

HOLLOW PITH

EQUISETUM

STEM

C.S.

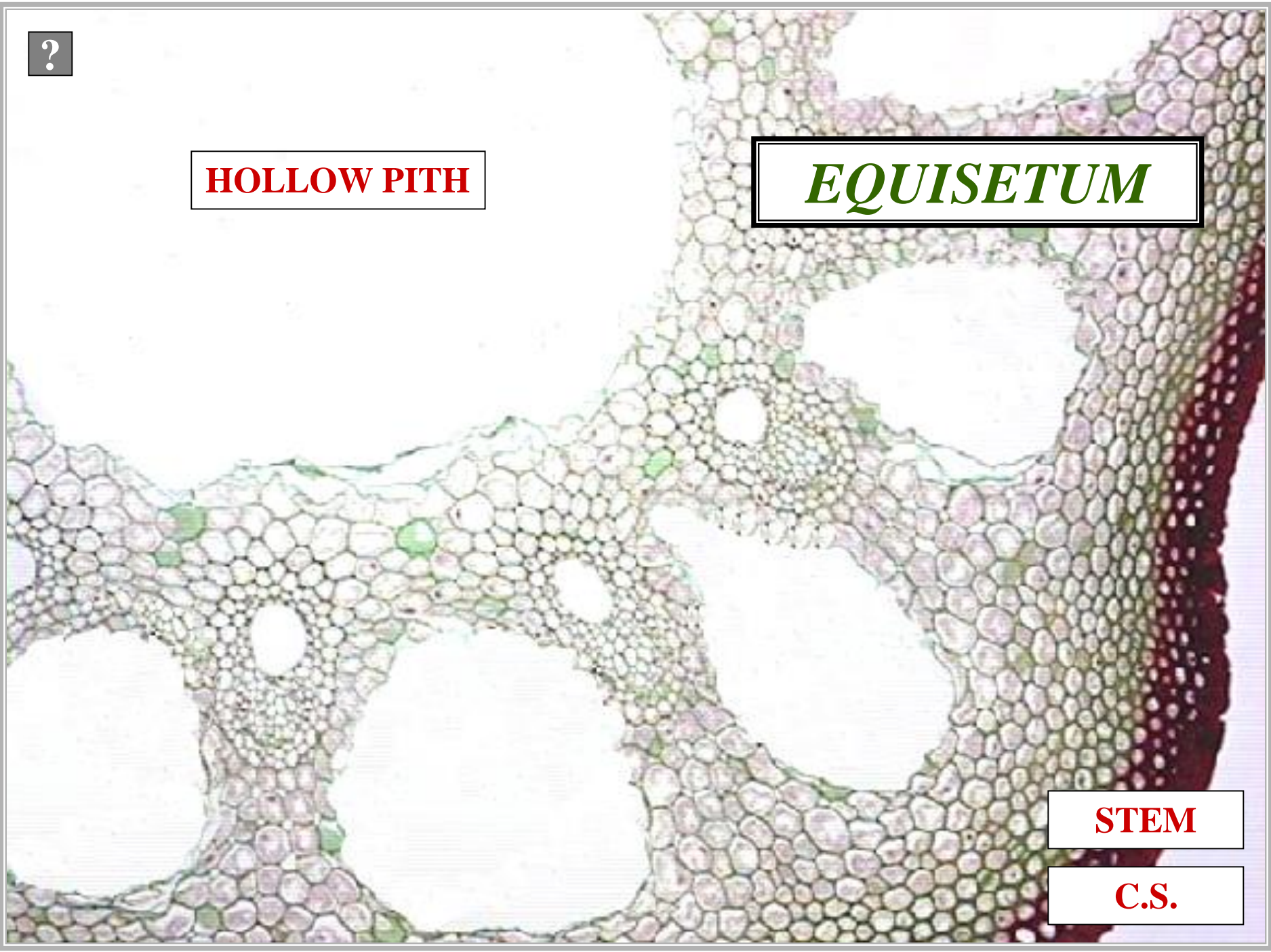
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HOLLOW PITH

EQUISETUM

STEM

C.S.



