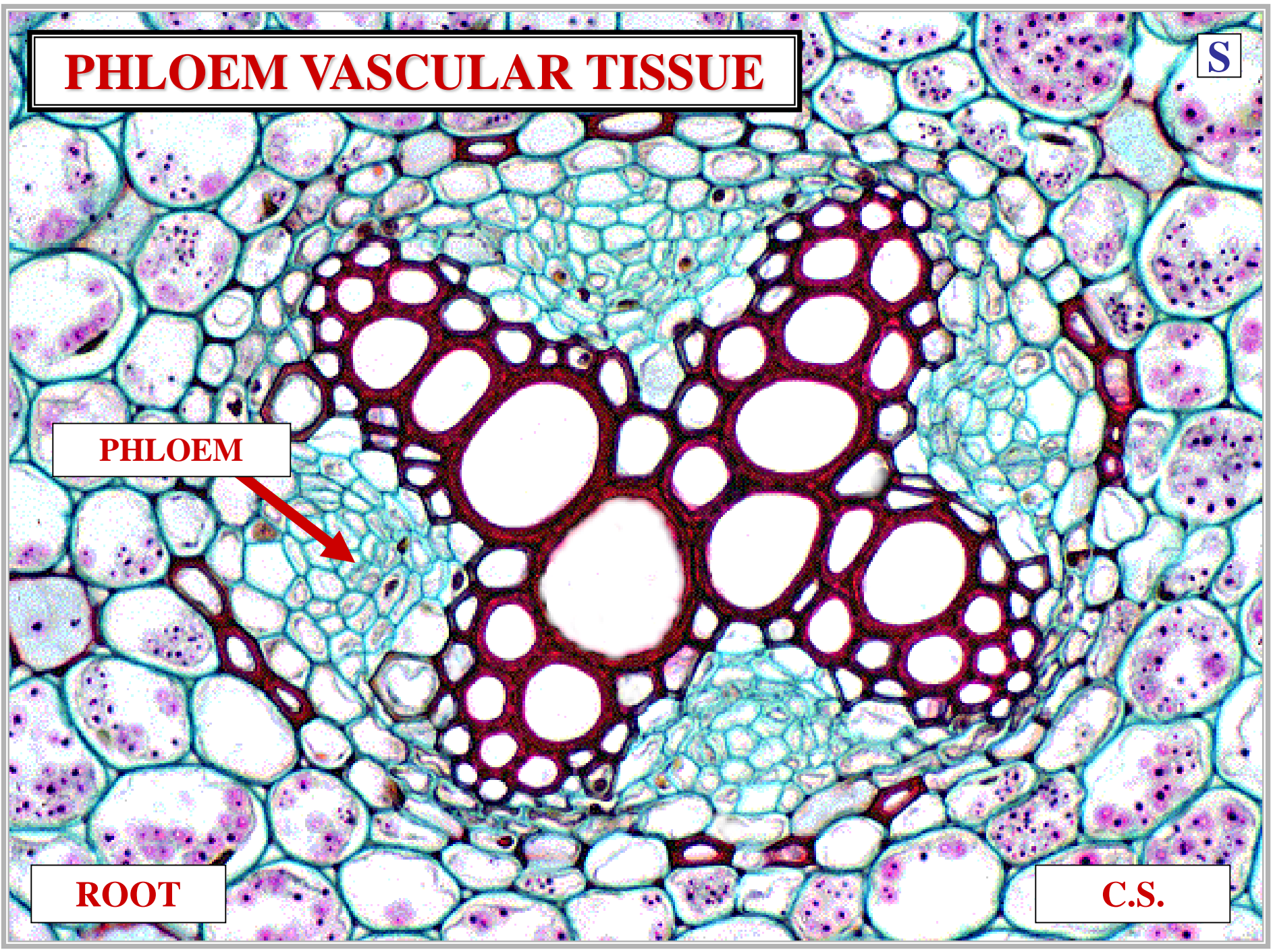
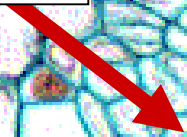
# PHLOEM VASCULAR TISSUE

S

PHLOEM

ROOT

C.S.

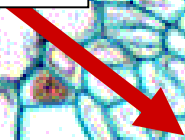




# PHLOEM VASCULAR TISSUE

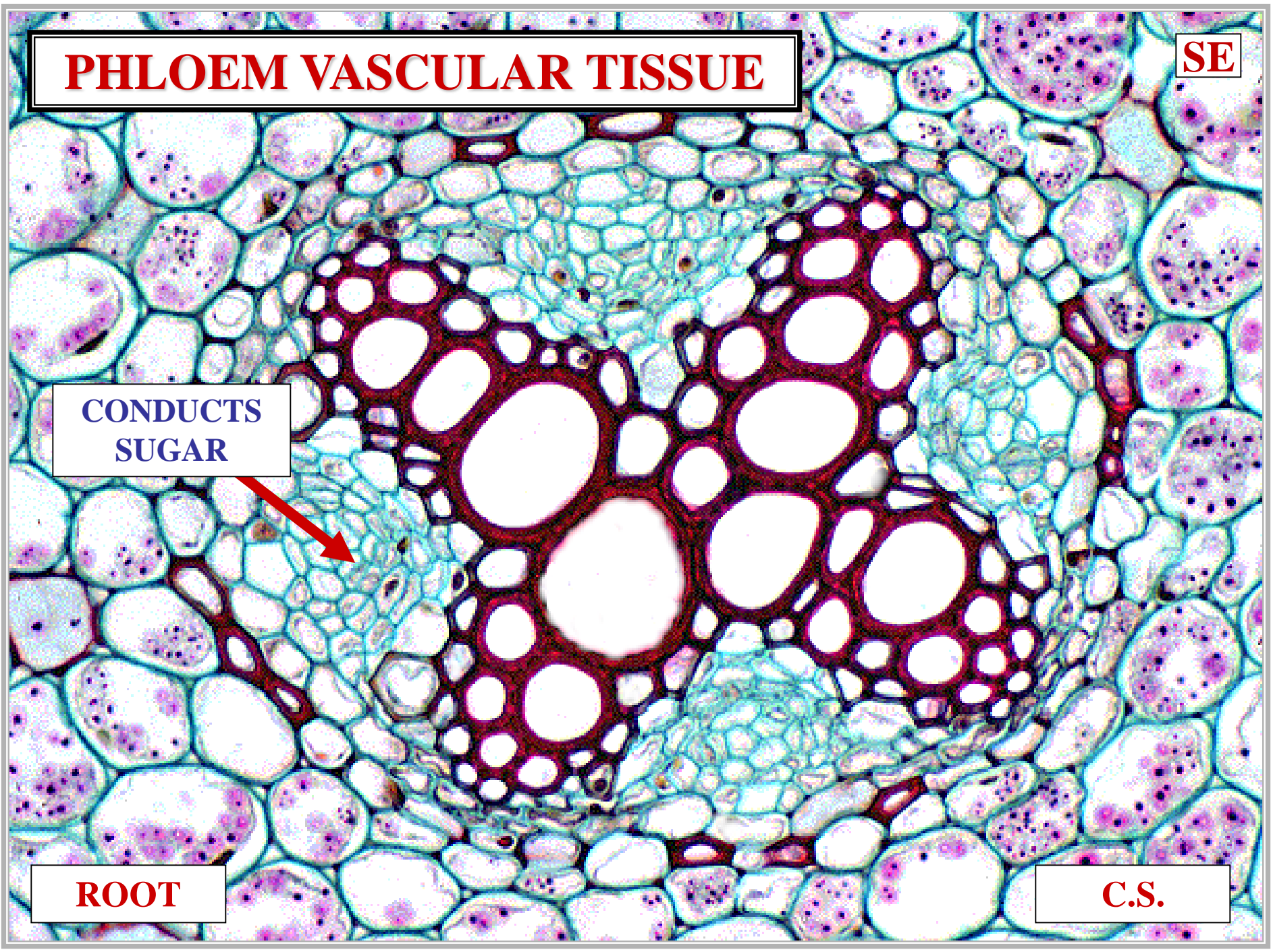
SE

CONDUCTS  
SUGAR



ROOT

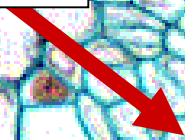
C.S.



# PHLOEM VASCULAR TISSUE

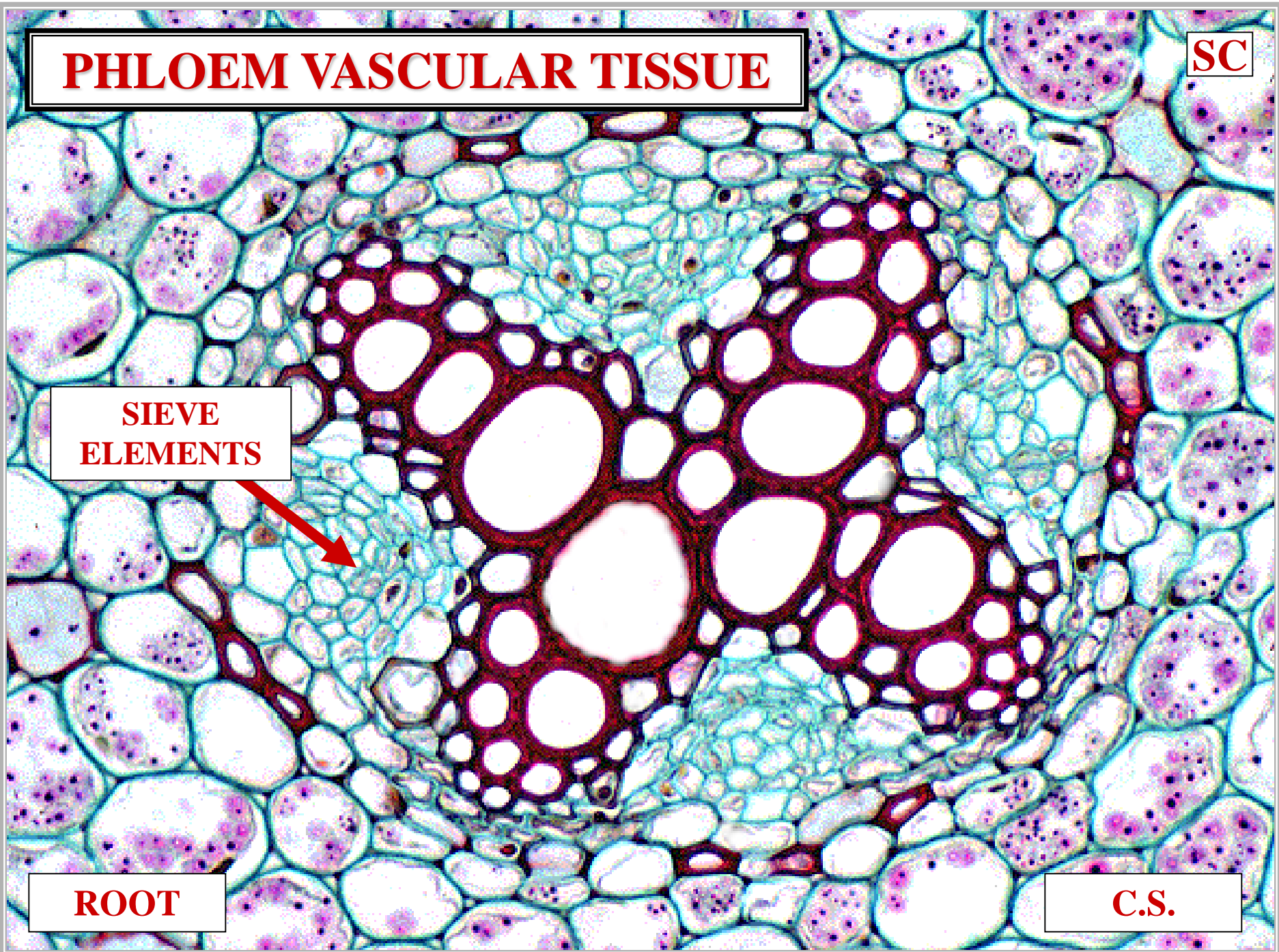
SC

SIEVE  
ELEMENTS



ROOT

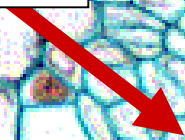
C.S.



# PHLOEM VASCULAR TISSUE

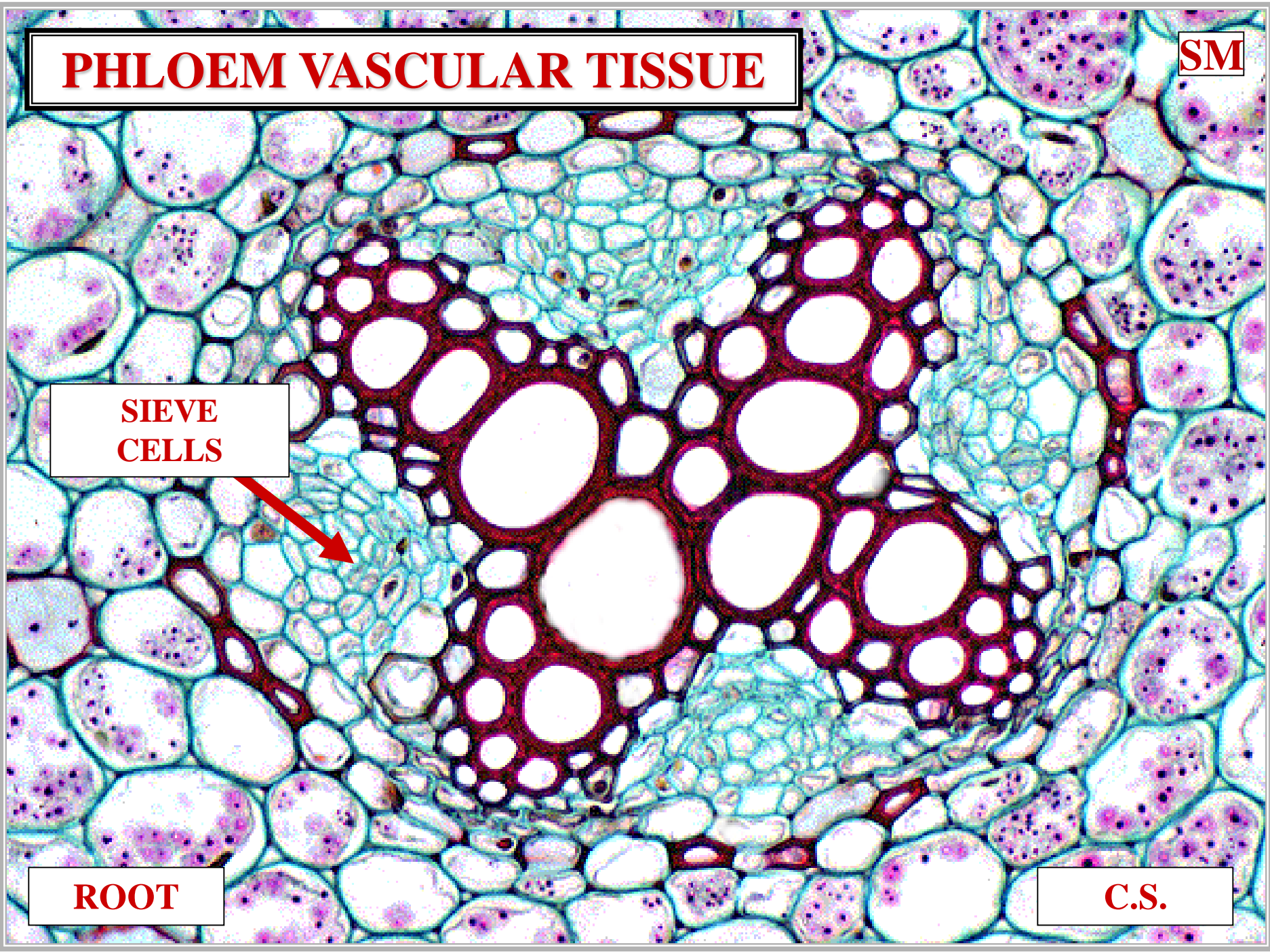
SM

SIEVE  
CELLS



ROOT

C.S.



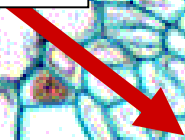


# PHLOEM VASCULAR TISSUE

SC

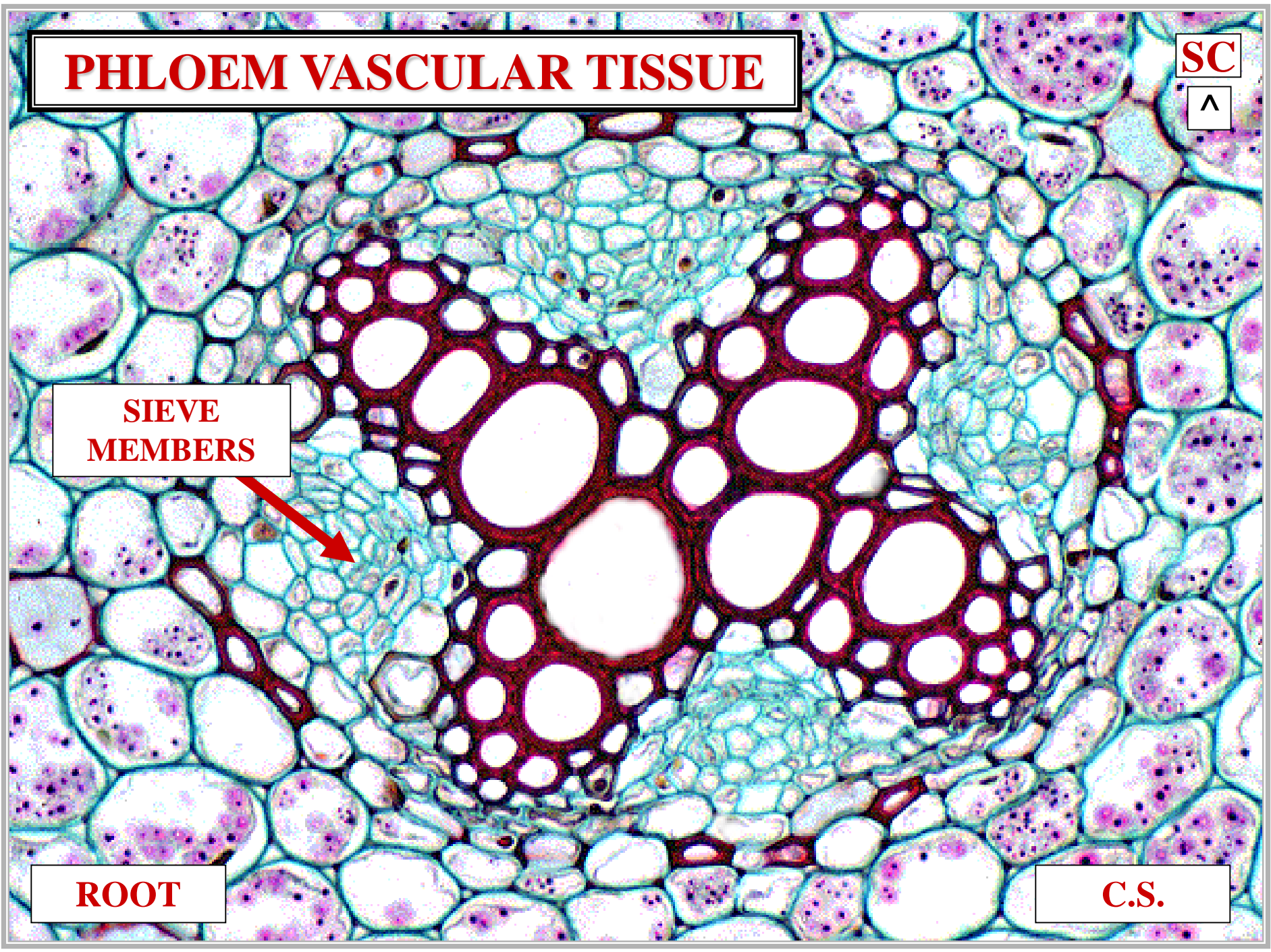
^

SIEVE  
MEMBERS



ROOT

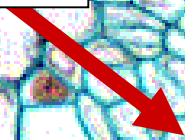
C.S.



# PHLOEM VASCULAR TISSUE

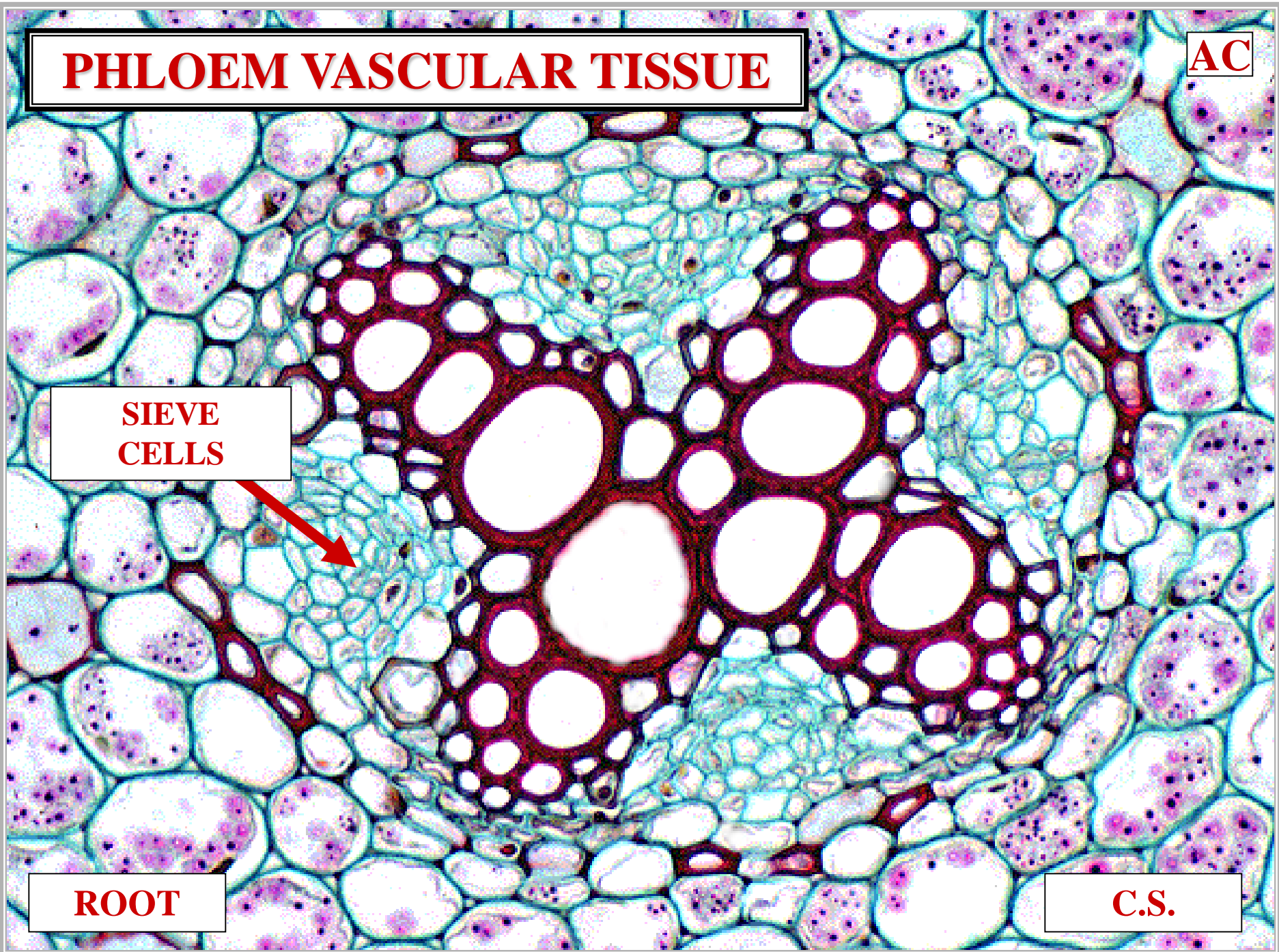
AC

SIEVE  
CELLS



ROOT

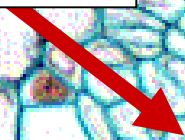
C.S.