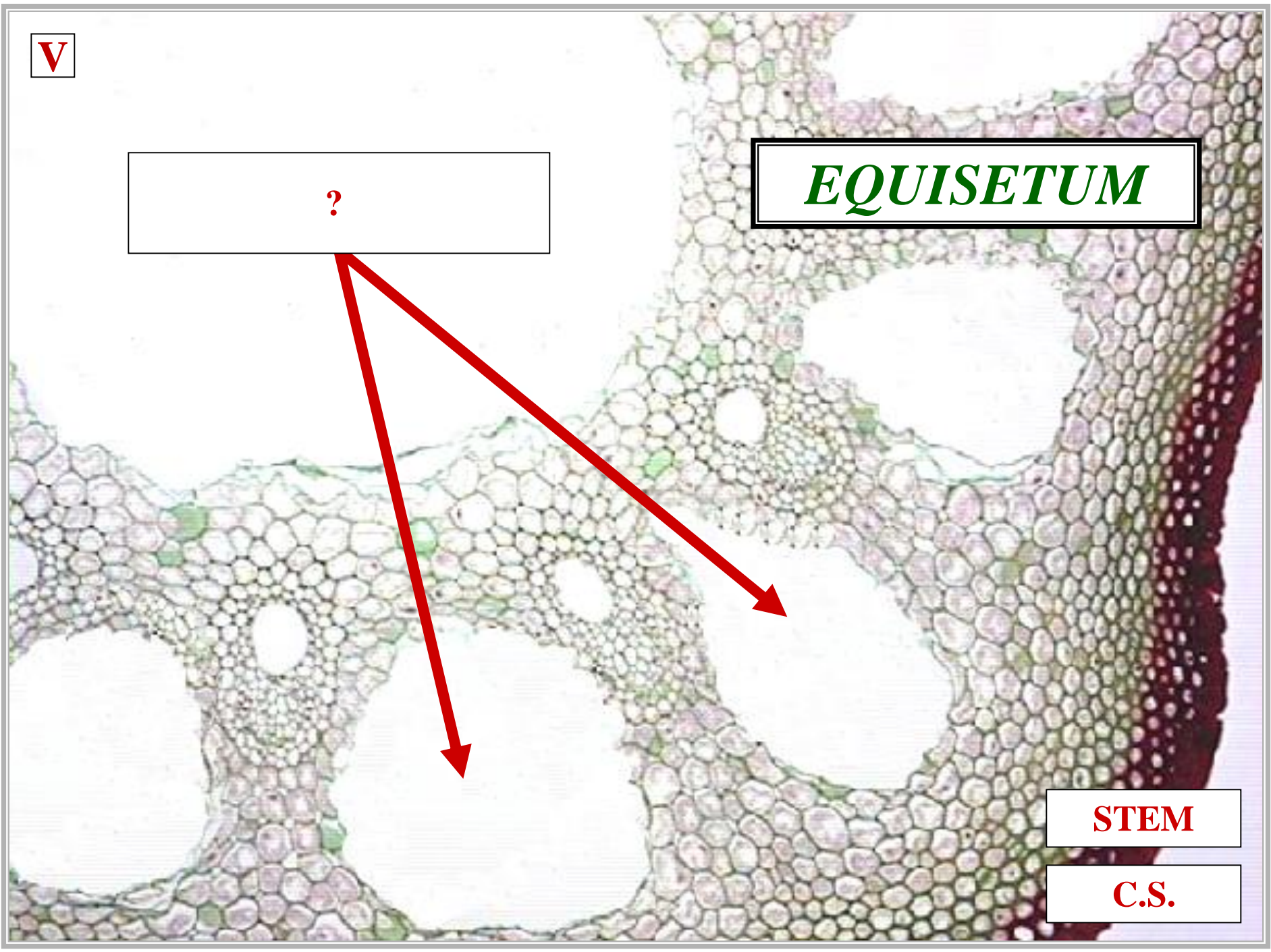
V

?

EQUISETUM

STEM

C.S.