# PHLOEM VASCULAR TISSUE

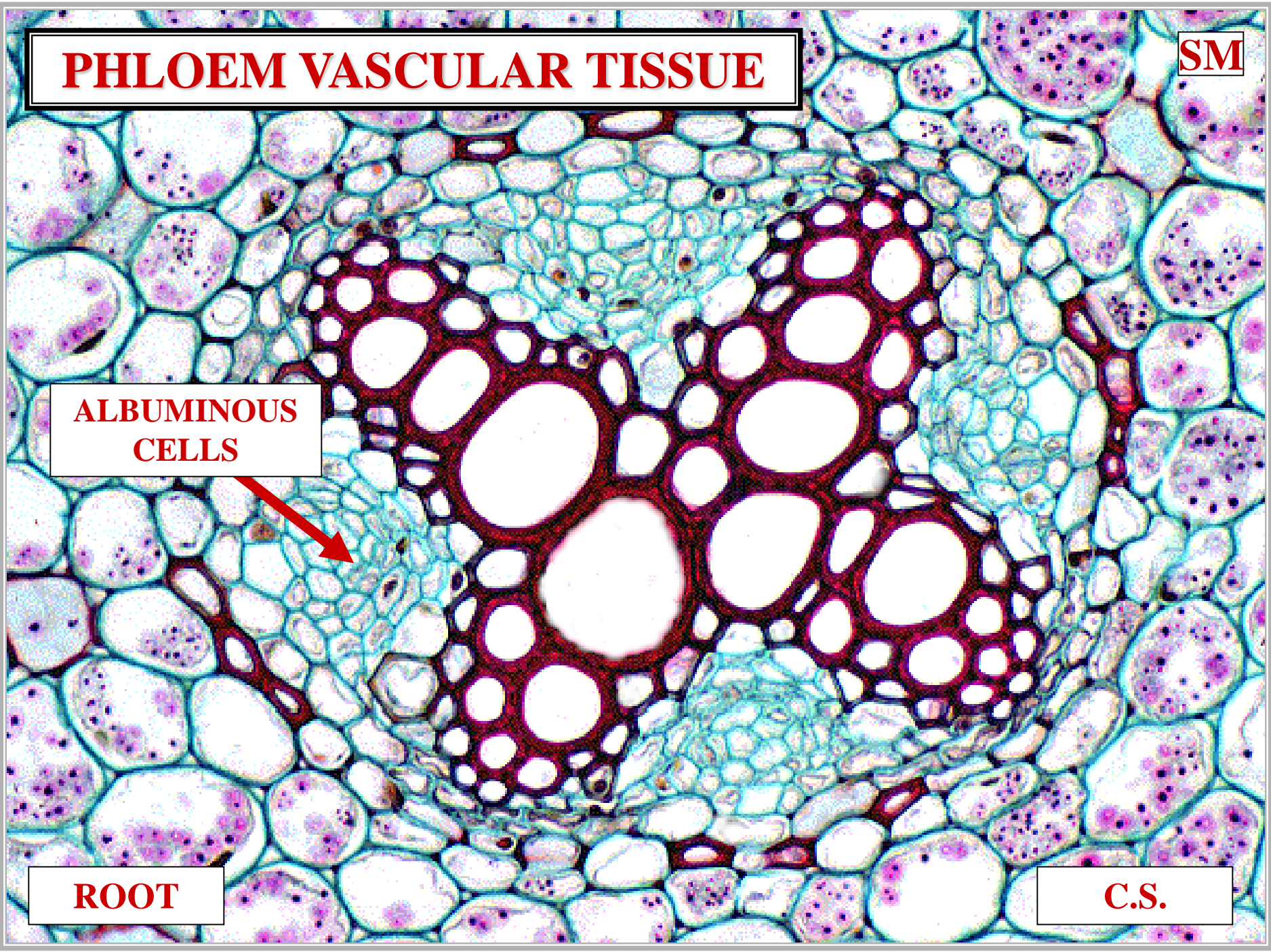
SM

ALBUMINOUS  
CELLS



ROOT

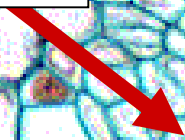
C.S.



# PHLOEM VASCULAR TISSUE

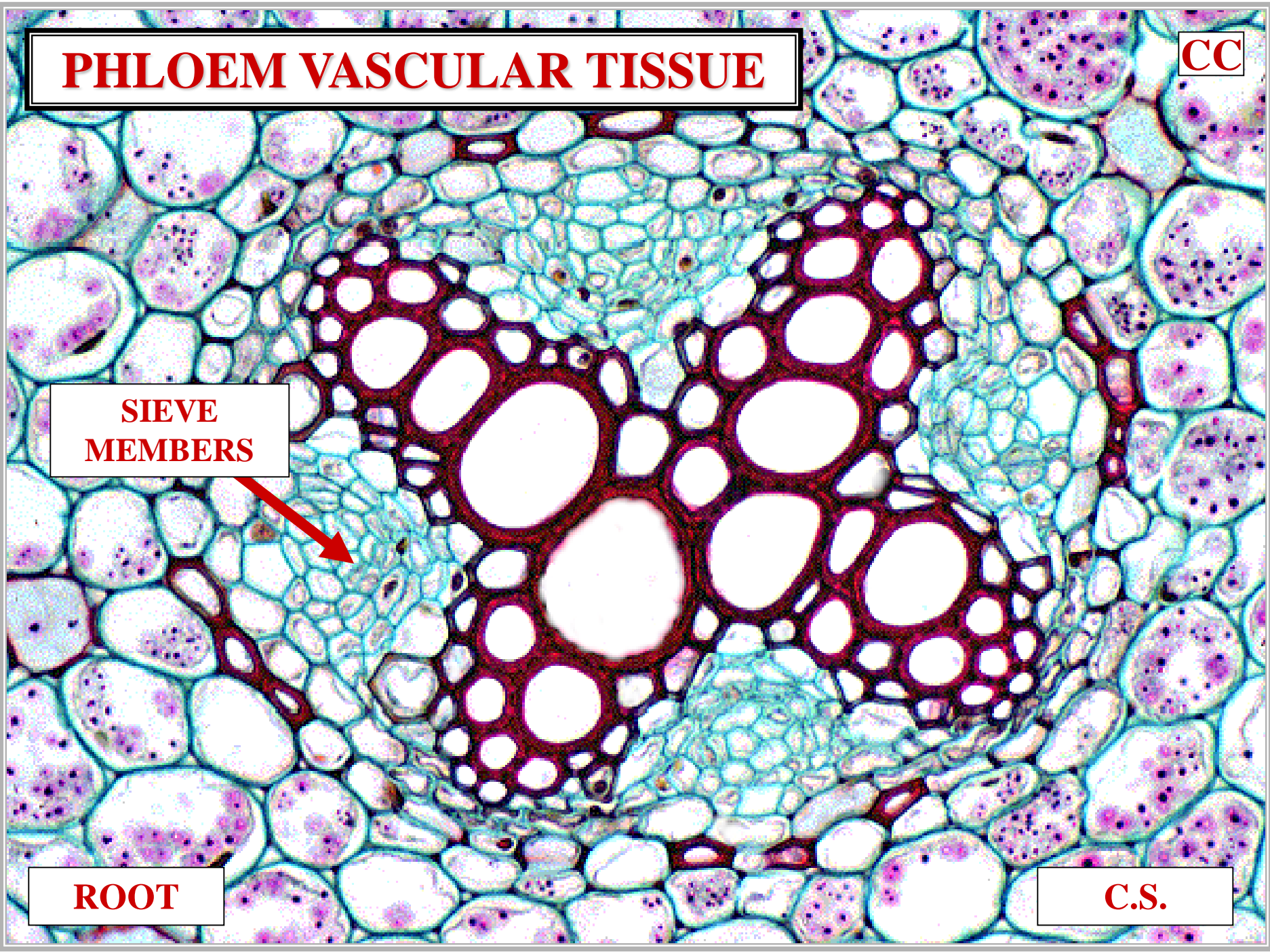
CC

SIEVE MEMBERS



ROOT

C.S.

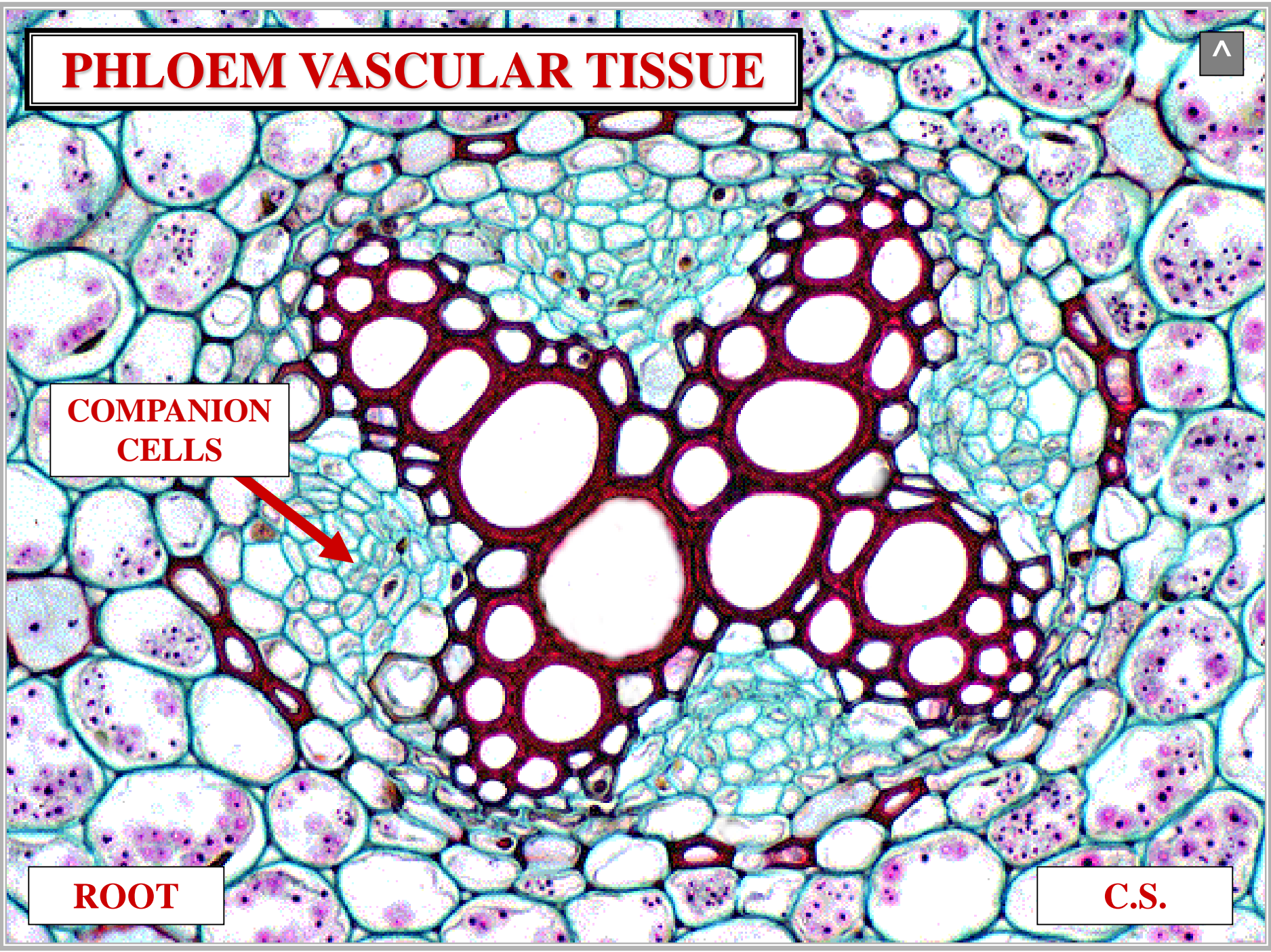
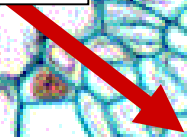


# PHLOEM VASCULAR TISSUE

COMPANION  
CELLS

ROOT

C.S.



# TRACHEOPHYTE VASCULAR STELES

**STELLE**





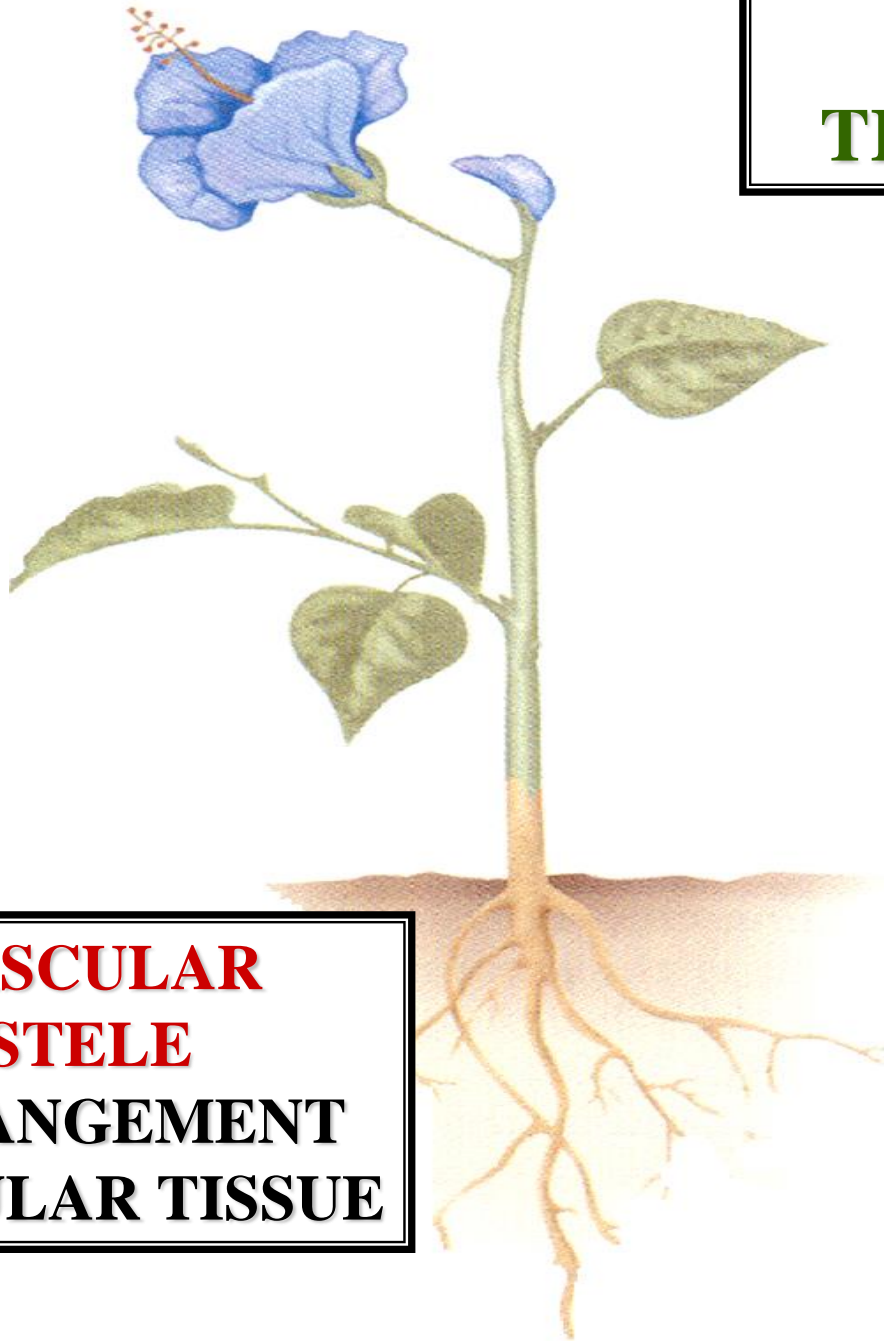
**STELE**

**ARRANGEMENT  
VASCULAR TISSUE**

**STELE**

# TYPICAL TRACHEOPHYTE

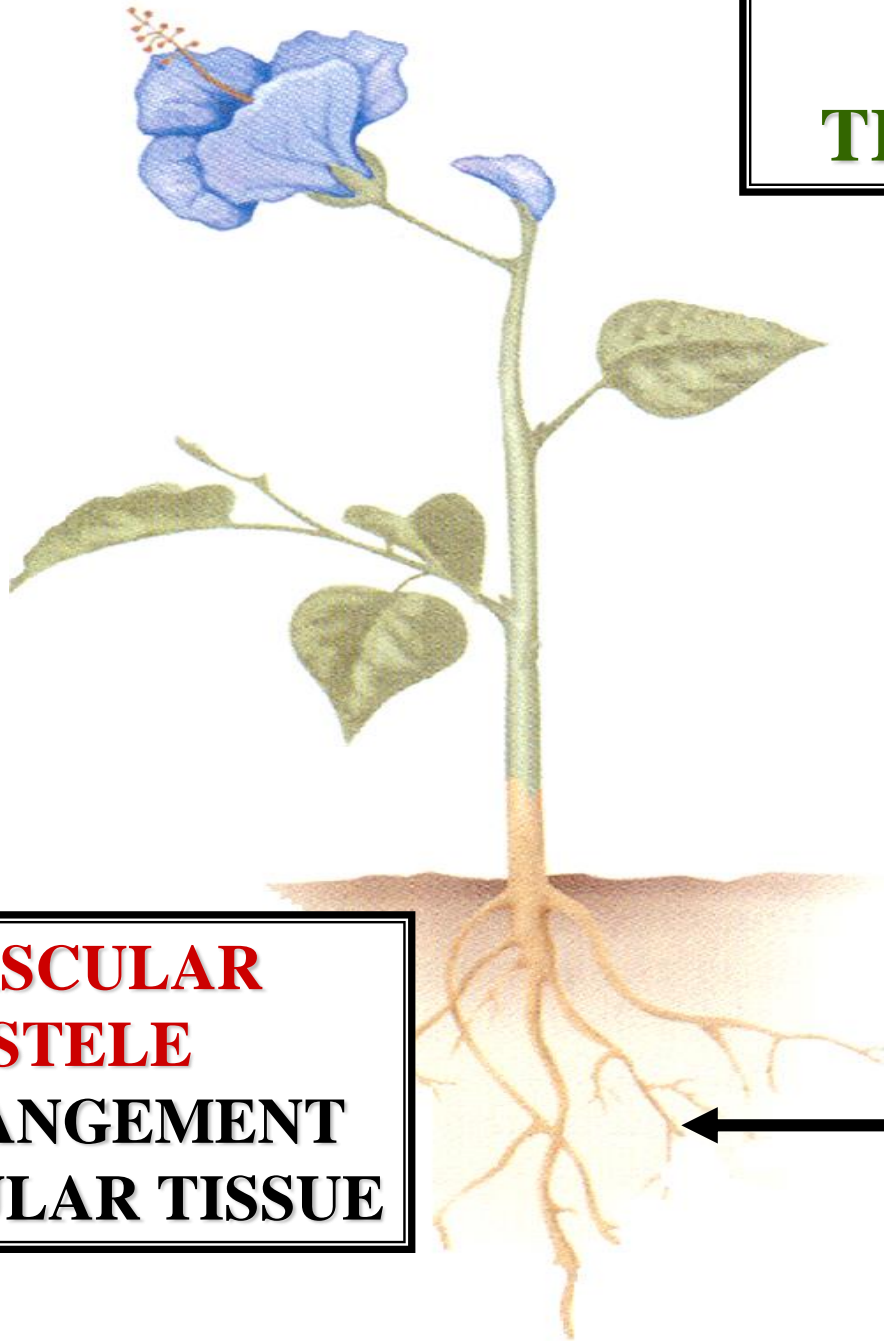
RT



**VASCULAR  
STELE  
ARRANGEMENT  
VASCULAR TISSUE**

# TYPICAL TRACHEOPHYTE

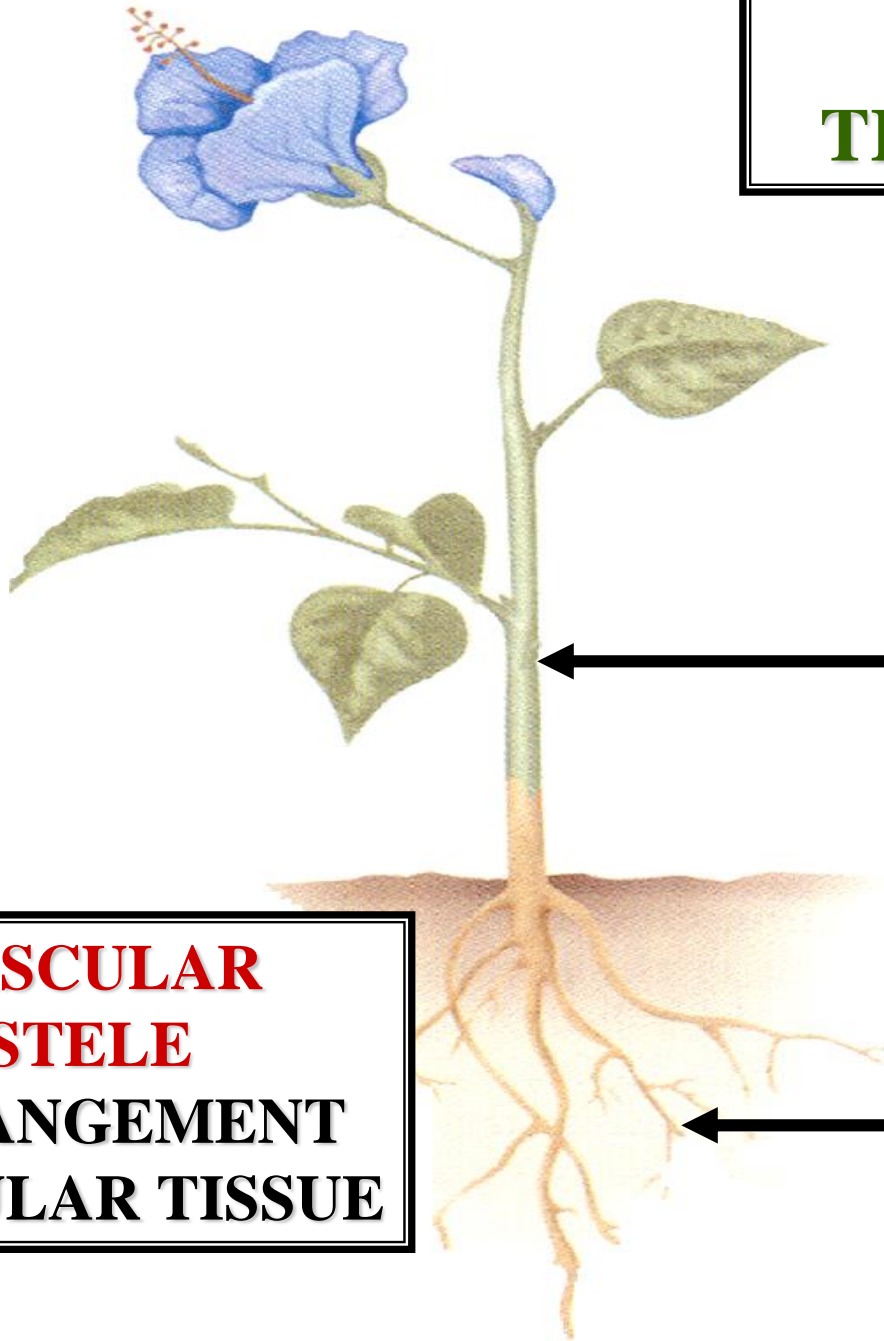
ST



**VASCULAR  
STELE  
ARRANGEMENT  
VASCULAR TISSUE**

**ROOT**

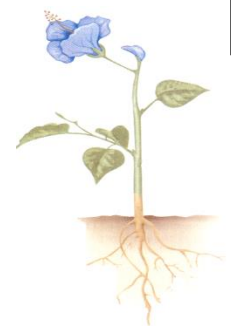
# TYPICAL TRACHEOPHYTE



**STEM**

**ROOT**

**VASCULAR  
STELE  
ARRANGEMENT  
VASCULAR TISSUE**



**EPIDERMIS**



**VASCULAR STELE**

**CORTEX**



**XYLEM**

**PHLOEM**



**PLANT X-SECTION**

**ARRANGEMENT VASCULAR TISSUE**

**STEM**

**ROOT**



**C.S.**

**TRACHEOPHYTE  
VASCULAR  
STELES  
TYPES**

# **VASCULAR STELE TYPES**

**PROTOSTELES**

# **VASCULAR STELE TYPES**



# **VASCULAR STELE TYPES**

**PROTOSTELES**

**SIPHONOSTELES**

**VASCULAR STELE  
TYPES**

# VASCULAR STELE TYPES



PROTOSTELES

SIPHONOSTELES

ATACTOSTELE

# VASCULAR STELE TYPES

# PROTOSTELES

**PROTOSTELE**

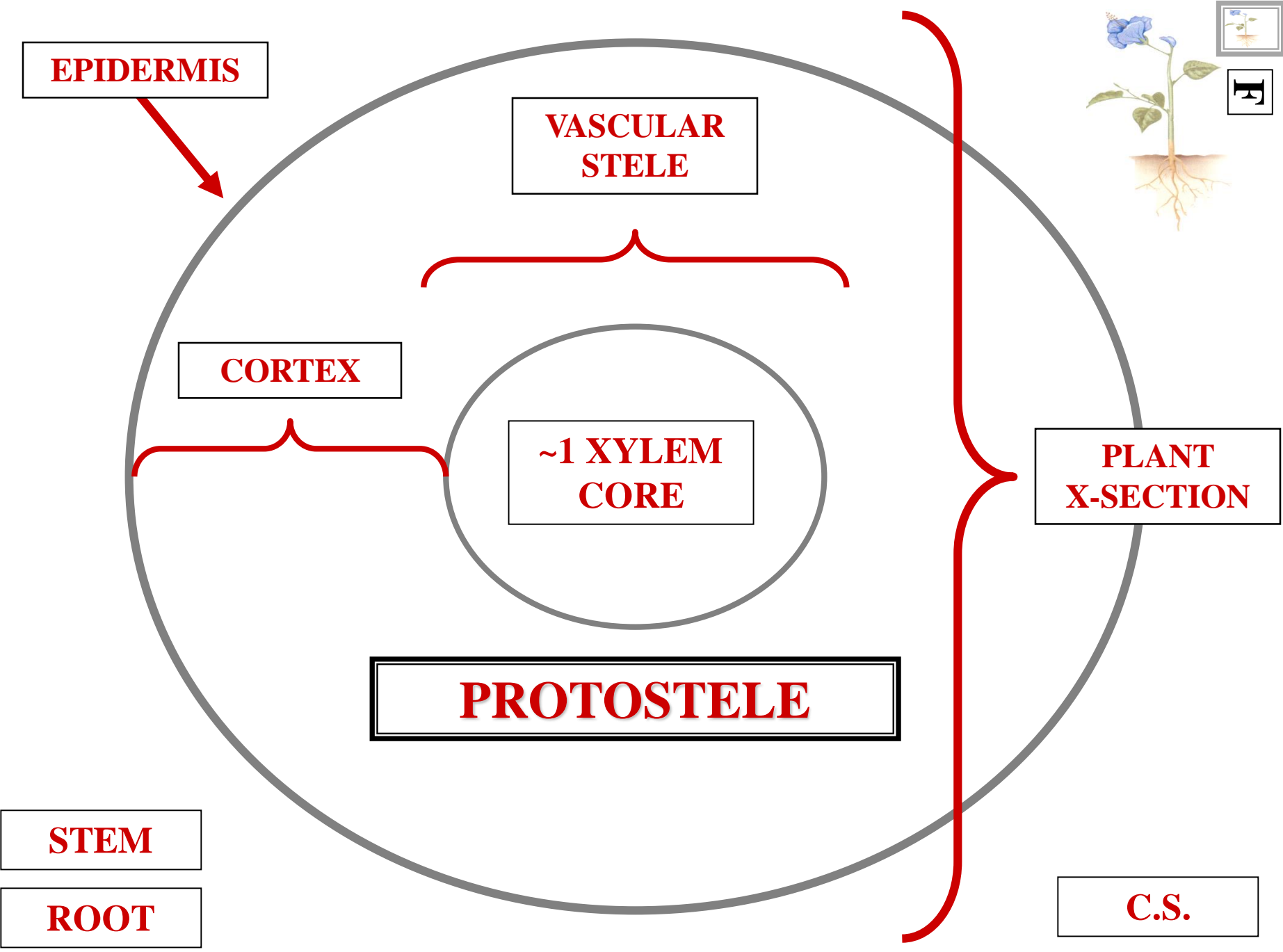
**VASCULAR STELE  
PROTOSTELE**



**XYLEM CORE  
WITH**

**PERIPHERAL PHLOEM**

**VASCULAR STELE  
PROTOSTELE**



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

**~1 XYLEM CORE**

**PROTOSTELE**

**PLANT X-SECTION**

**STEM**

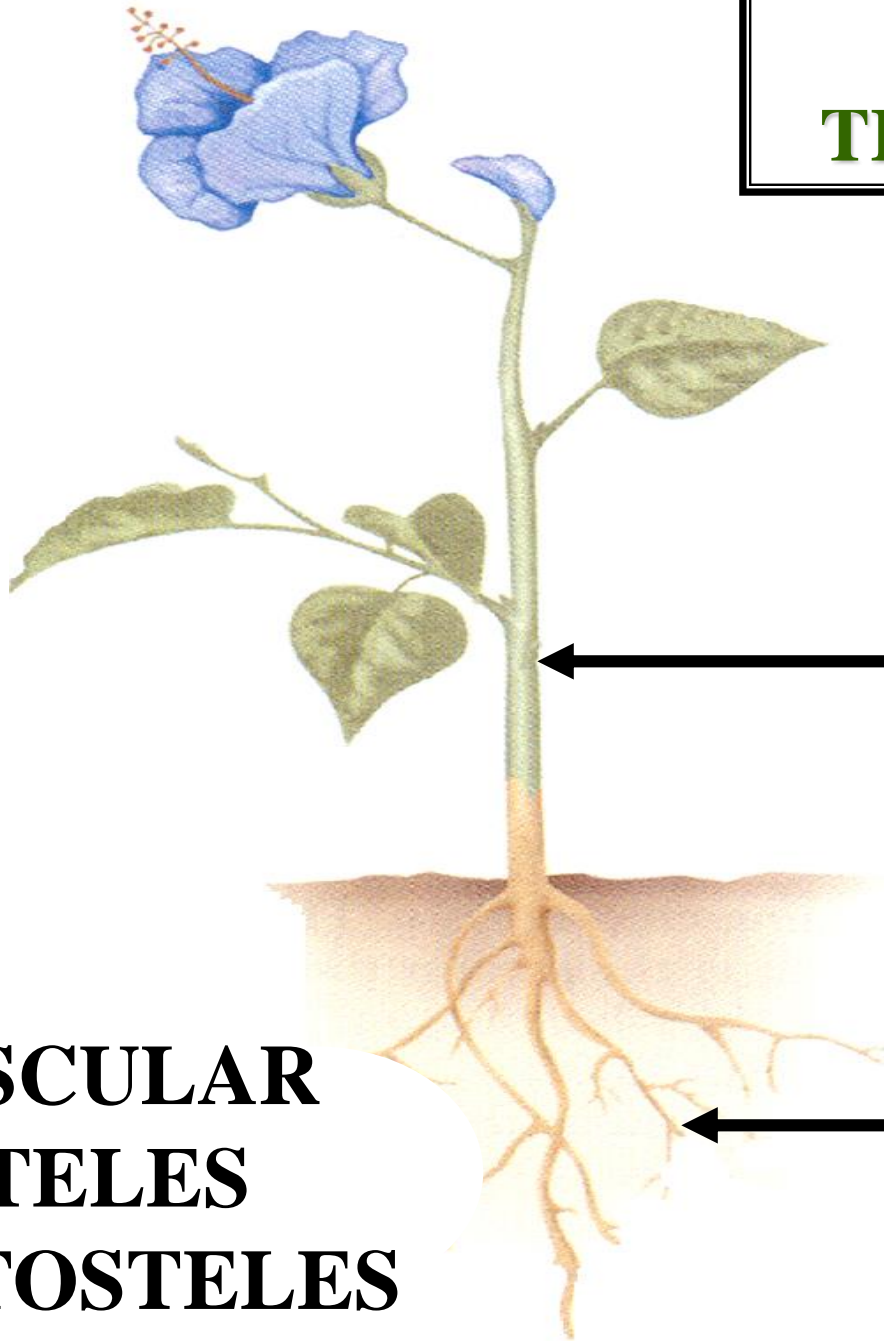
**ROOT**

**C.S.**



**F**

# TYPICAL TRACHEOPHYTE



**STEM**

**ROOT**

**VASCULAR  
STELES  
PROTOSTELES**

# PROTOSTELE TYPES



# **PROTOSTELE TYPES**

**HAPLOSTELE**

# **PROTOSTELE TYPES**

# **PROTOSTELE TYPES**

**HAPLOSTELE**

**ACTINOSTELE**

# **PROTOSTELE TYPES**

# PROTOSTELE TYPES

HAPLOSTELE

ACTINOSTELE

PLECTOSTELE

# PROTOSTELE TYPES

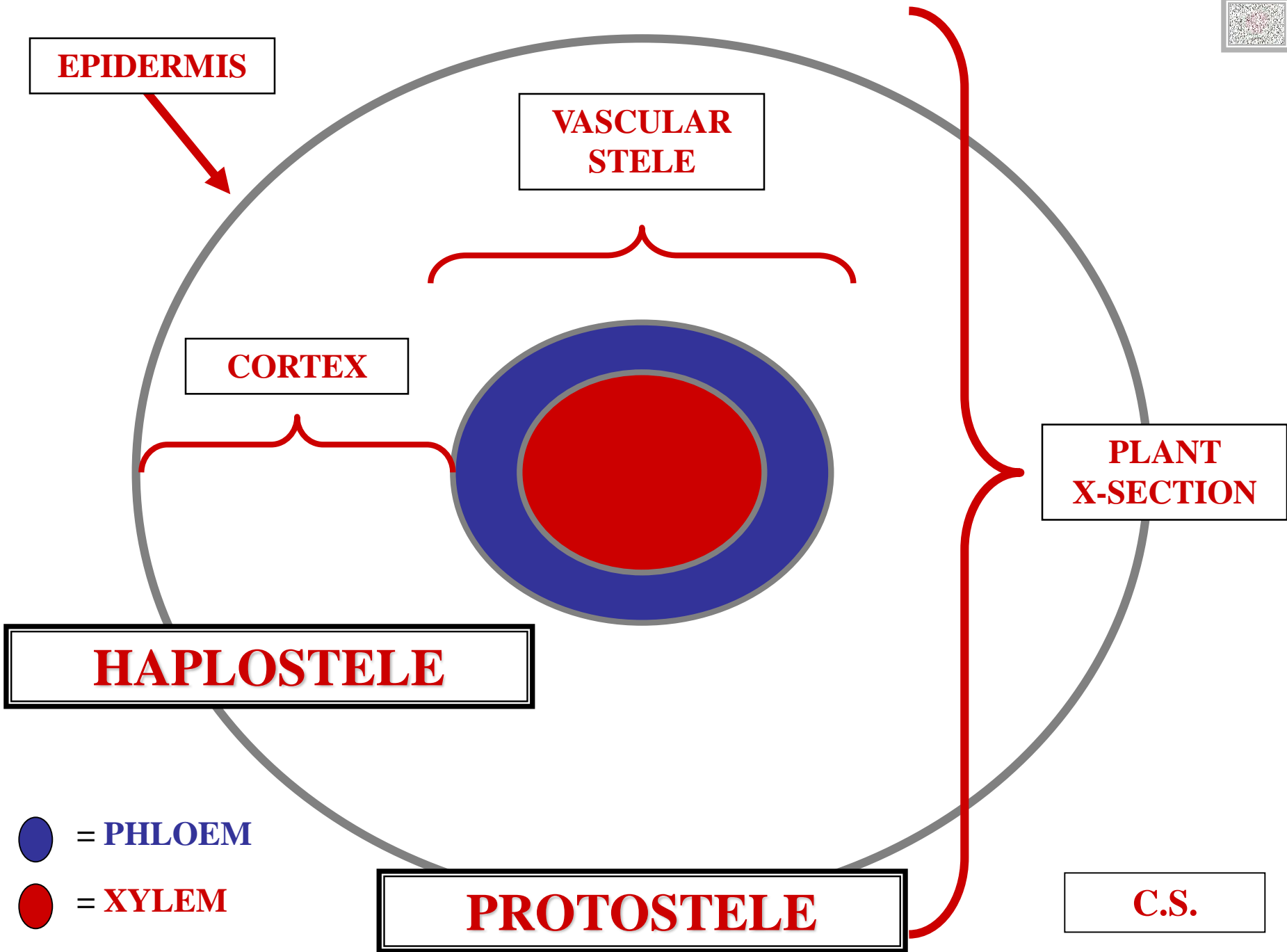
**HAPLOSTELE**

**PROTOSTELE  
HAPLOSTELE**



**XYLEM ROUND**

**PROTOSTELE  
TYPES**



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

**PLANT X-SECTION**

**HAPLOSTELE**

**PROTOSTELE**

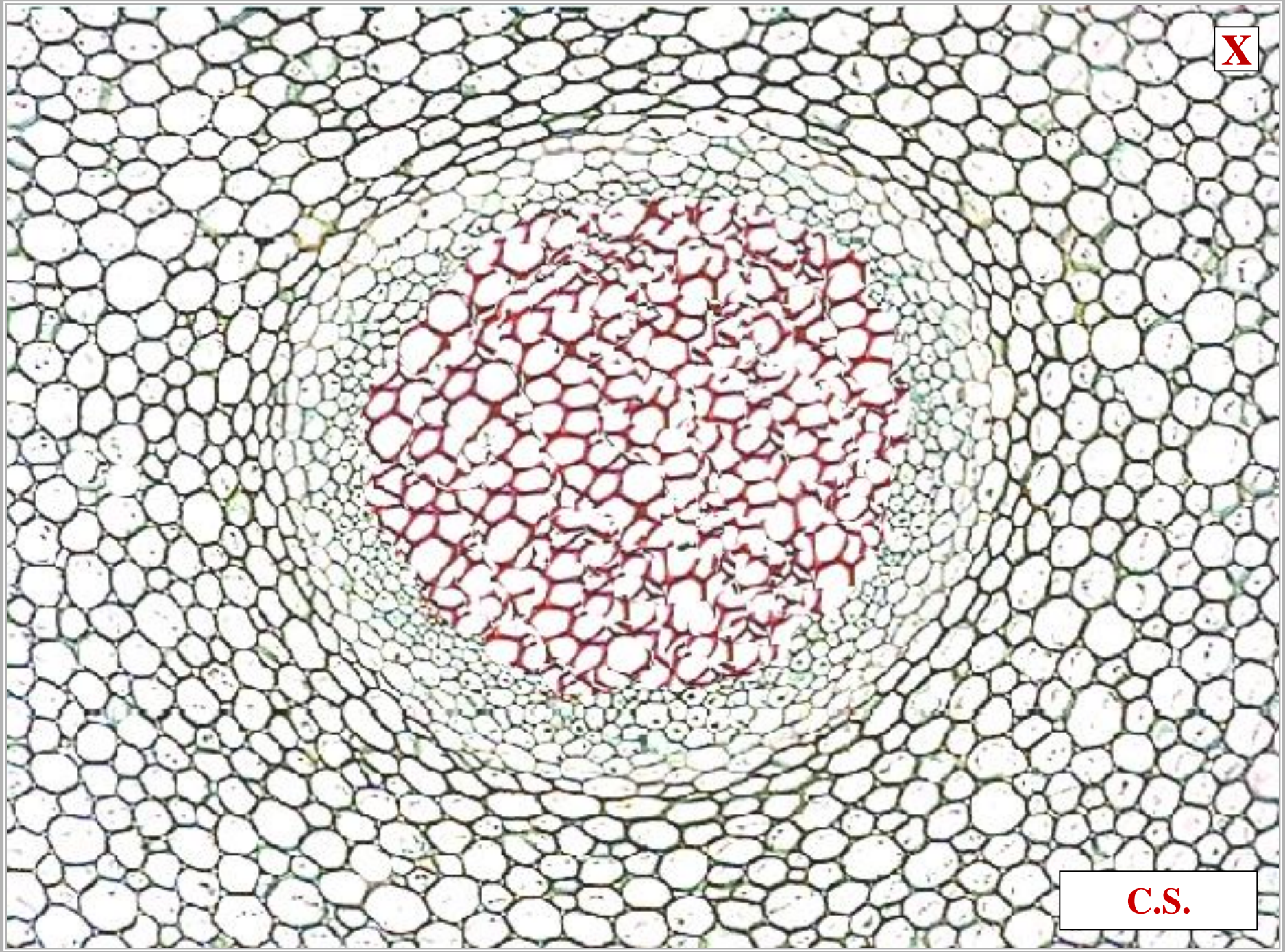
**C.S.**

**= PHLOEM**

**= XYLEM**



X



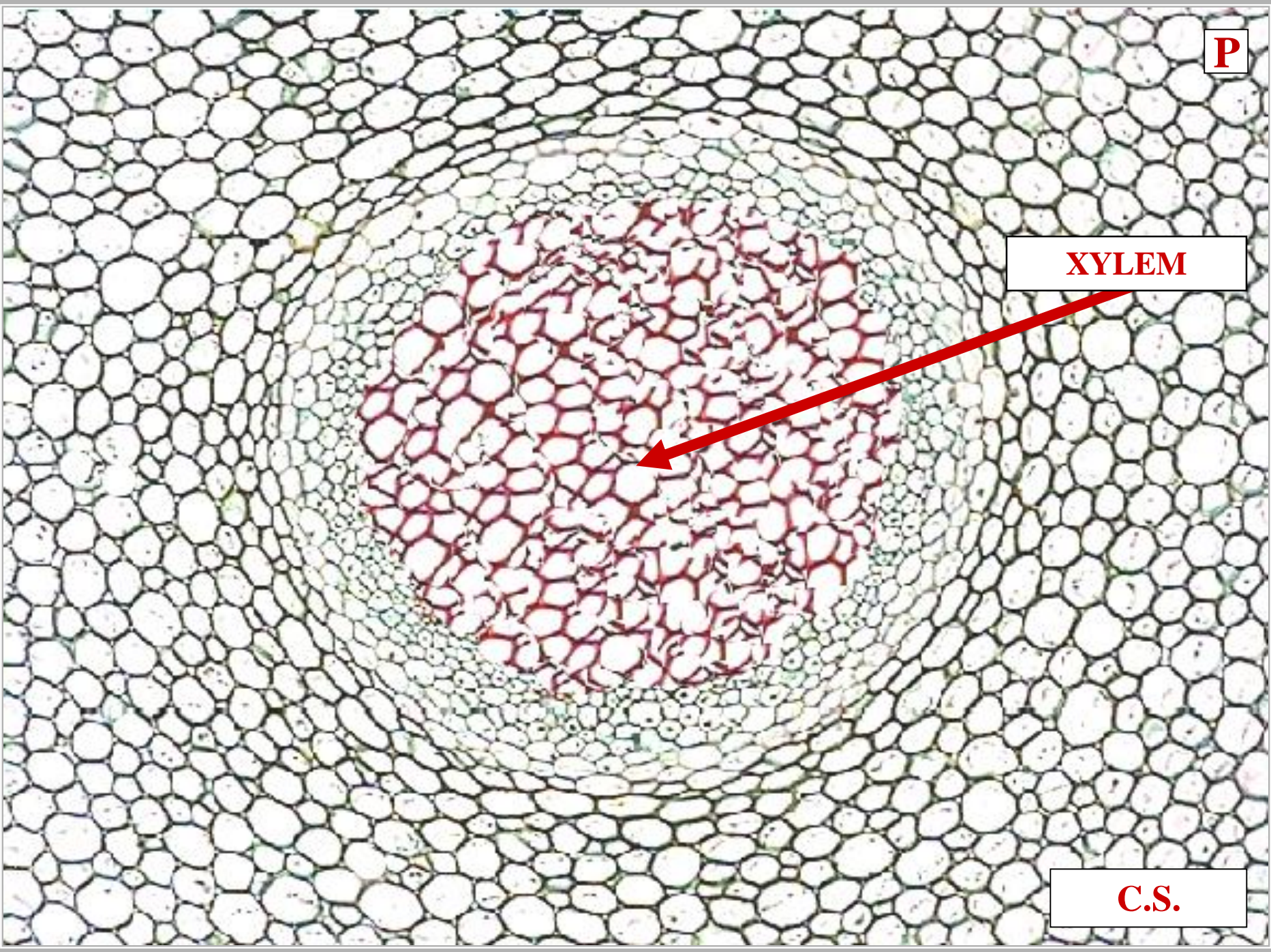
C.S.