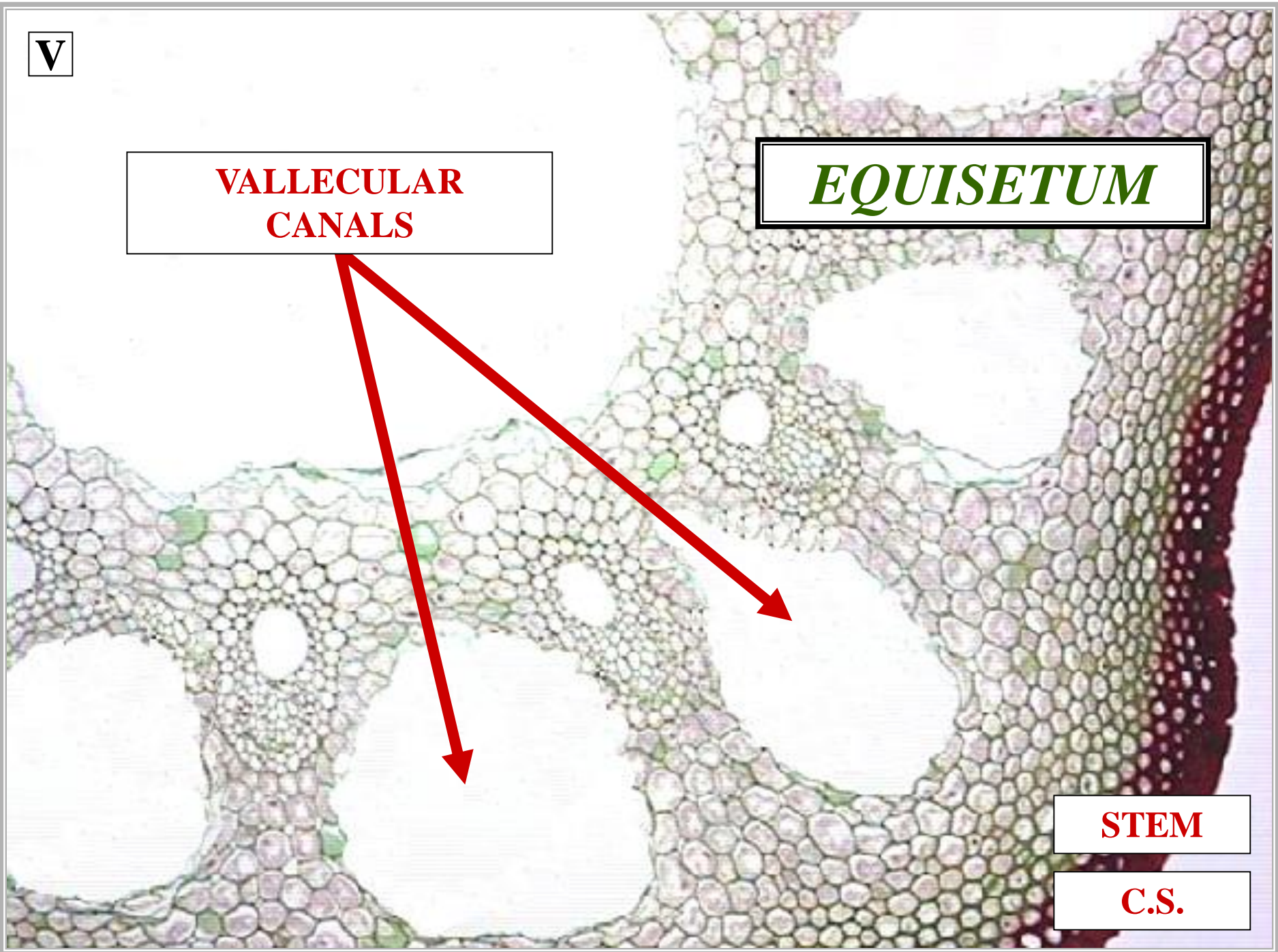
V

**VALLEULAR
CANALS**

EQUISETUM

STEM

C.S.