**P**

**XYLEM**

**C.S.**



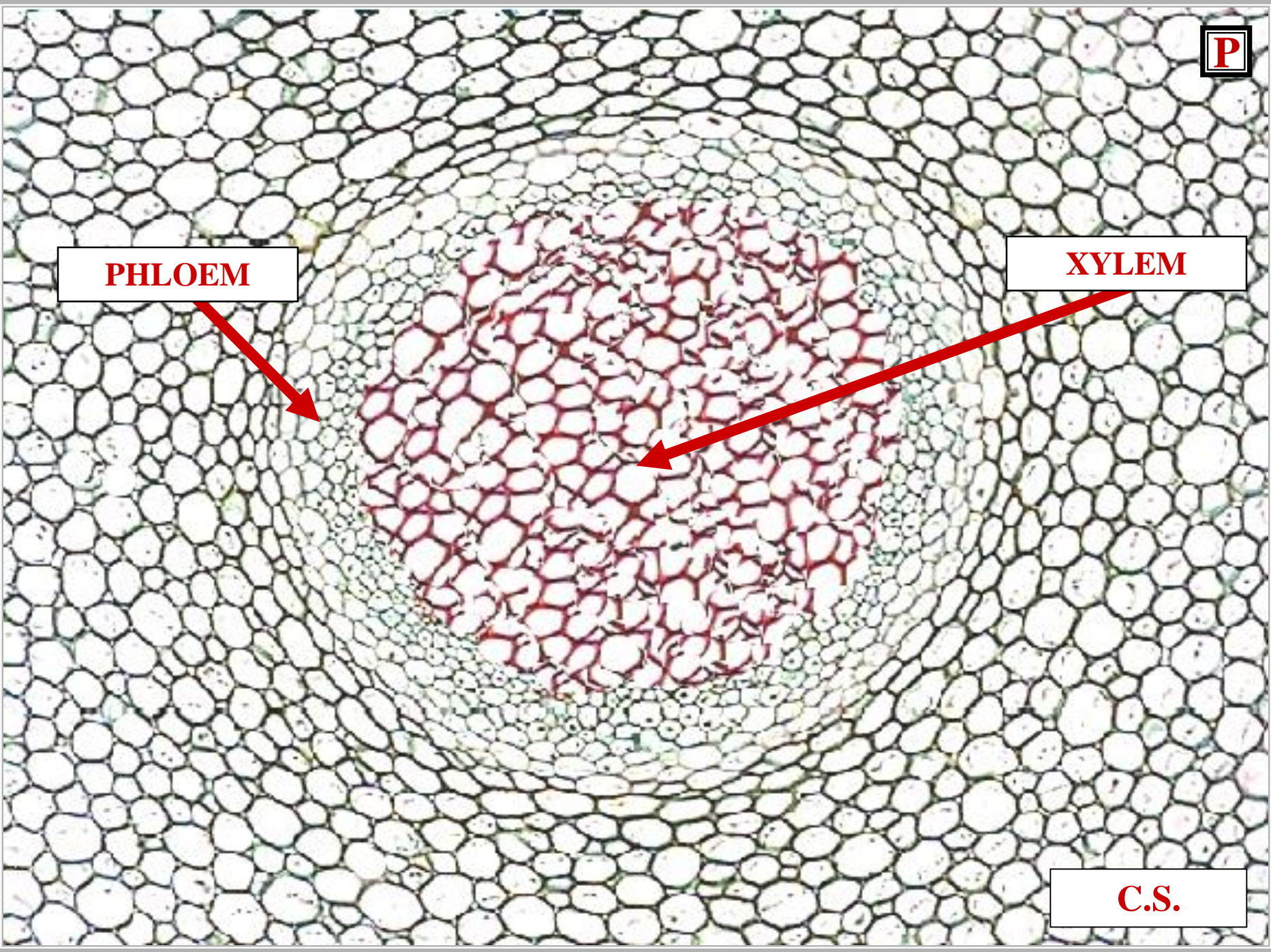


**P**

**PHLOEM**

**XYLEM**

**C.S.**

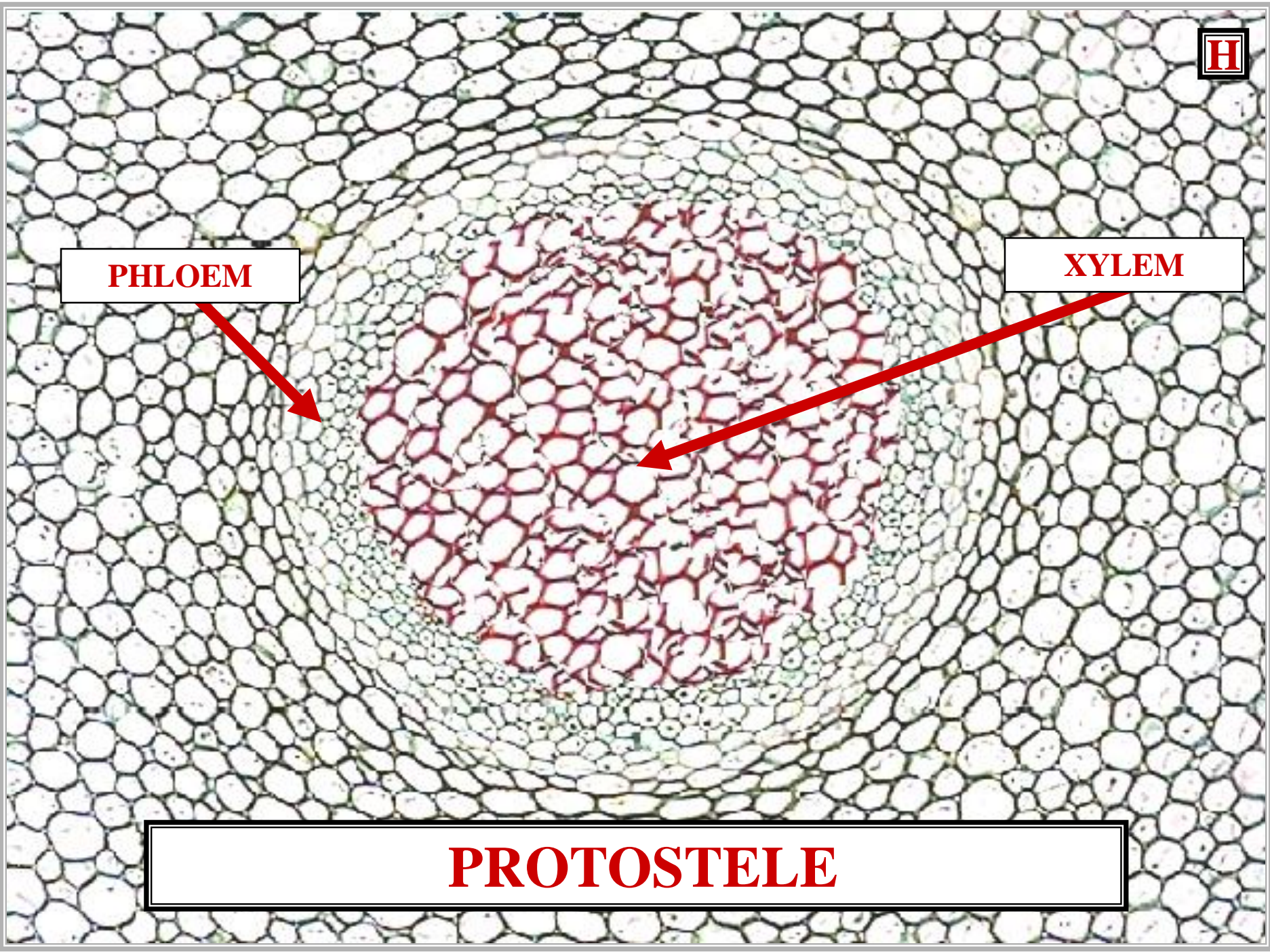




**PHLOEM**

**XYLEM**

**PROTOSTELE**





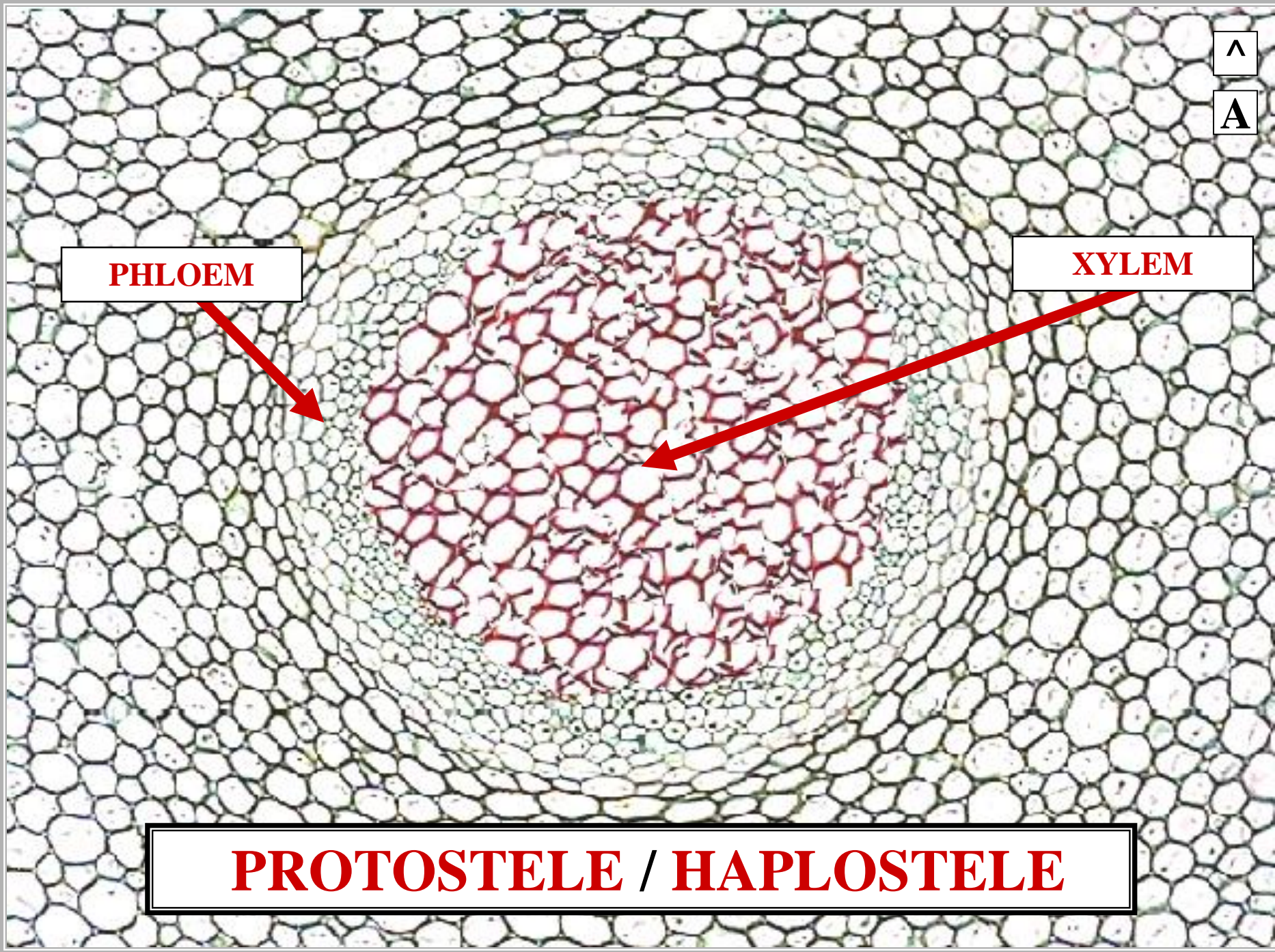
^

A

**PHLOEM**

**XYLEM**

**PROTOSTELE / HAPLOSTELE**



**ACTINOSTELE**

**PROTOSTELE  
ACTINOSTELE**



**XYLEM RIDGED**

**PROTOSTELE  
ACTINOSTELE**



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

**PLANT X-SECTION**

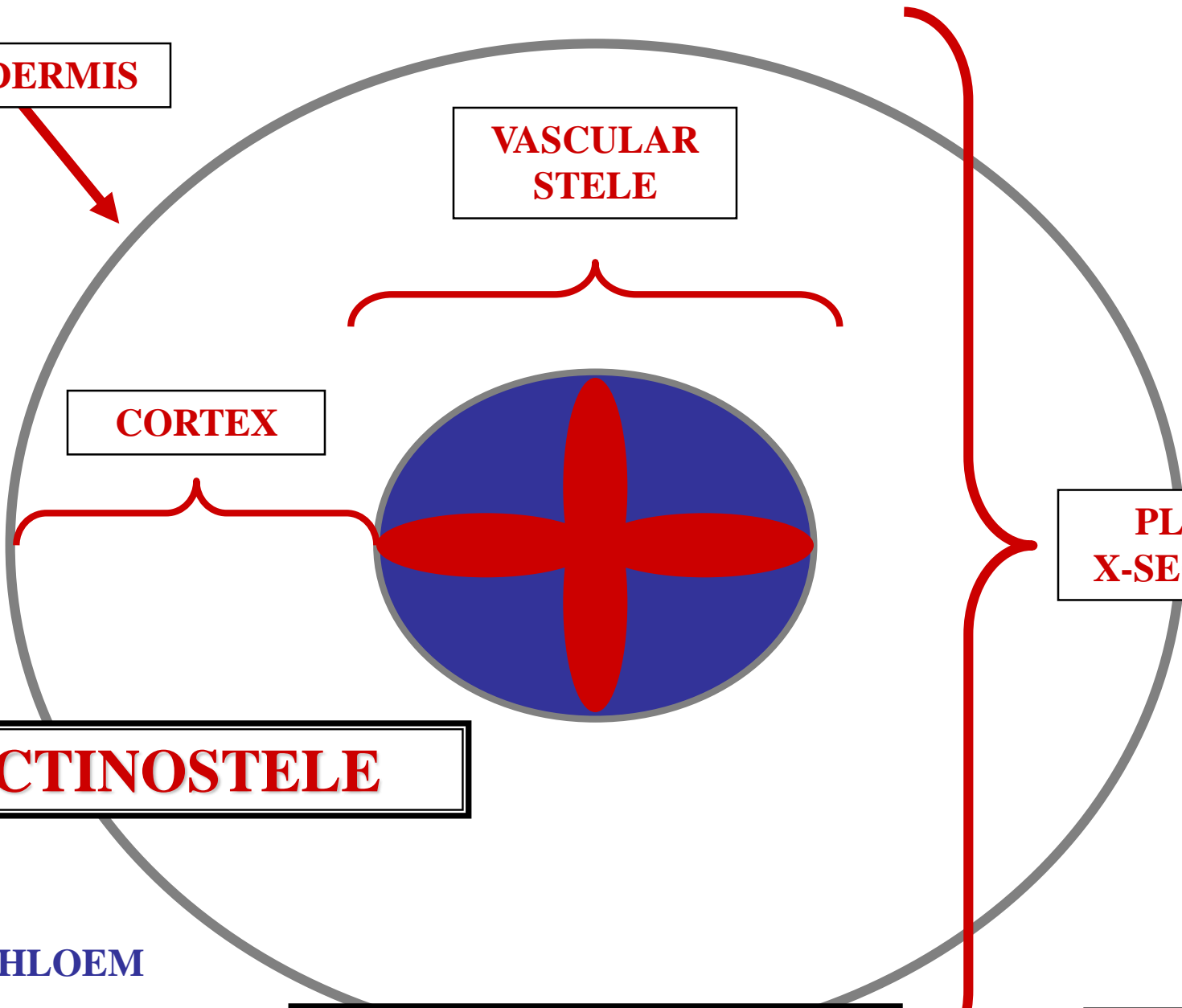
**ACTINOSTELE**

**PROTOSTELE**

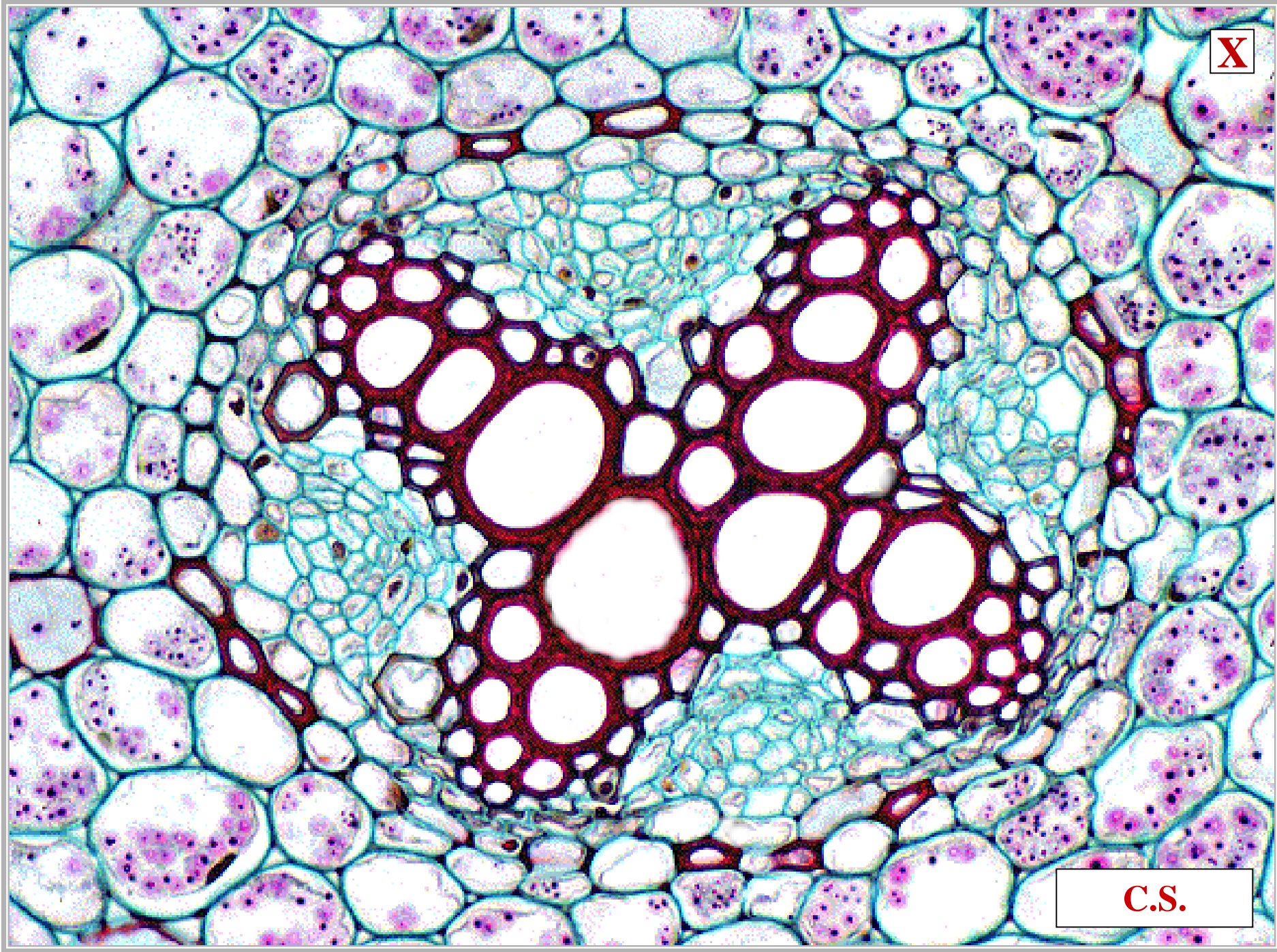
**C.S.**

**PHLOEM**

**XYLEM**



X



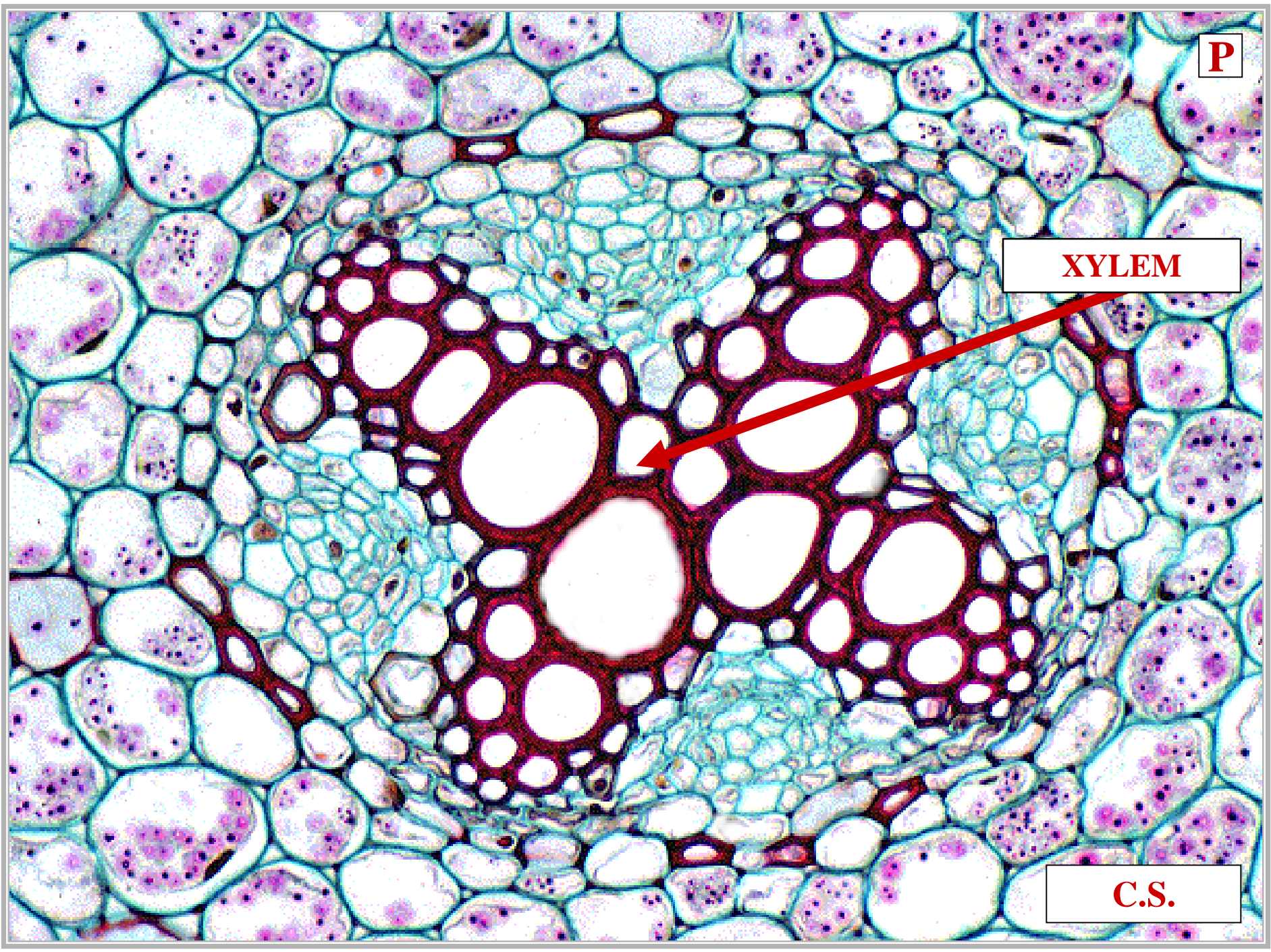
C.S.



**P**

**XYLEM**

**C.S.**



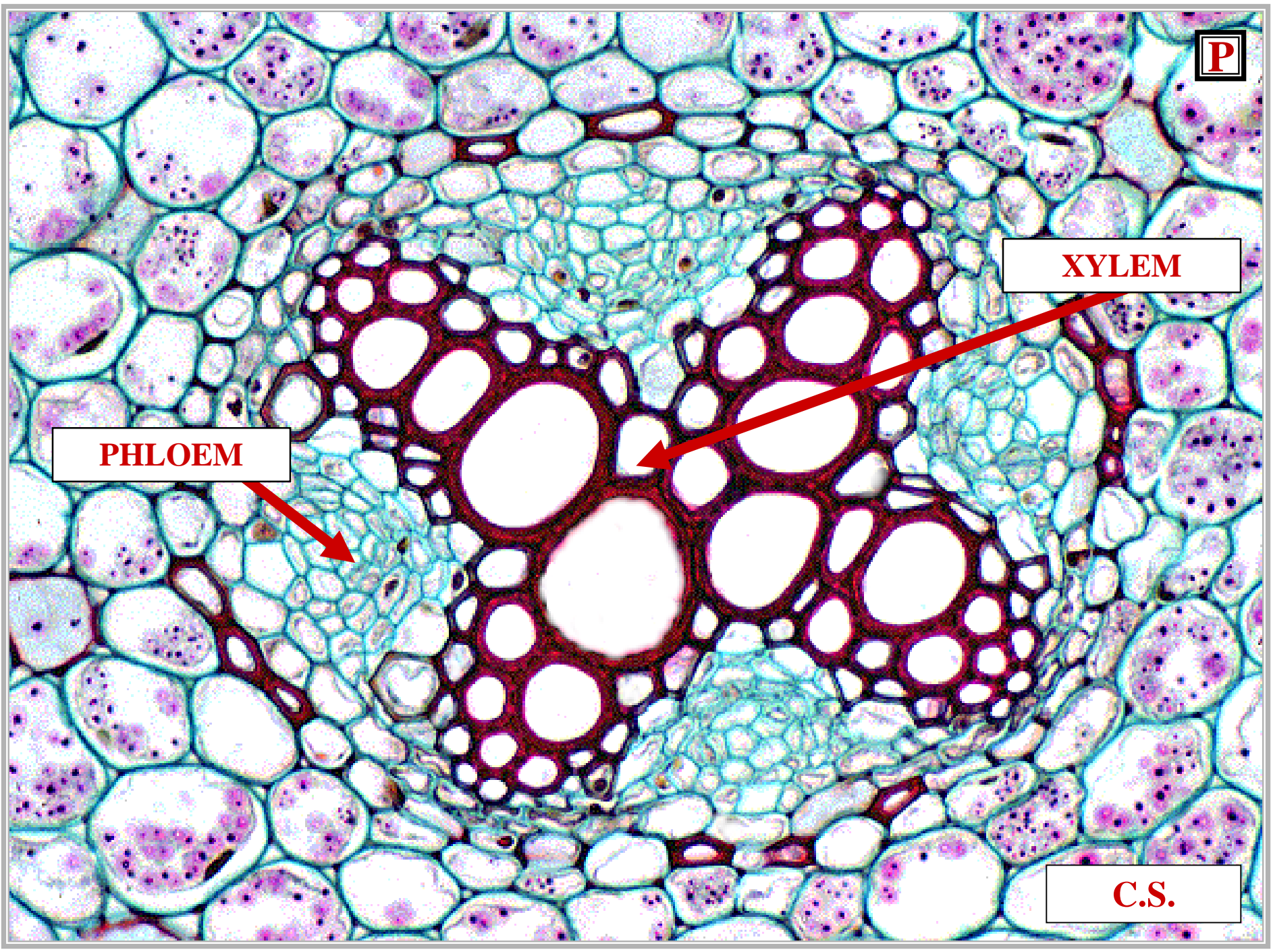


P

**XYLEM**

**PHLOEM**

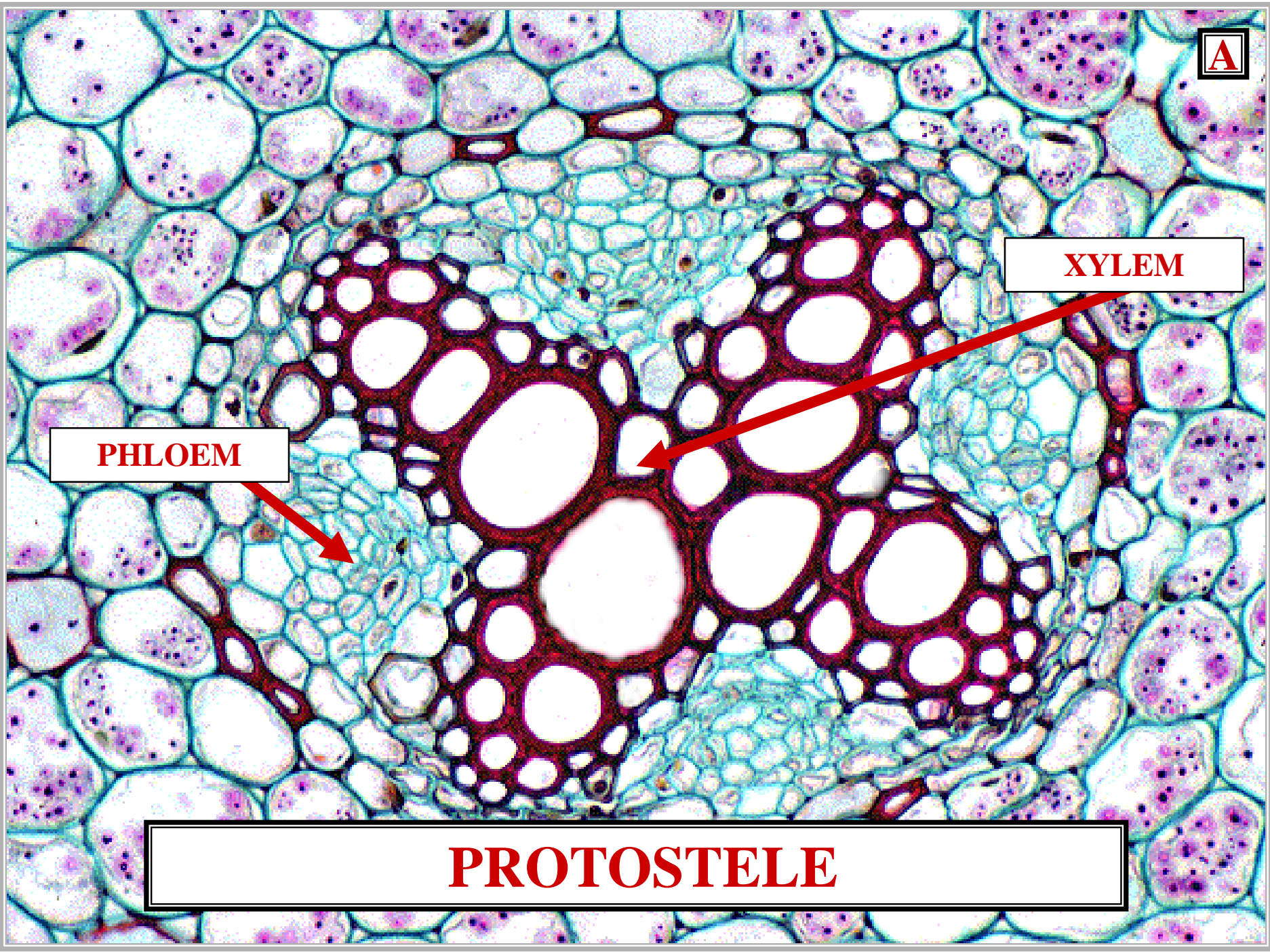
**C.S.**



**XYLEM**

**PHLOEM**

**PROTOSTELE**



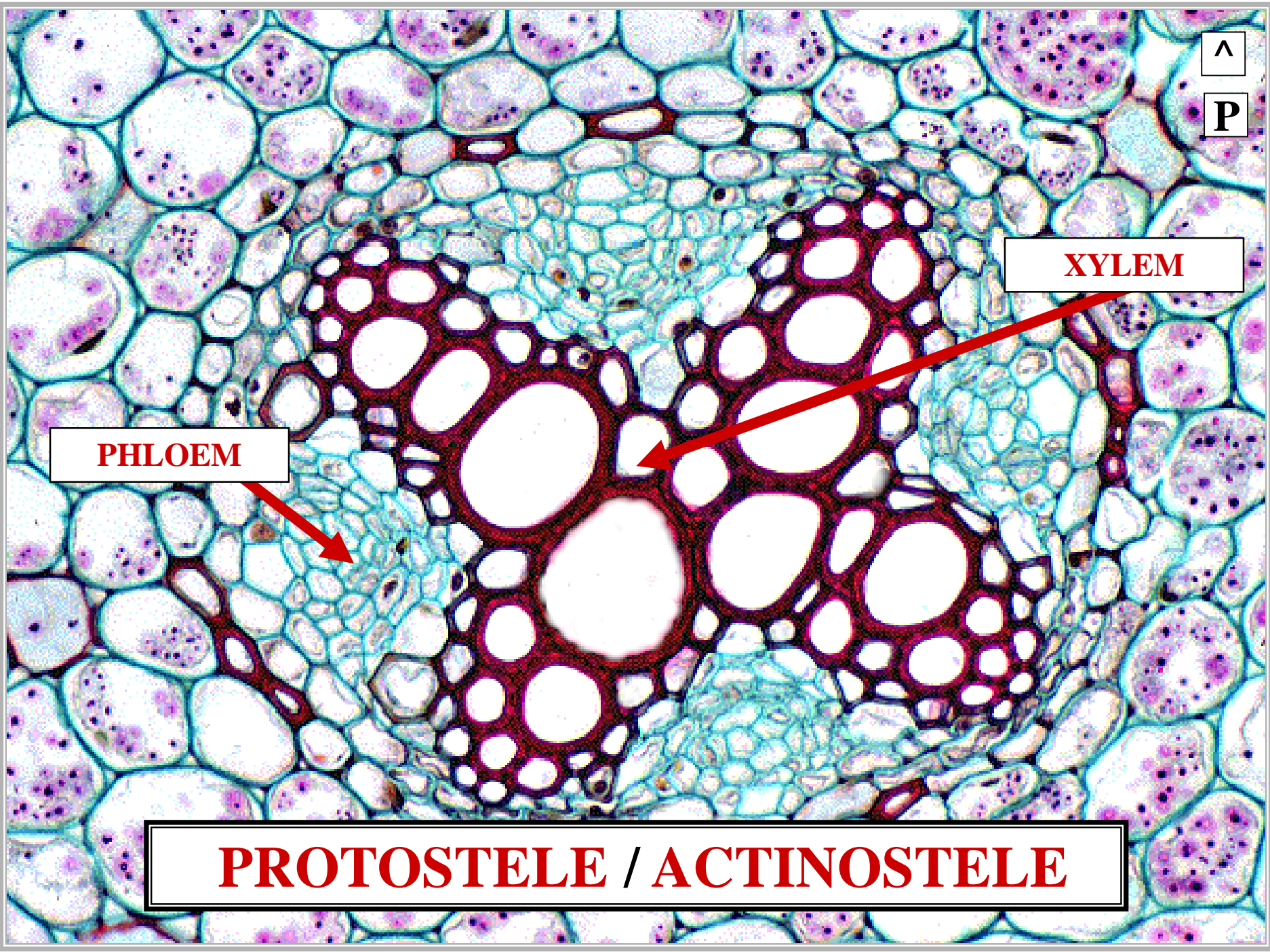
^

P

**XYLEM**

**PHLOEM**

**PROTOSTELE / ACTINOSTELE**



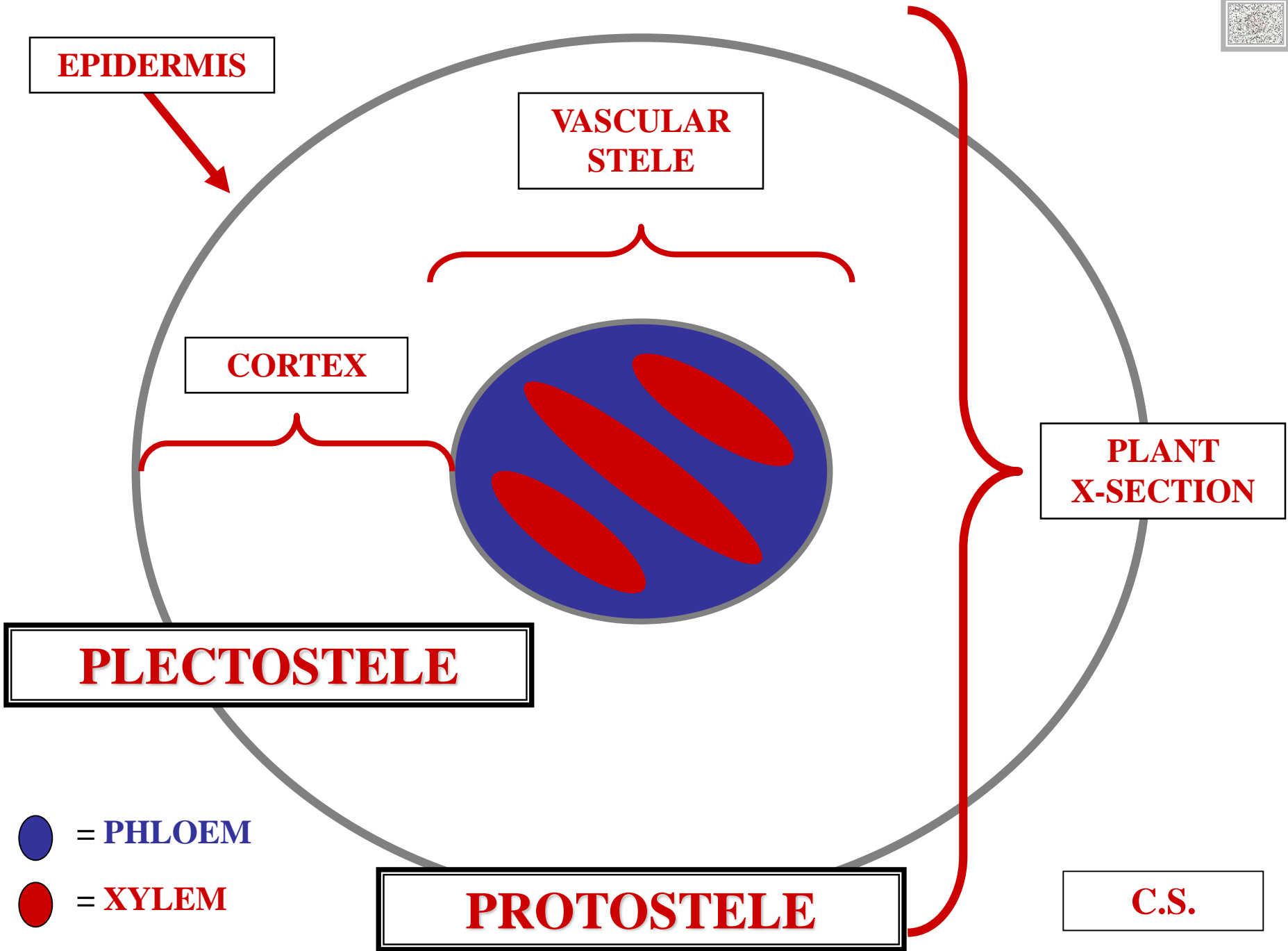
**PLECTOSTELE**

**PROTOSTELE**  
**PLECTOSTELE**



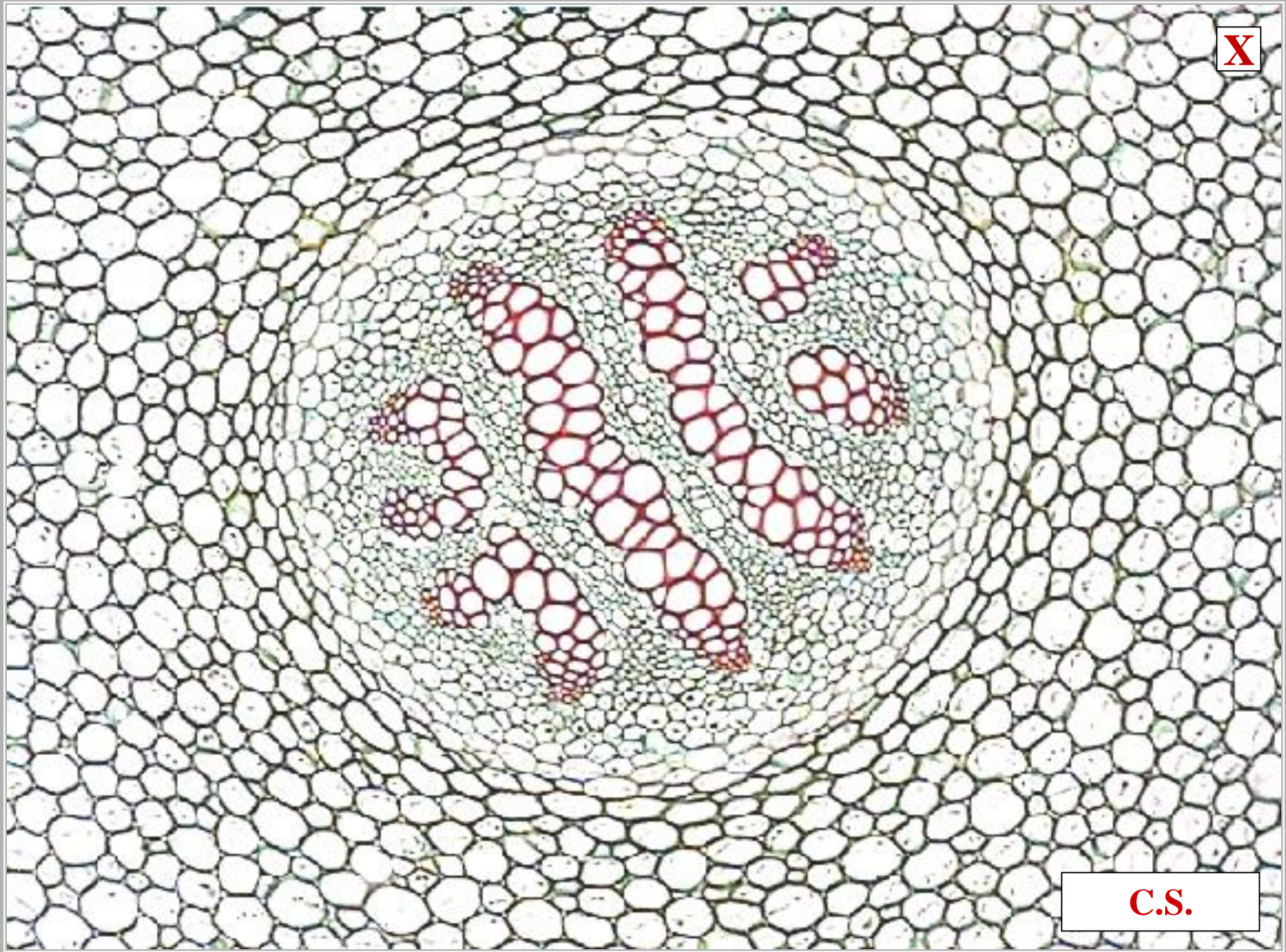
**XYLEM & PHLOEM**  
**INTERSPERSED**

**PROTOSTELE**  
**PLECTOSTELE**





X

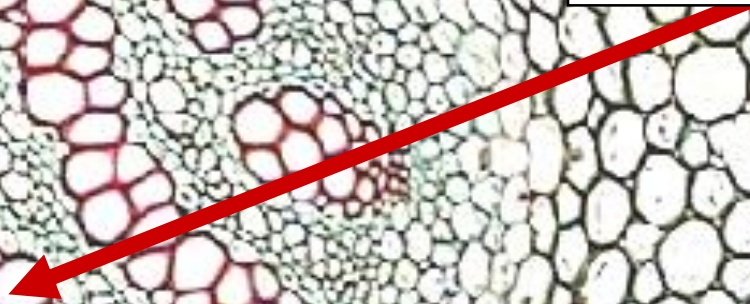


C.S.

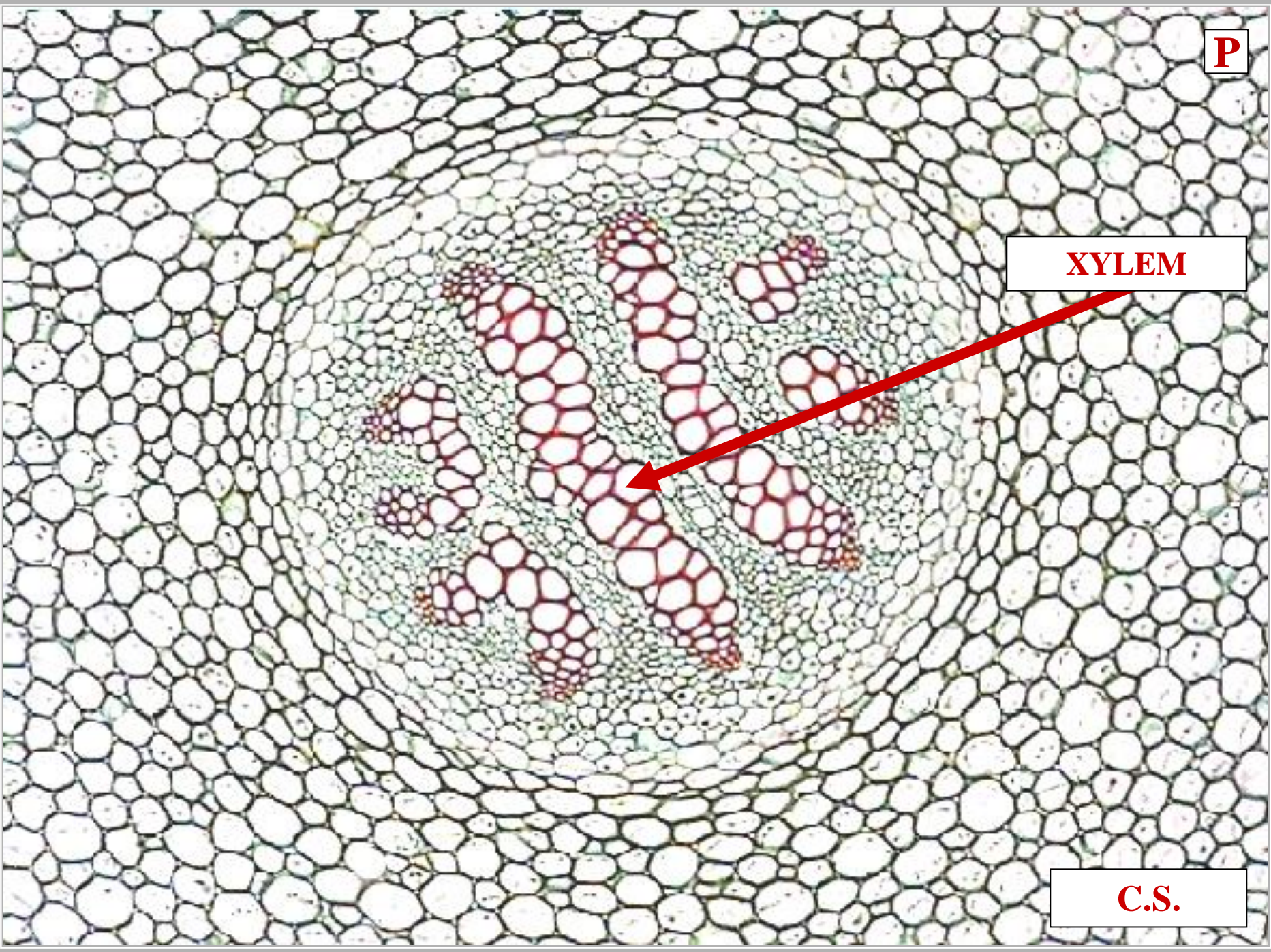


**P**

**XYLEM**



**C.S.**



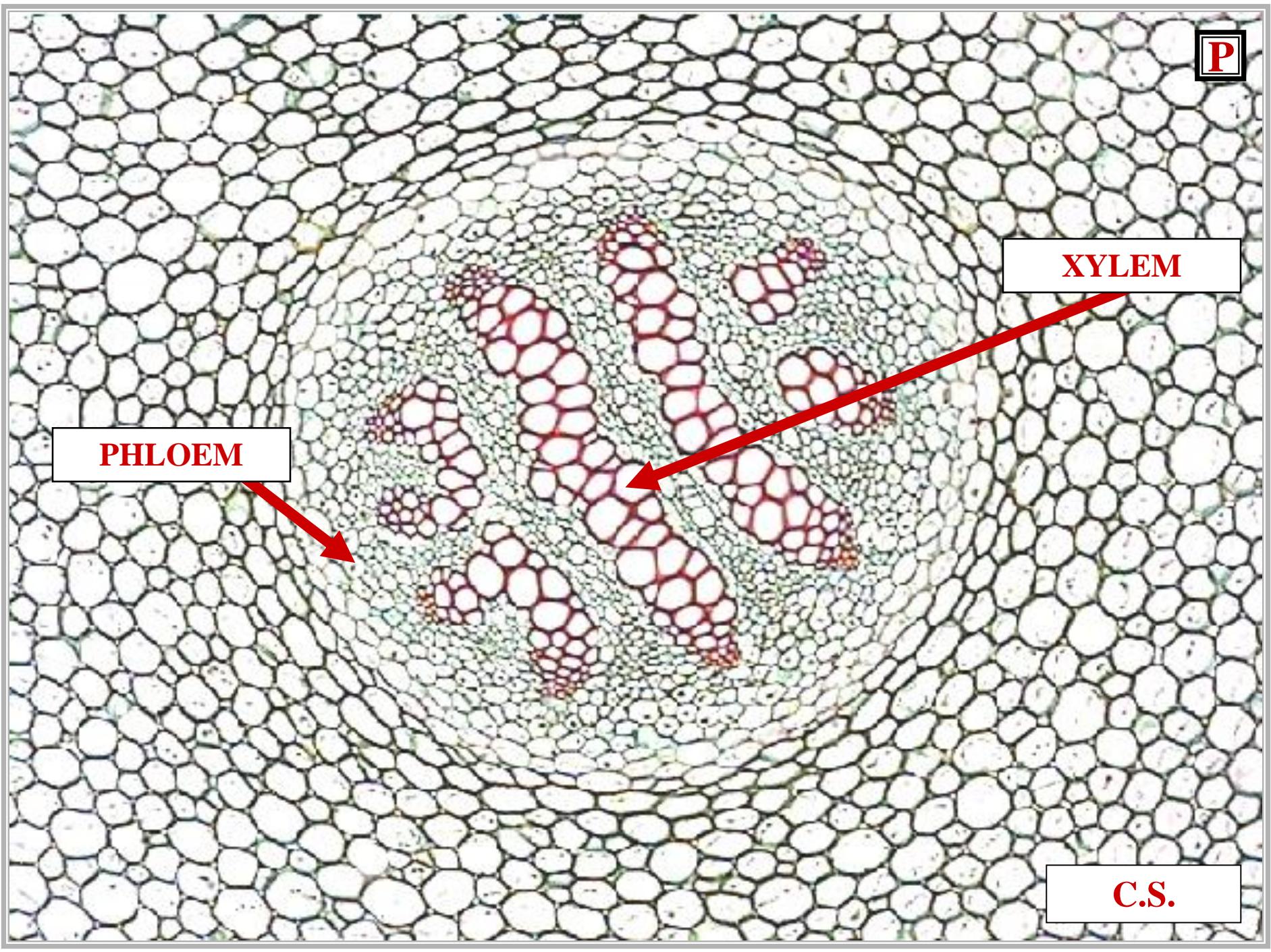


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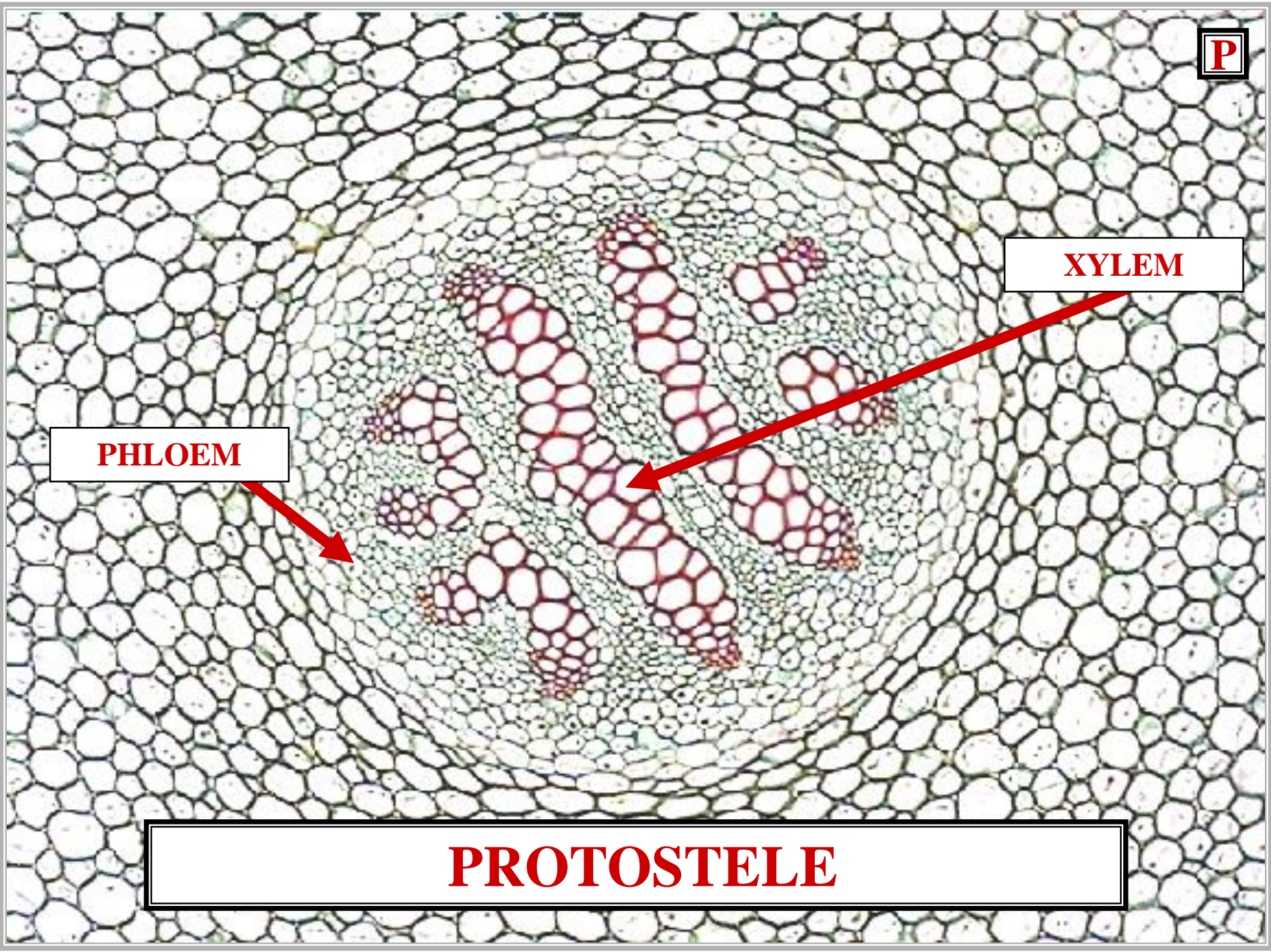
**XYLEM**

**PHLOEM**

**C.S.**







**XYLEM**

**PHLOEM**

**PROTOSTELE**

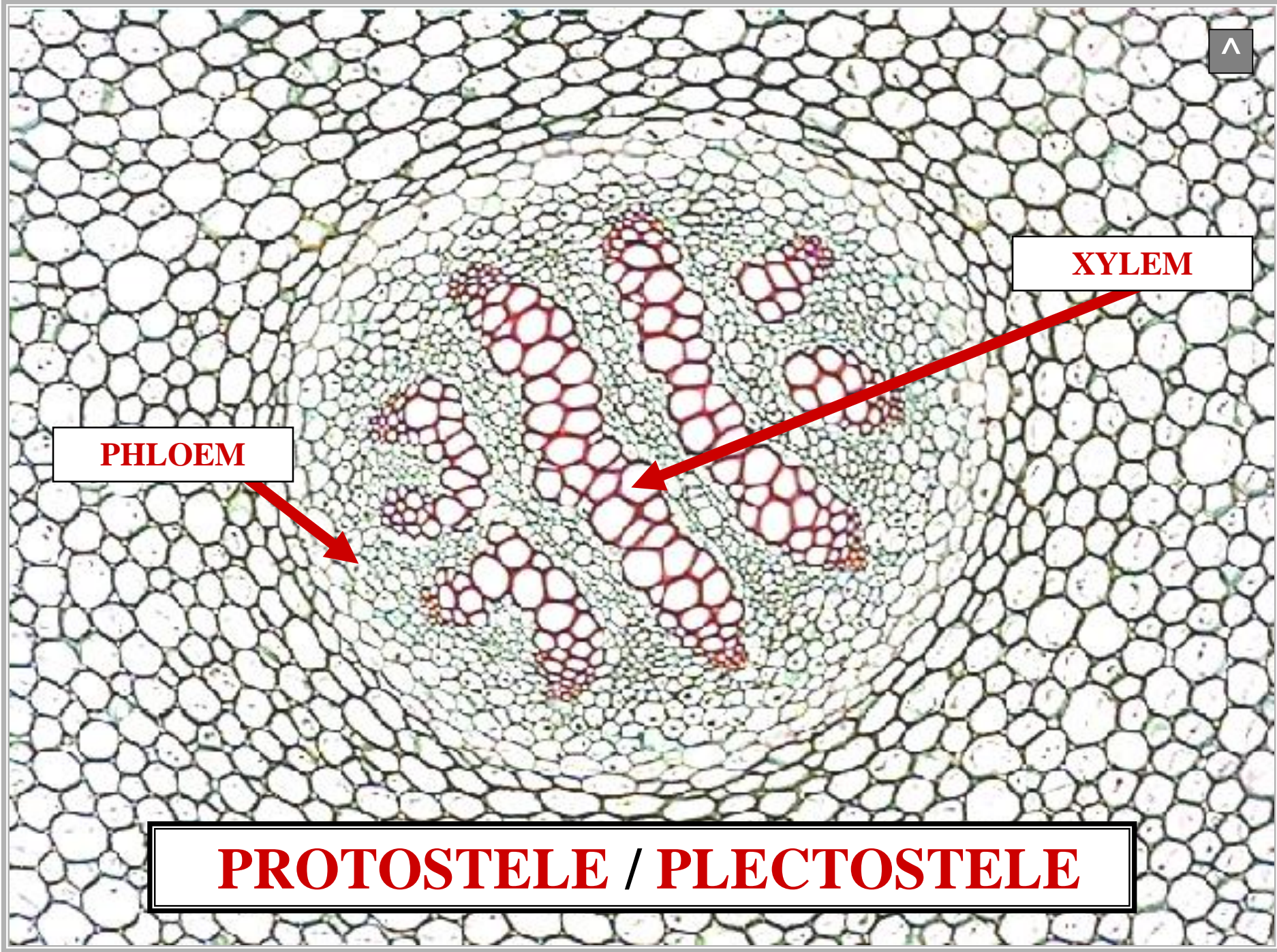




**XYLEM**

**PHLOEM**

**PROTOSTELE / PLECTOSTELE**



# SIPHONOSTELES

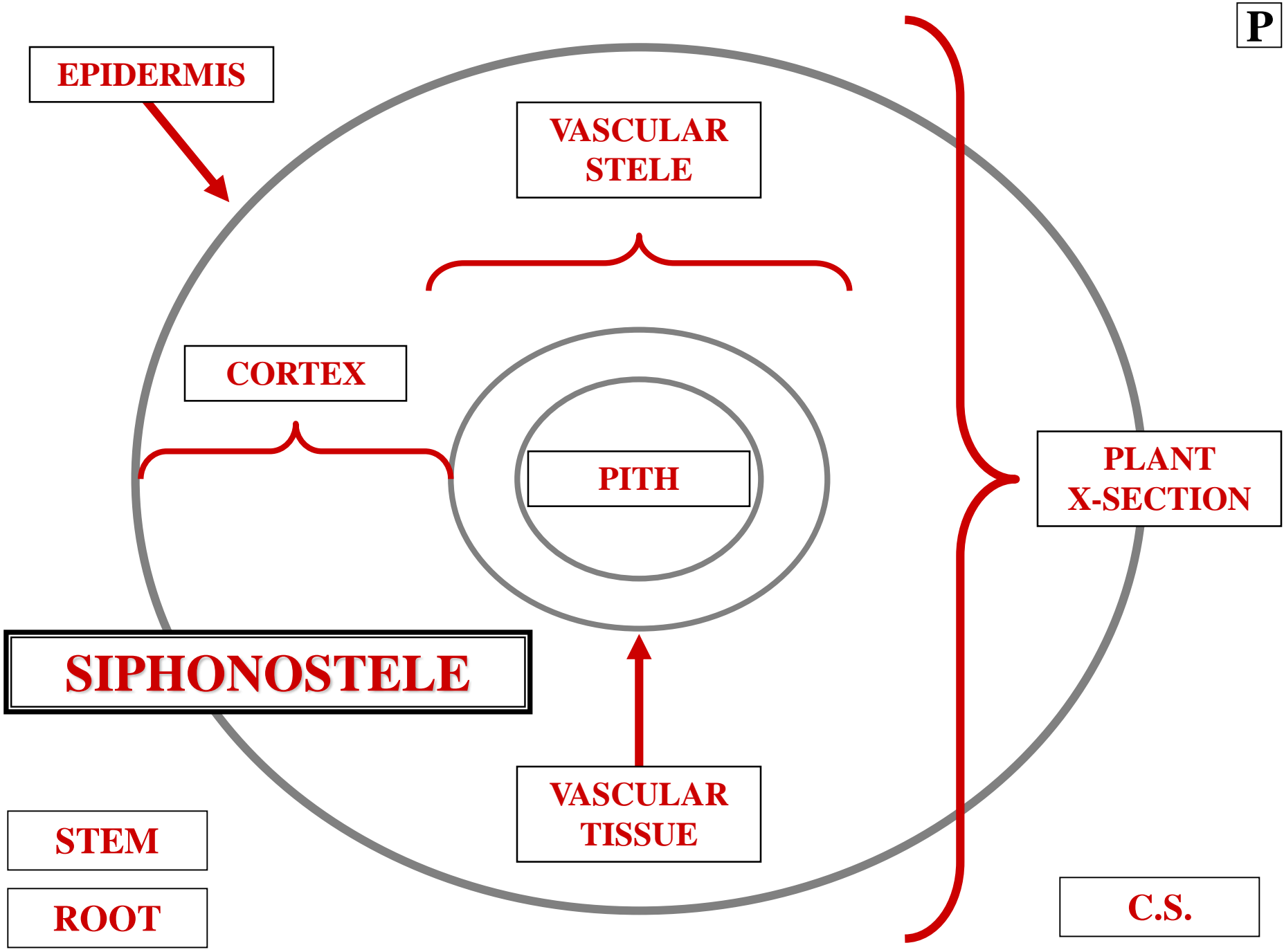
**SIPHONOSTELE**

# VASCULAR STELE SIPHONOSTELE



XYLEM & PHLOEM  
SURROUND PITH

VASCULAR STELE  
SIPHONOSTELE



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

**PITH**

**PLANT X-SECTION**

**SIPHONOSTELE**

**VASCULAR TISSUE**

**STEM**

**ROOT**

**C.S.**



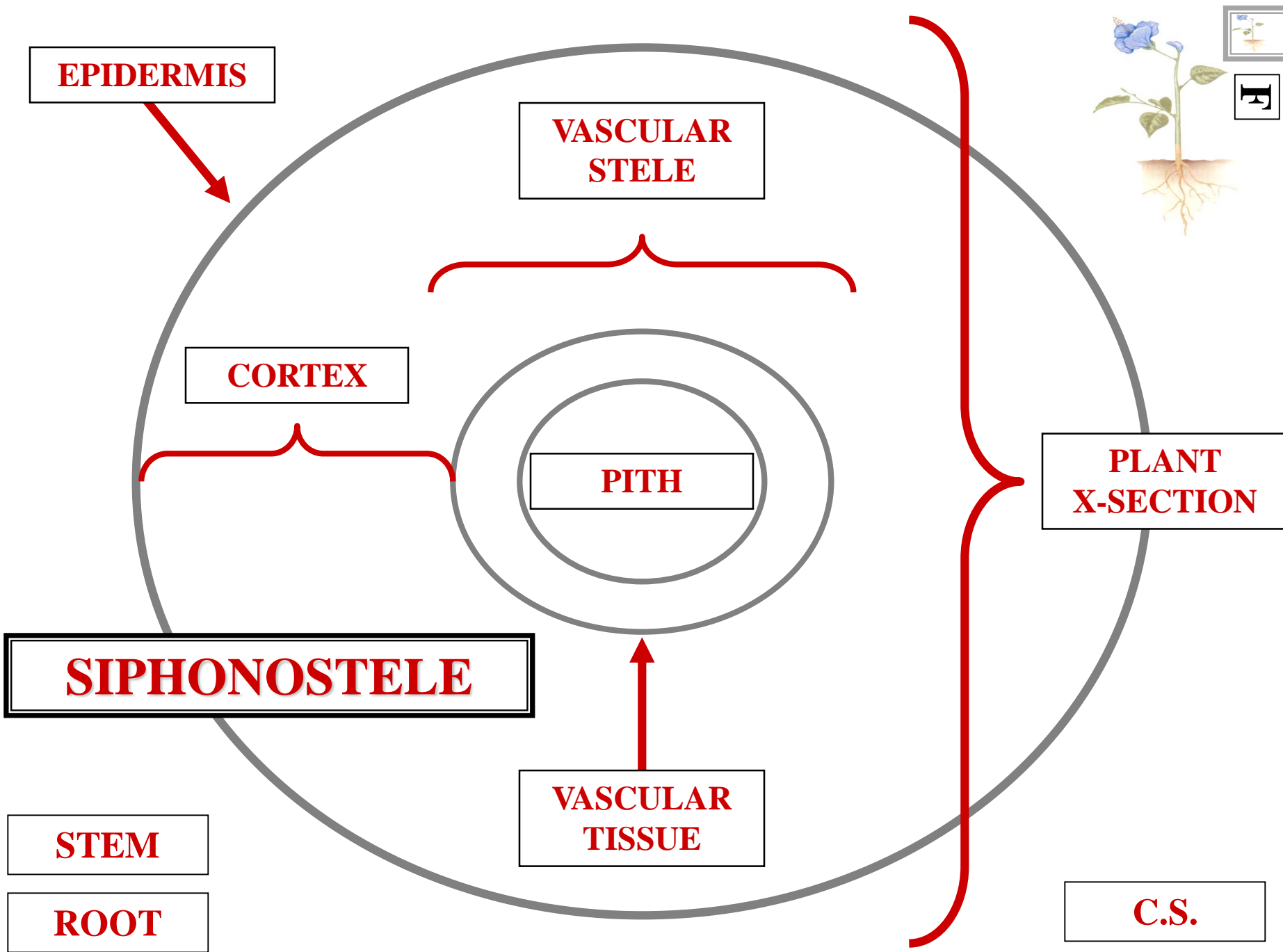
**PITH**

**VASCULAR STELE  
PITH**



**CENTER  
STEM OR ROOT**

**VASCULAR STELE  
PITH**



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

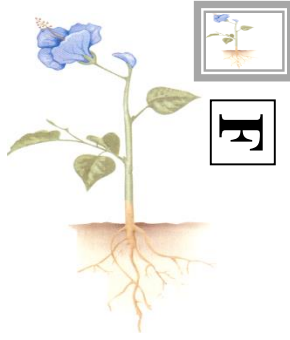
**PITH**

**SIPHONOSTELE**

**VASCULAR TISSUE**

**STEM**

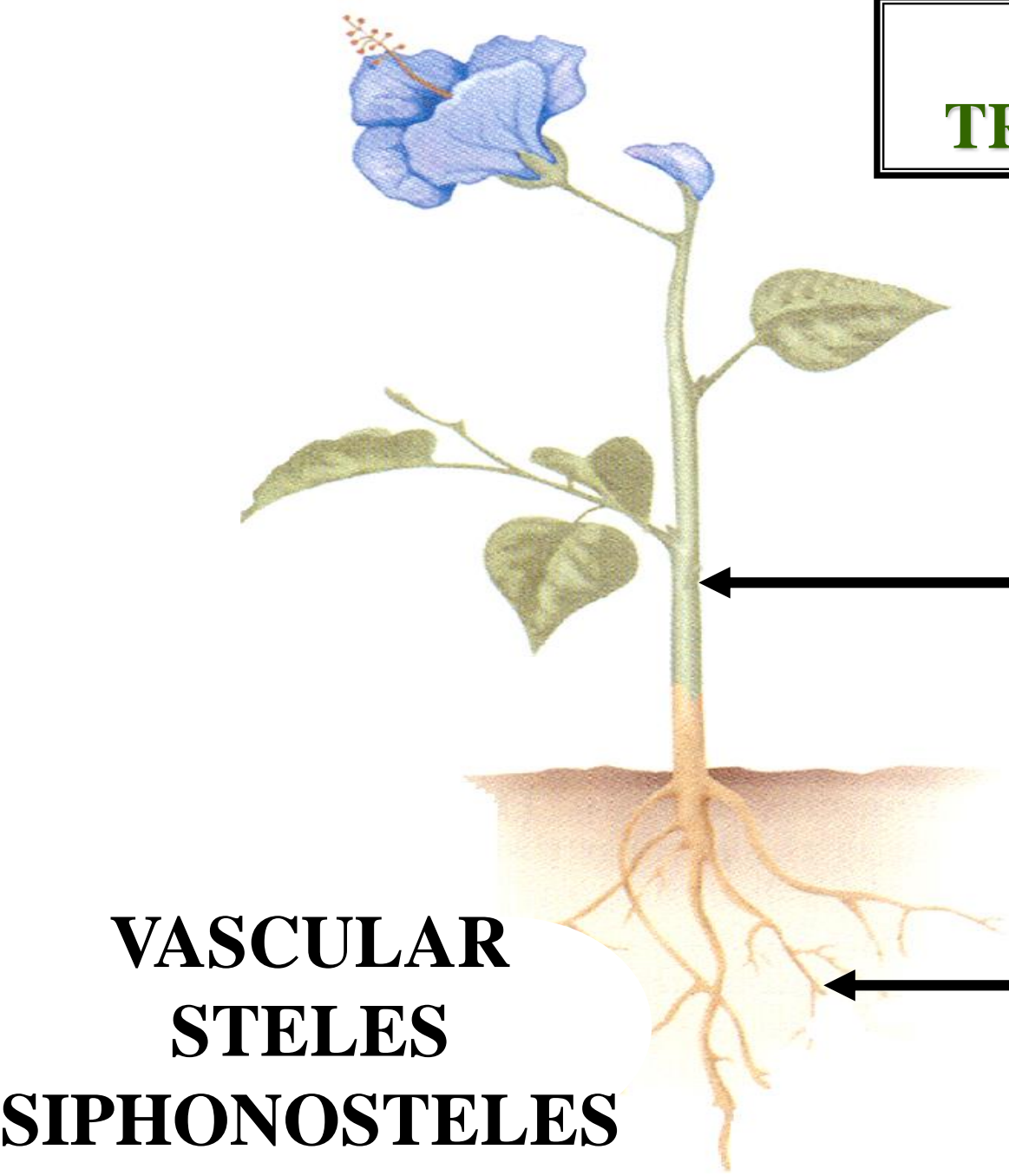
**ROOT**



**PLANT X-SECTION**

**C.S.**

# TYPICAL TRACHEOPHYTE



**STEM**

**ROOT**

**VASCULAR  
STELES**

**SIPHONOSTELES**

# SIPHONOSTELE TYPES

# **SIPHONOSTELE TYPES**

**ECTOPHLOIC**

# **SIPHONOSTELE TYPES**

# **SIPHONOSTELE TYPES**

**ECTOPHLOIC  
AMPHIPHOLIC**

**SIPHONOSTELE  
TYPES**



# **SIPHONOSTELE TYPES**

**ECTOPHLOIC  
AMPHIPHOLIC  
EUSTELE**

**SIPHONOSTELE  
TYPES**

**ECTOPHLOIC**

**SIPHONOSTELE  
ECTOPHOLIC**



**PHLOEM OUTSIDE XYLEM**

**SIPHONOSTELE  
ECTOPHOLIC**



**EPIDERMIS**

**VASCULAR STELE**

**CORTEX**

**PITH**

**PLANT X-SECTION**

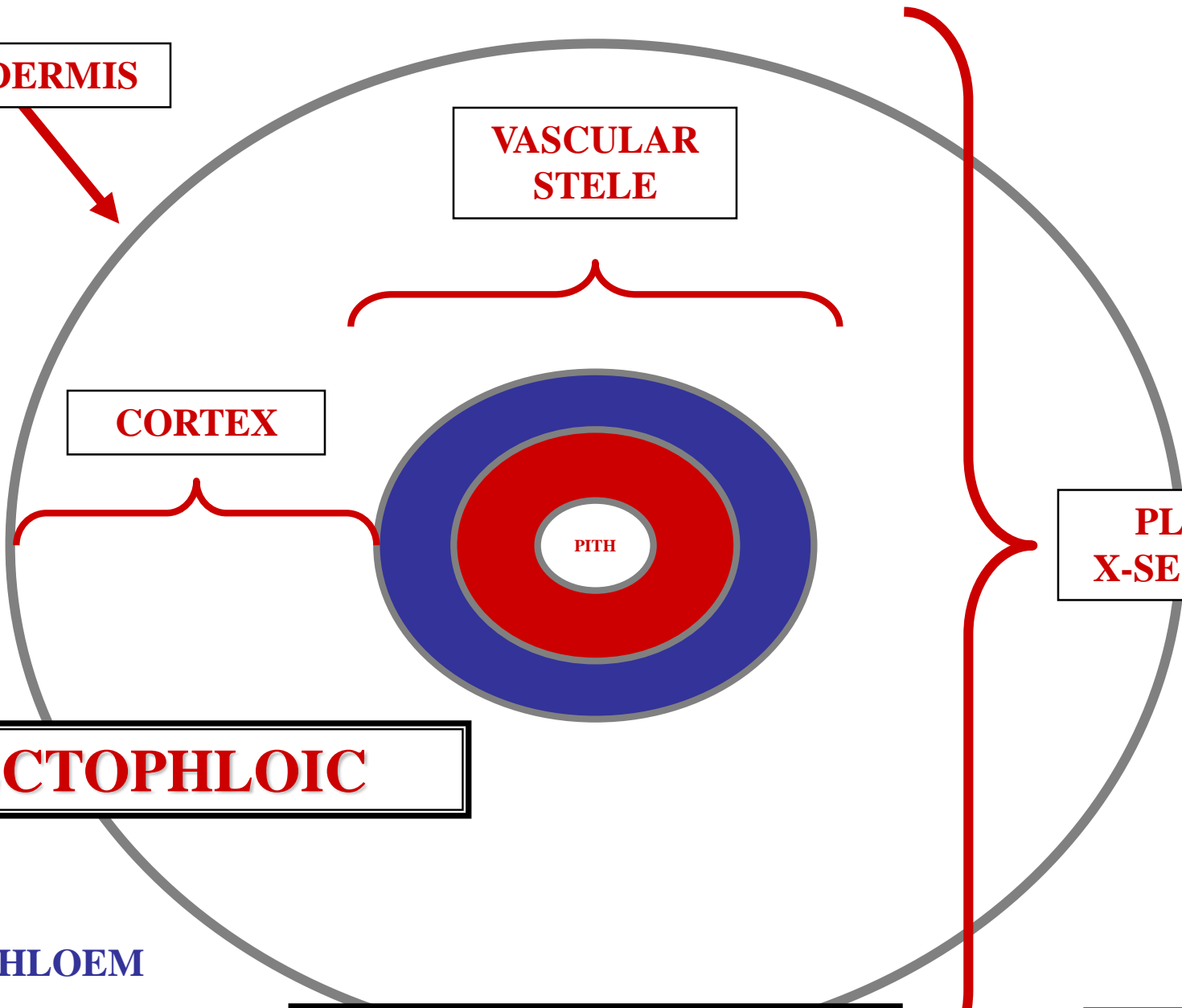
**ECTOPHLOIC**

**SIPHONOSTELE**

**C.S.**

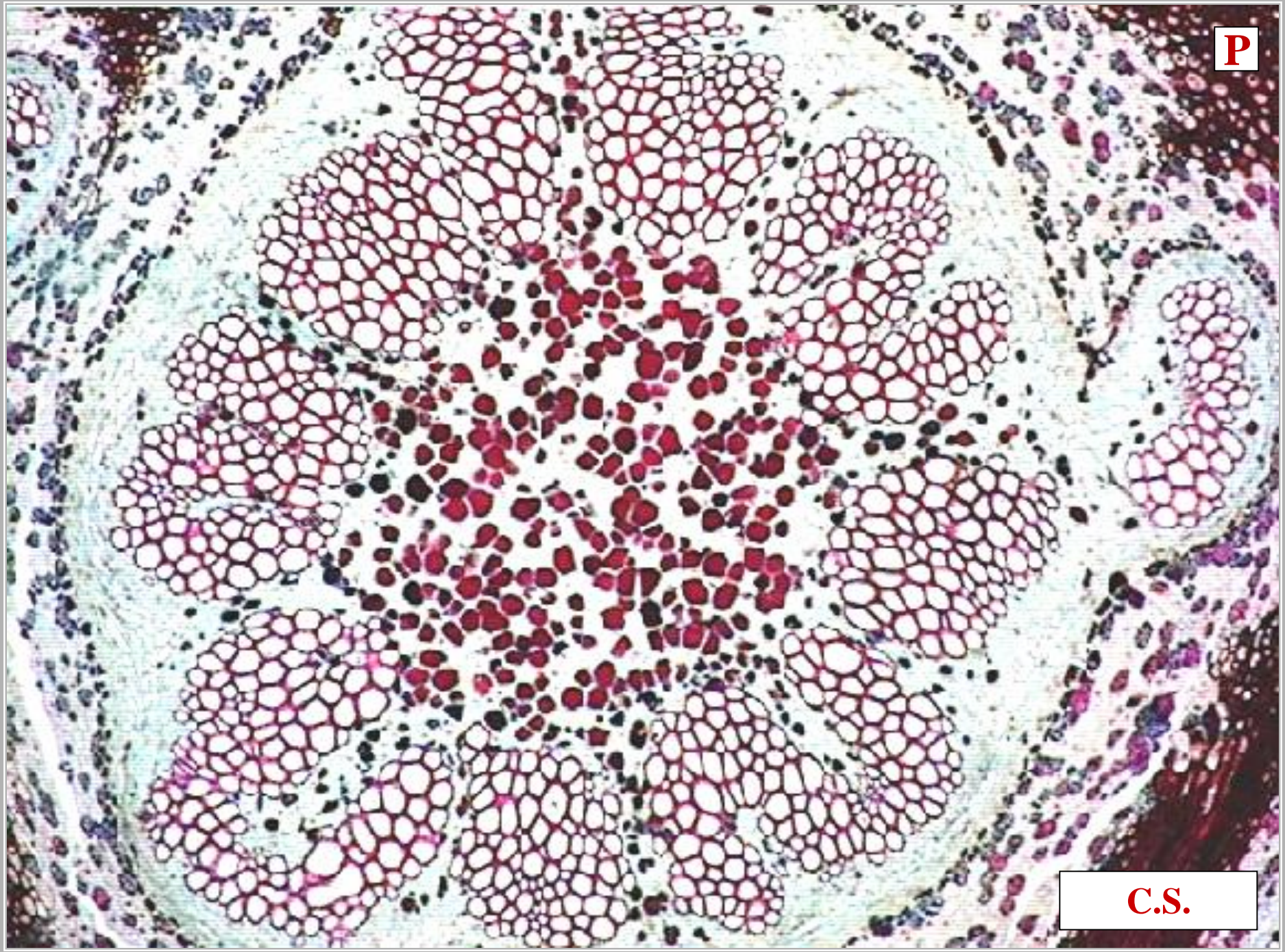
**● = PHLOEM**

**● = XYLEM**



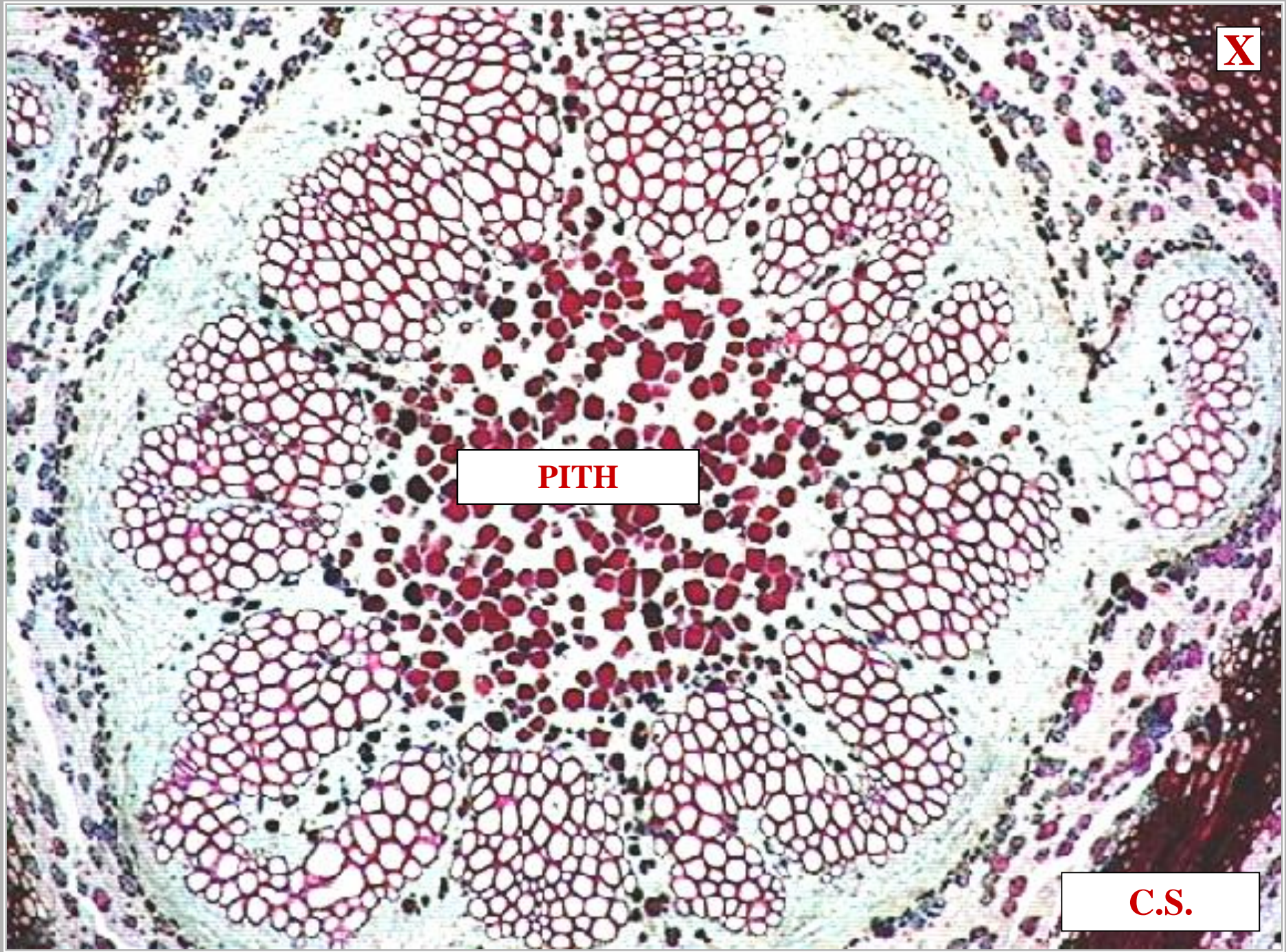


P



C.S.





**PITH**

**C.S.**

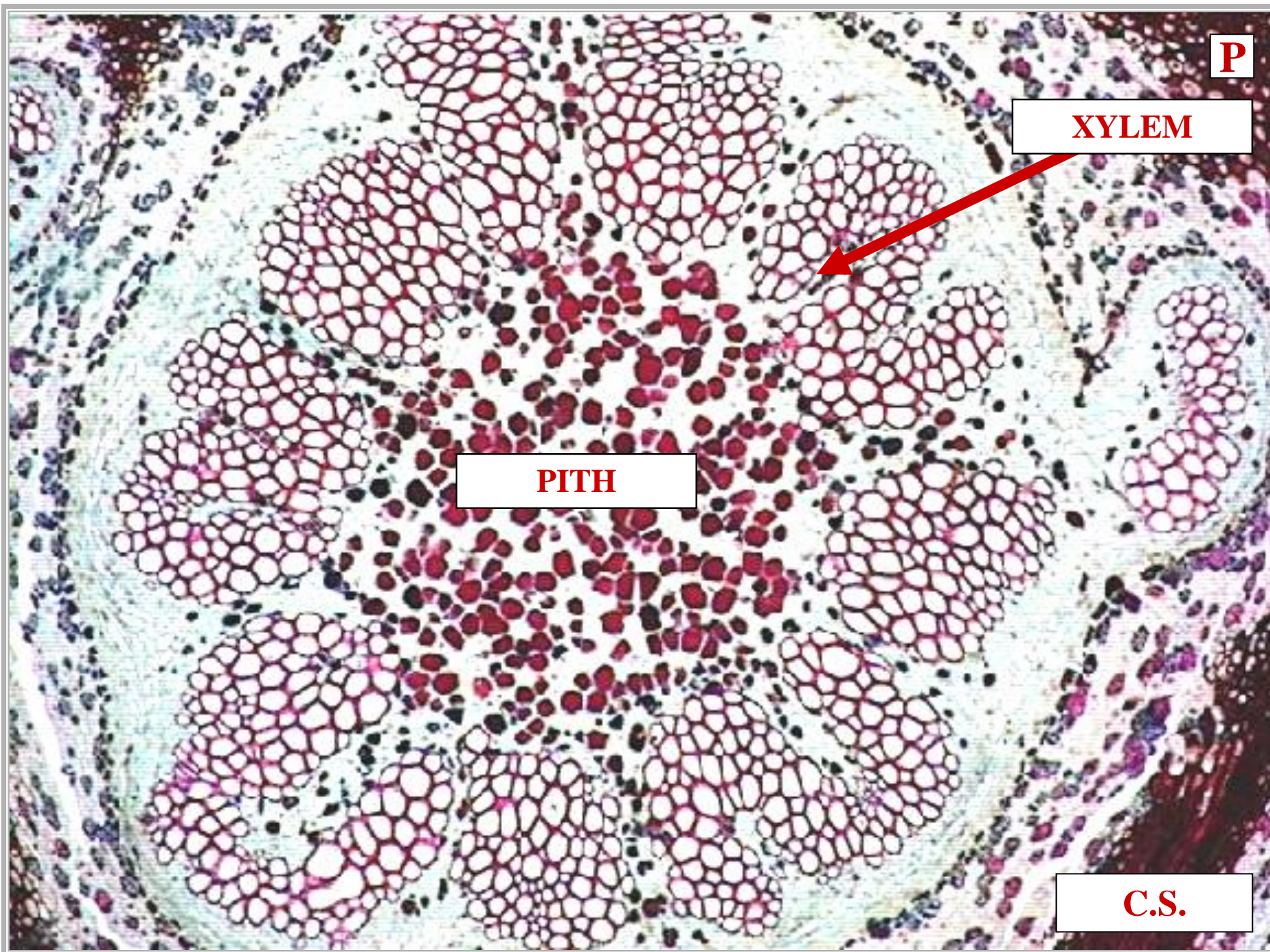


**P**

**XYLEM**

**PITH**

**C.S.**





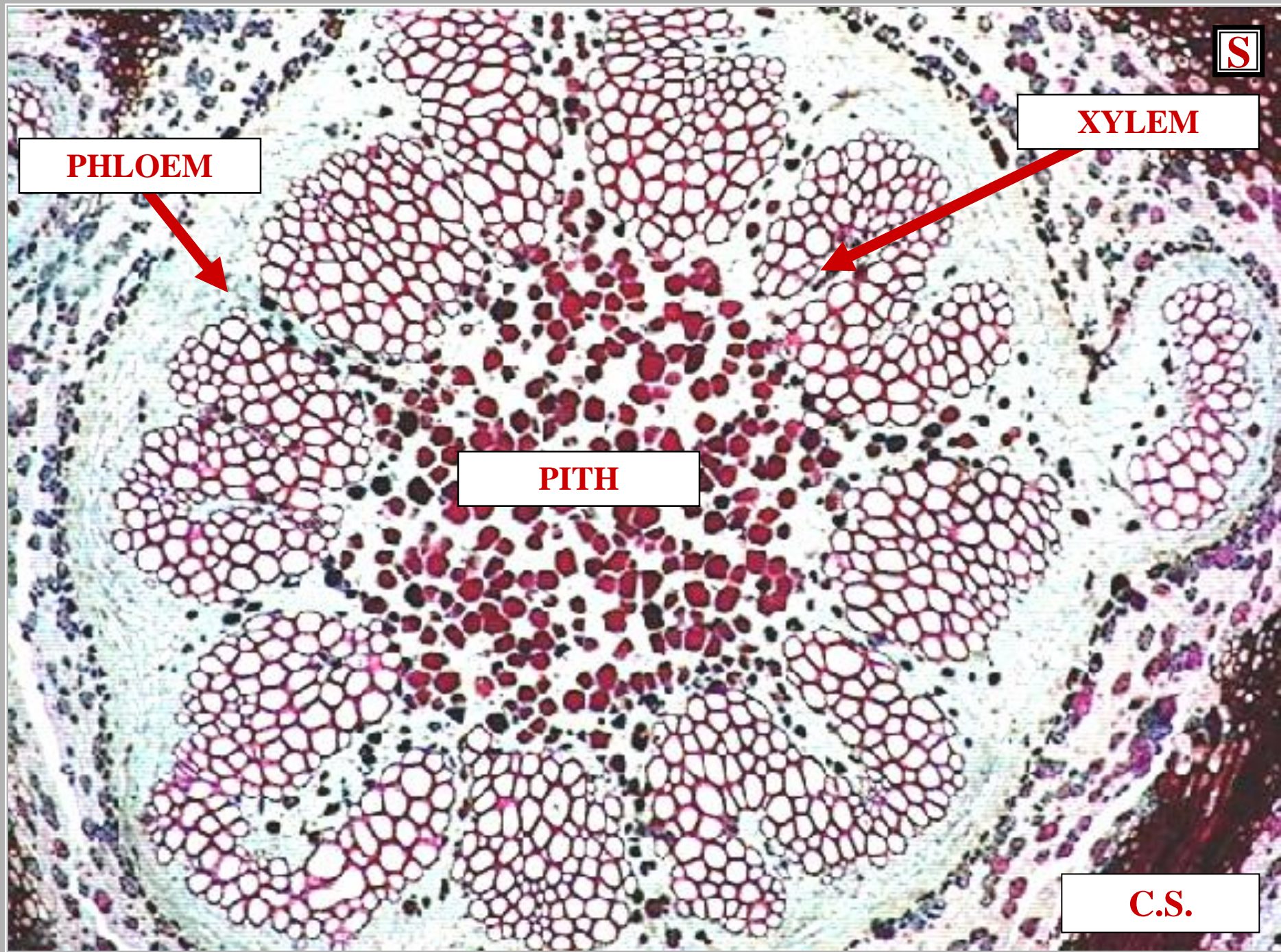
**S**

**PHLOEM**

**XYLEM**

**PITH**

**C.S.**



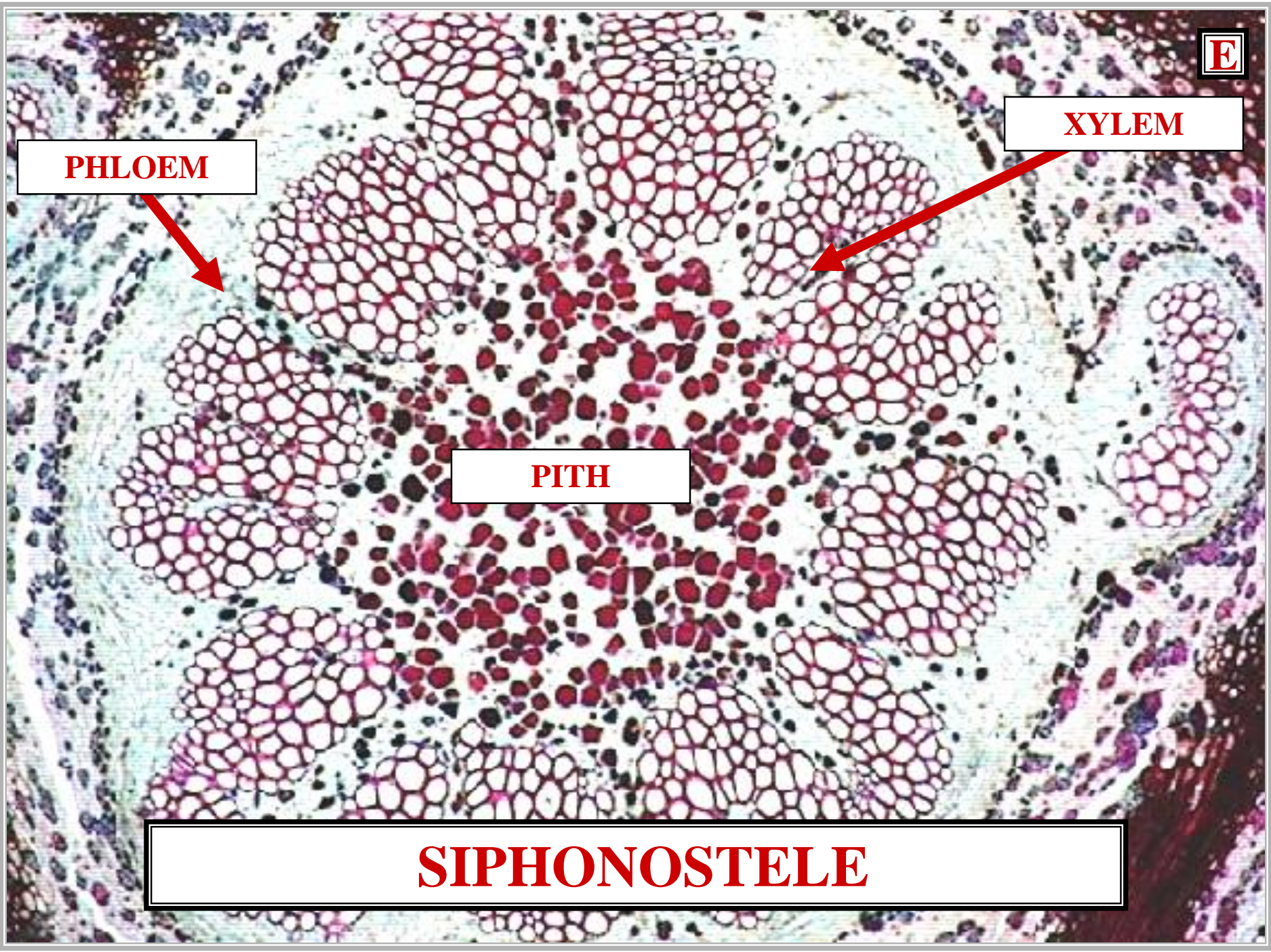


**PHLOEM**

**XYLEM**

**PITH**

**SIPHONOSTELE**





^

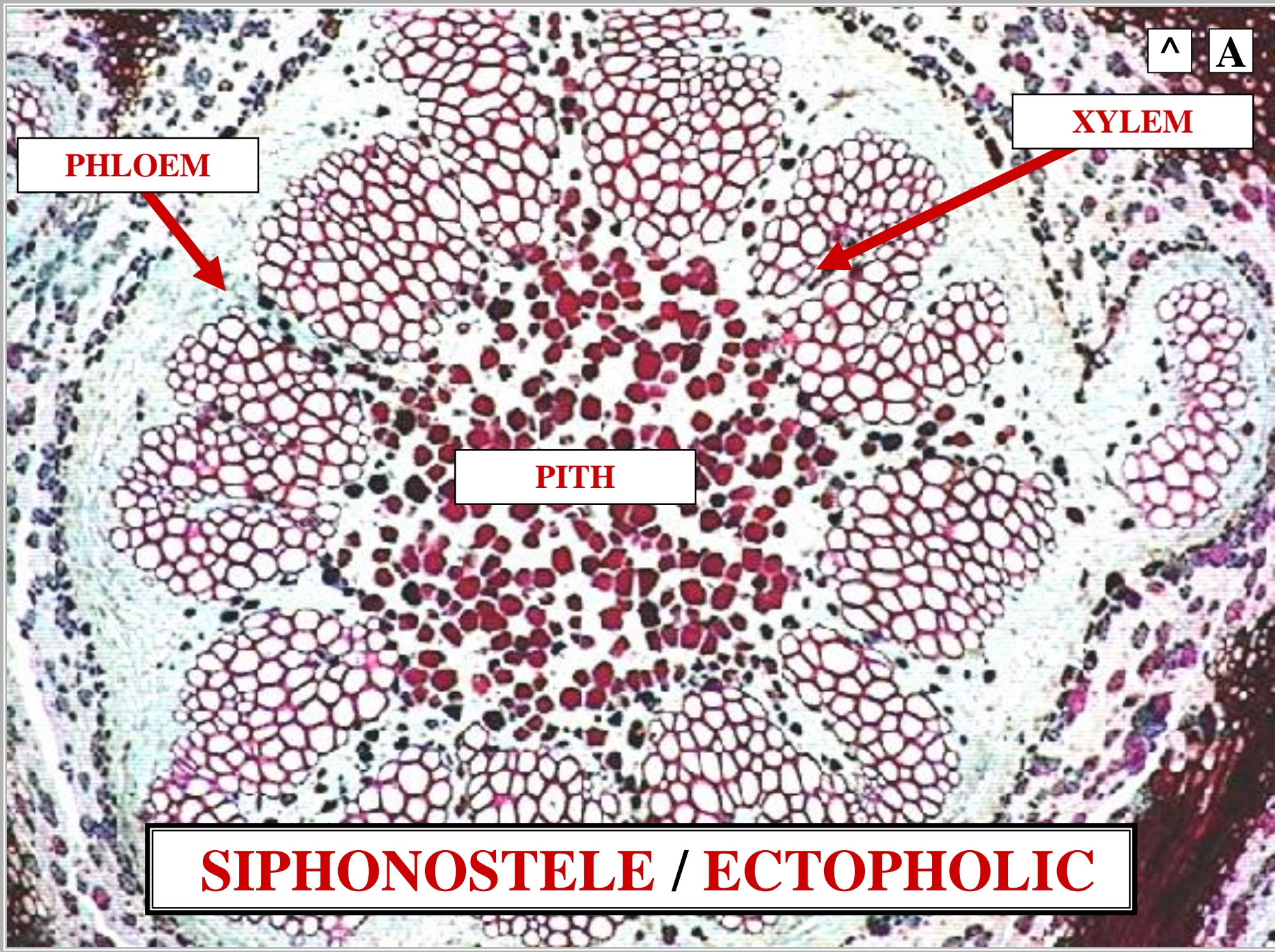
A

**PHLOEM**

**XYLEM**

**PITH**

**SIPHONOSTELE / ECTOPHOLIC**



**AMPHIPHOLIC**

**SIPHONOSTELE  
AMPHIPHLOIC**



**PHLOEM OUTSIDE  
AND  
INSIDE XYLEM**

**SIPHONOSTELE  
AMPHIPHLOIC**





**EPIDERMIS**



**VASCULAR STELE**



**CORTEX**



**PITH**

**PLANT X-SECTION**



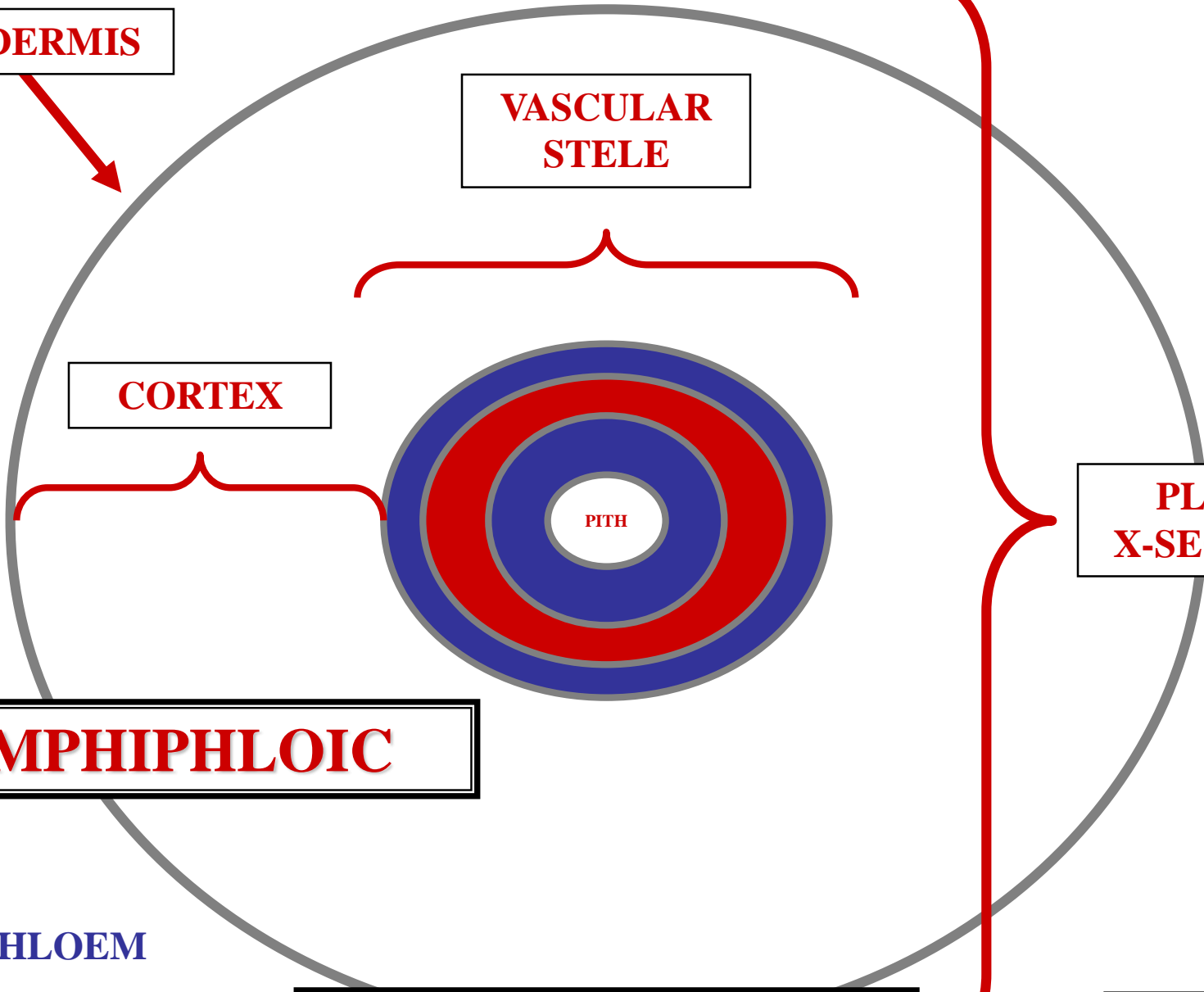
**AMPHIPHLOIC**

**● = PHLOEM**

**● = XYLEM**

**SIPHONOSTELE**

**C.S.**



**P**

**C.S.**

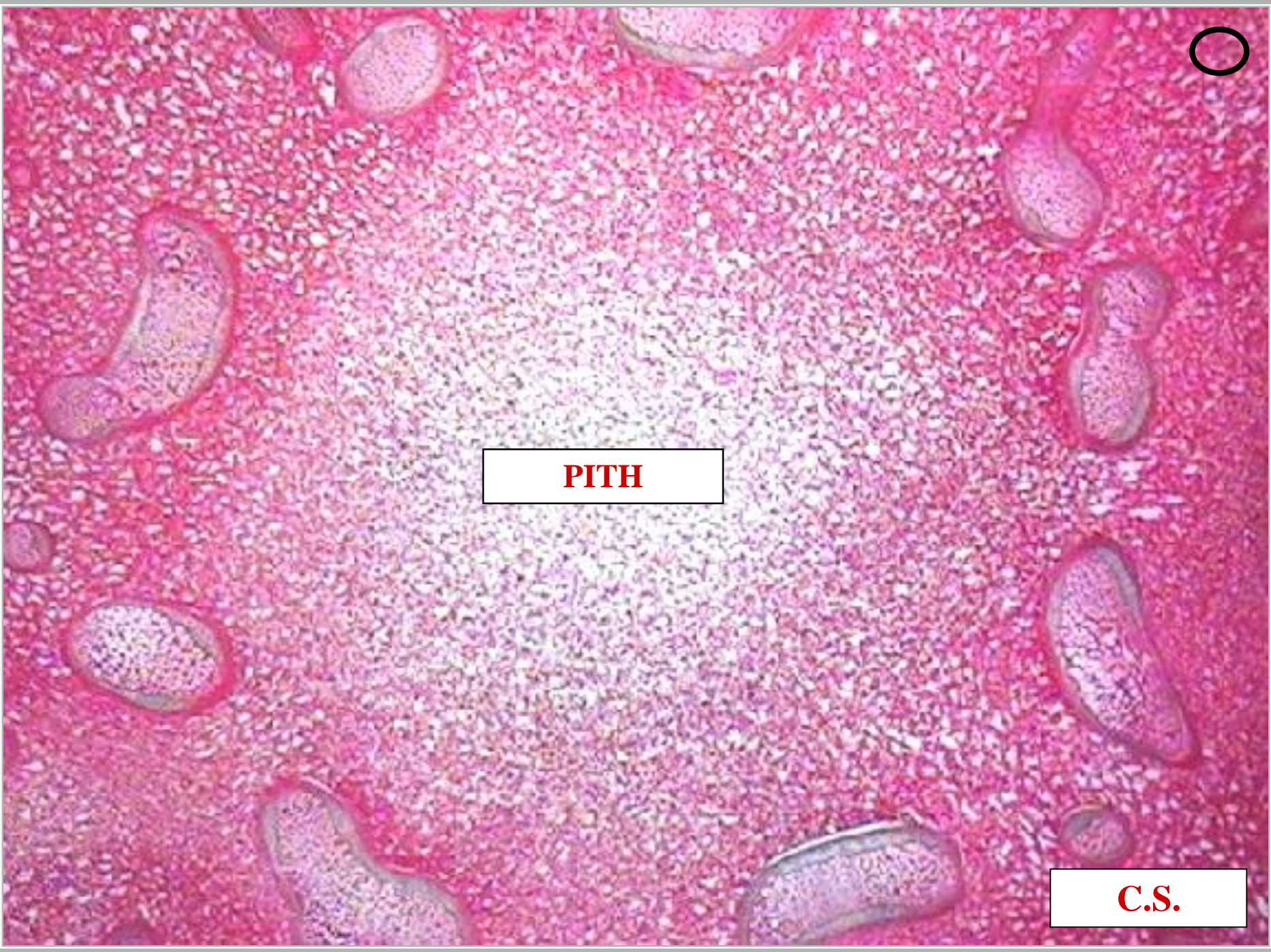






**PITH**

**C.S.**



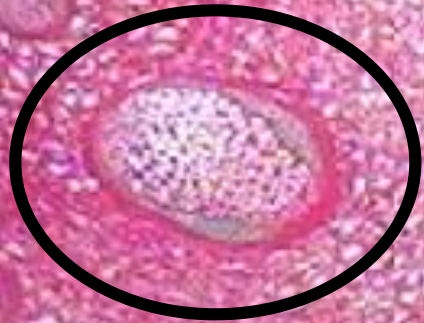




**PITH**

**VASCULAR TISSUE**

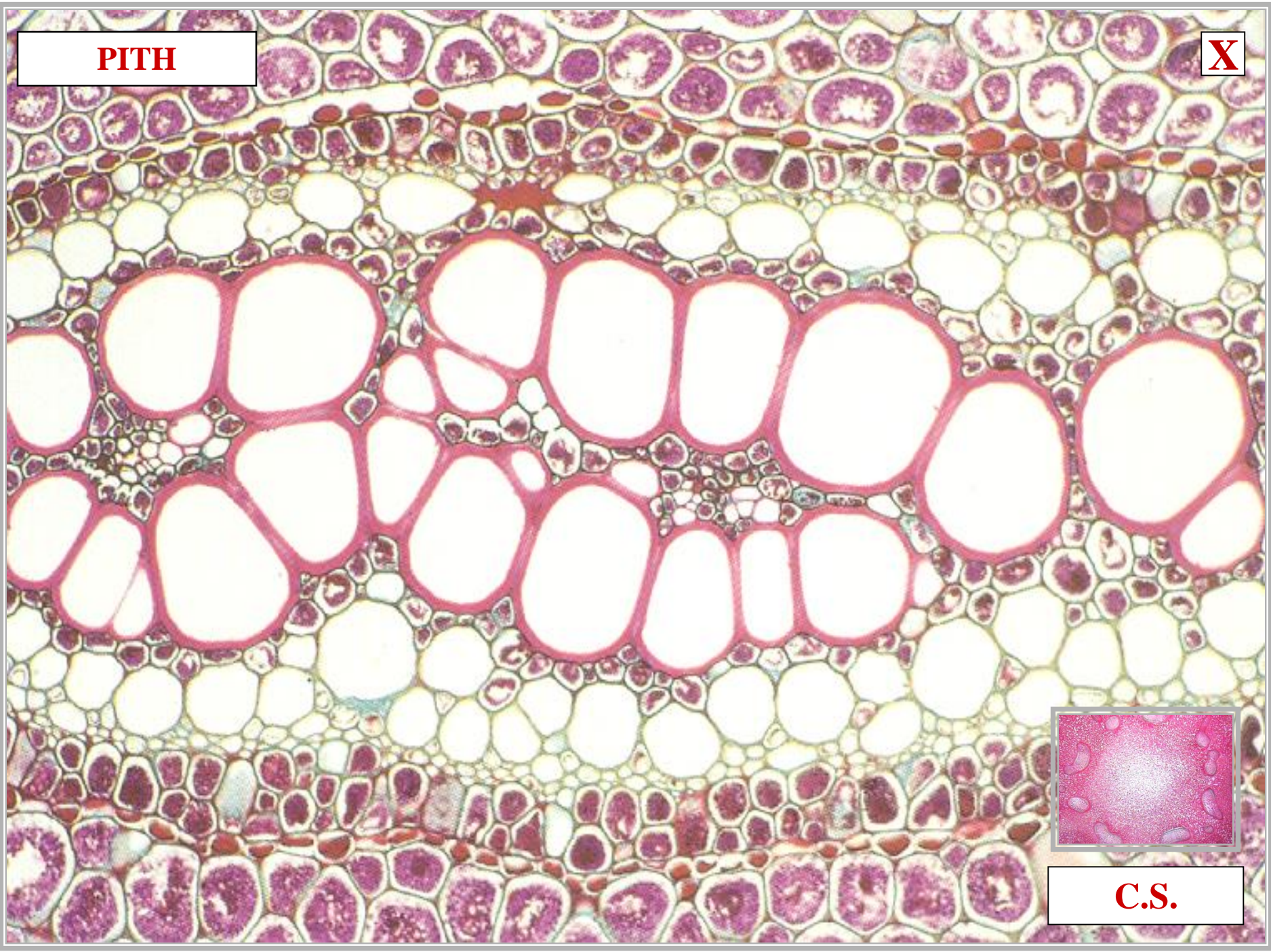
**C.S.**





**PITH**

**X**



**C.S.**



**PITH**

**P**

**XYLEM**



**C.S.**



**S**

**PITH**

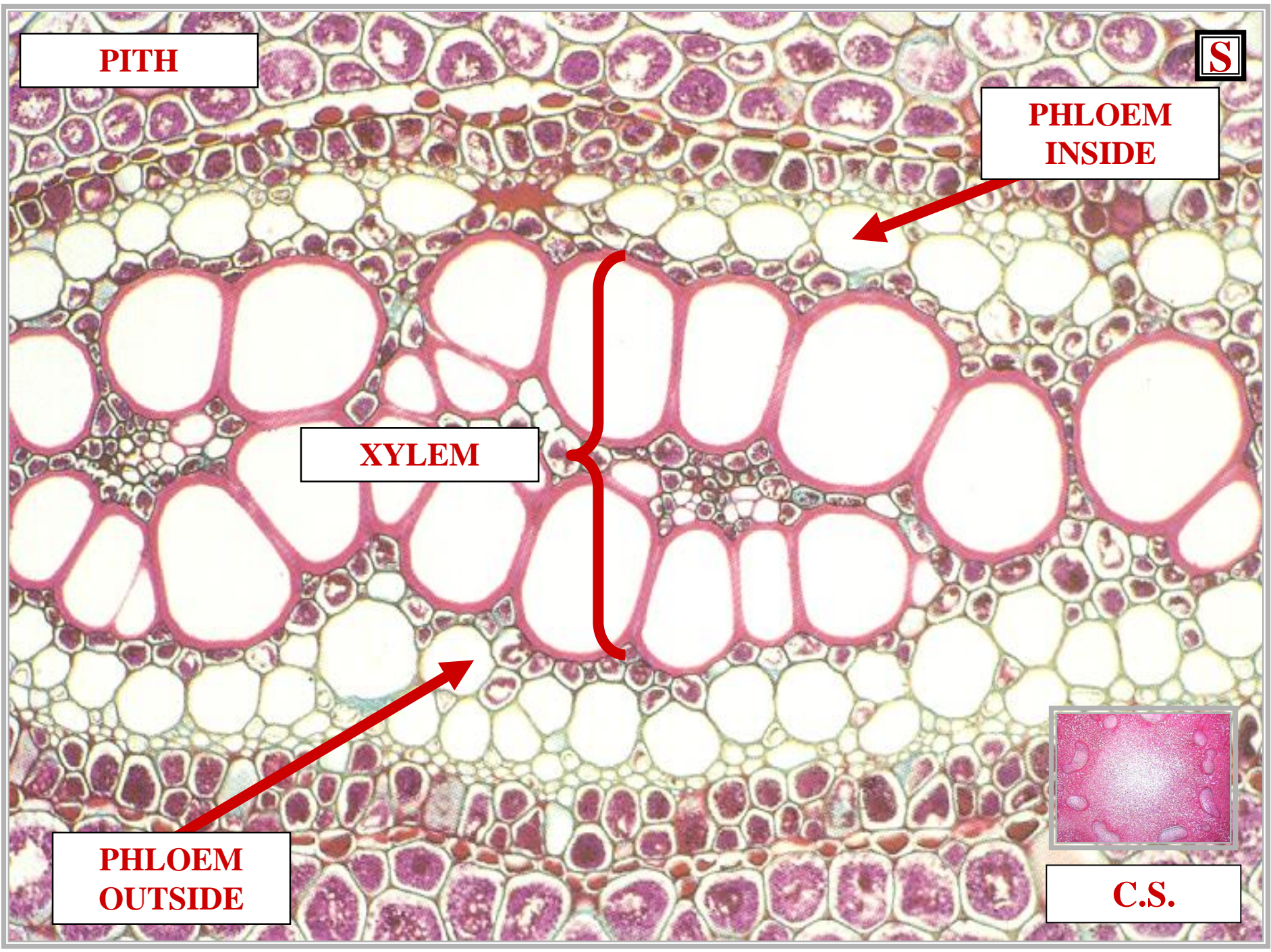
**PHLOEM  
INSIDE**

**XYLEM**

**PHLOEM  
OUTSIDE**



**C.S.**





**A**

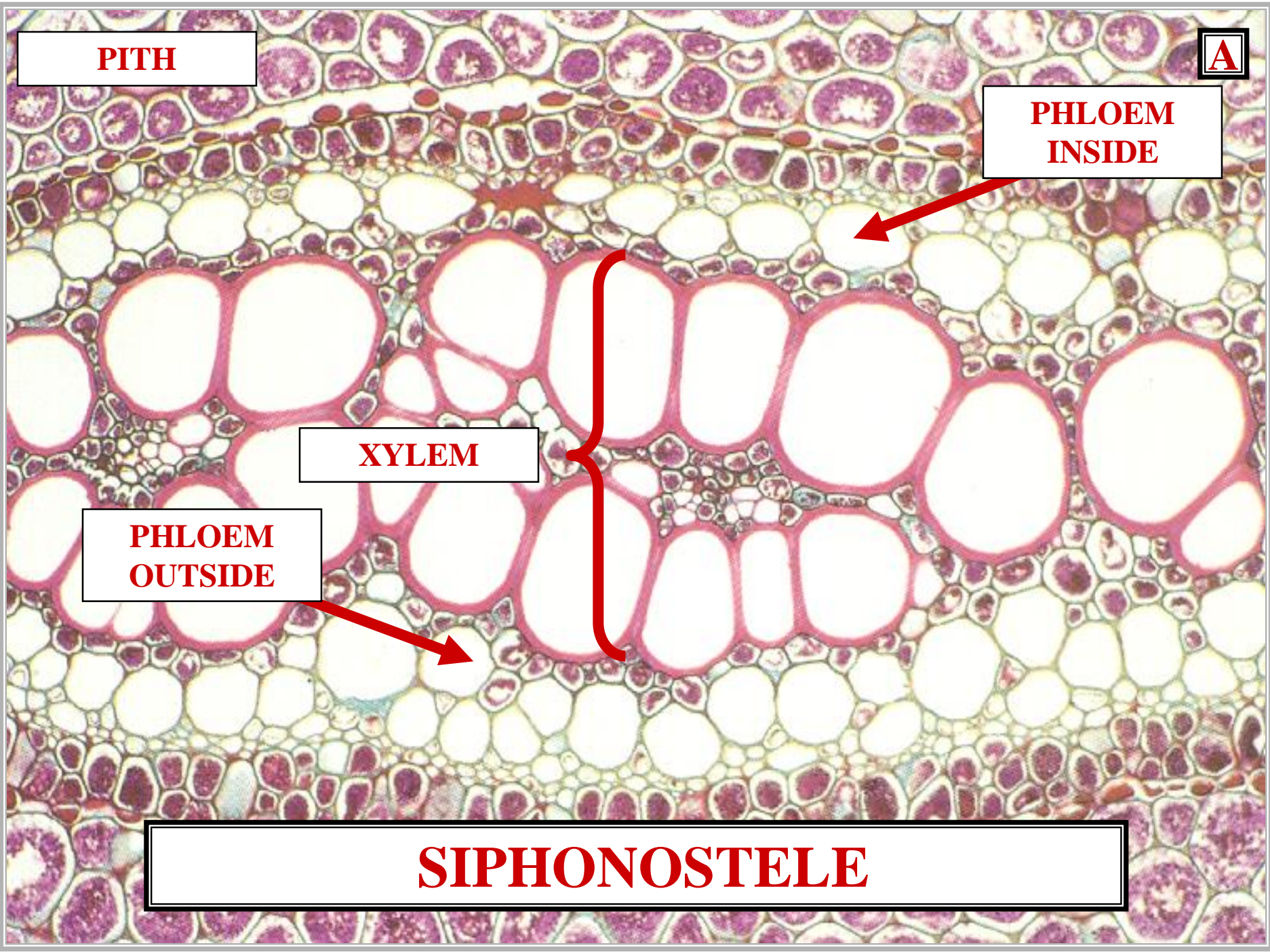
**PITH**

**PHLOEM  
INSIDE**

**XYLEM**

**PHLOEM  
OUTSIDE**

**SIPHONOSTELE**





**PITH**

**PHLOEM  
INSIDE**

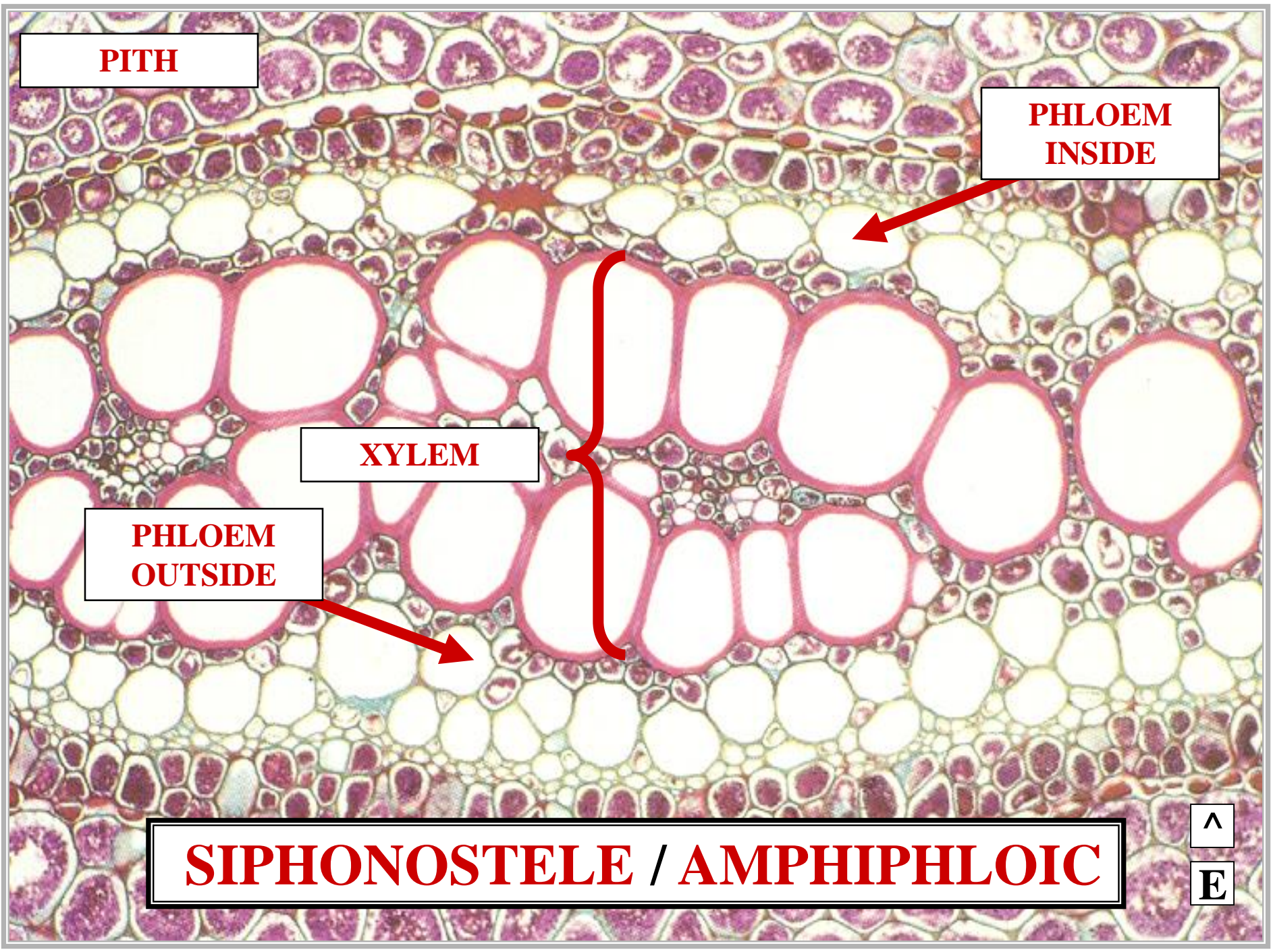
**XYLEM**

**PHLOEM  
OUTSIDE**

**SIPHONOSTELE / AMPHIPHLOIC**

^

E





**EUSTELE**