VALLECULAR CANALS

EQUISETUM
VALLECULAR CANALS



CORTEX CAVITIES

EQUISETUM
VALLECULAR CANALS

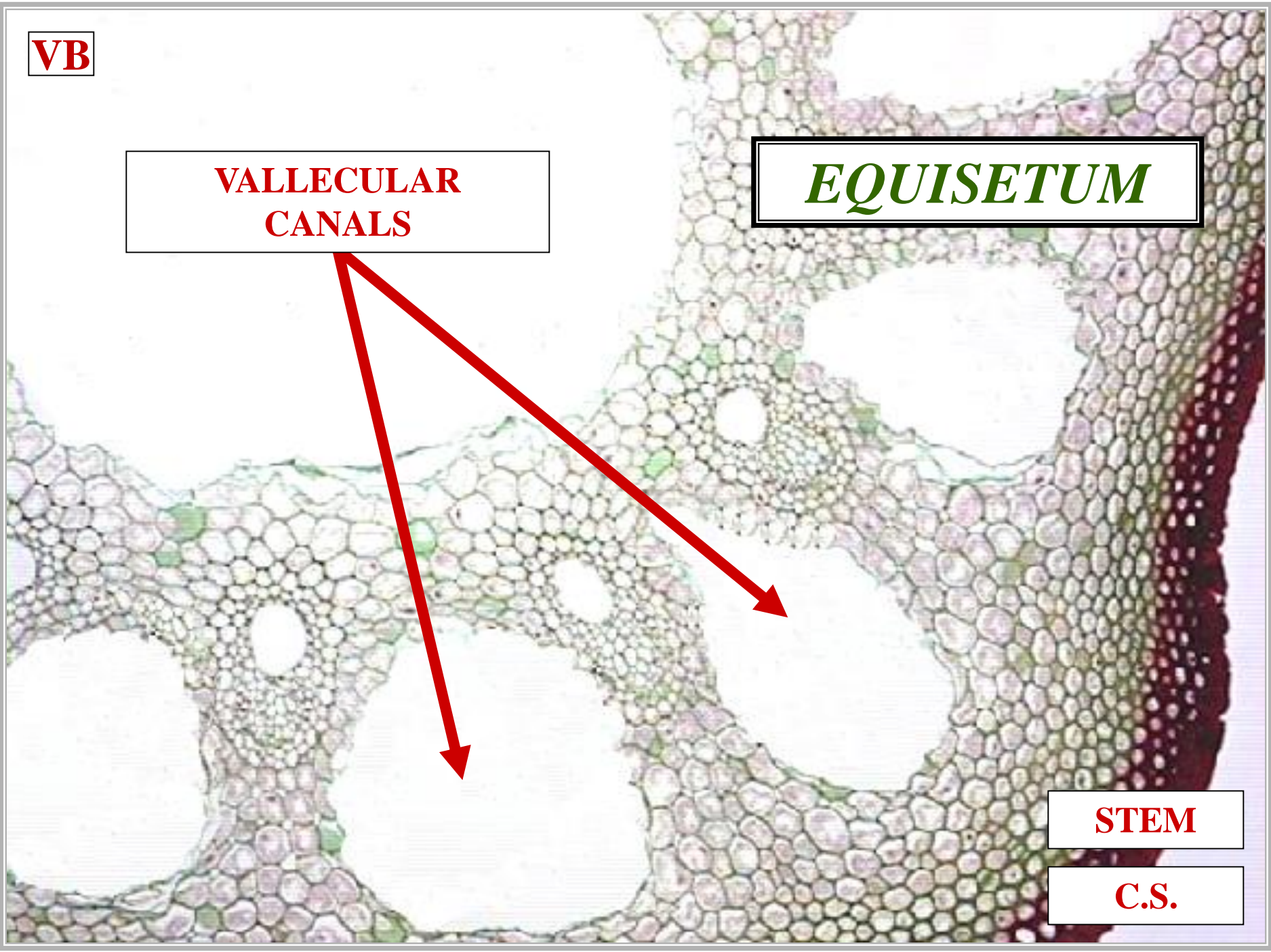
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**VALLECULAR
CANALS**

EQUISETUM

STEM

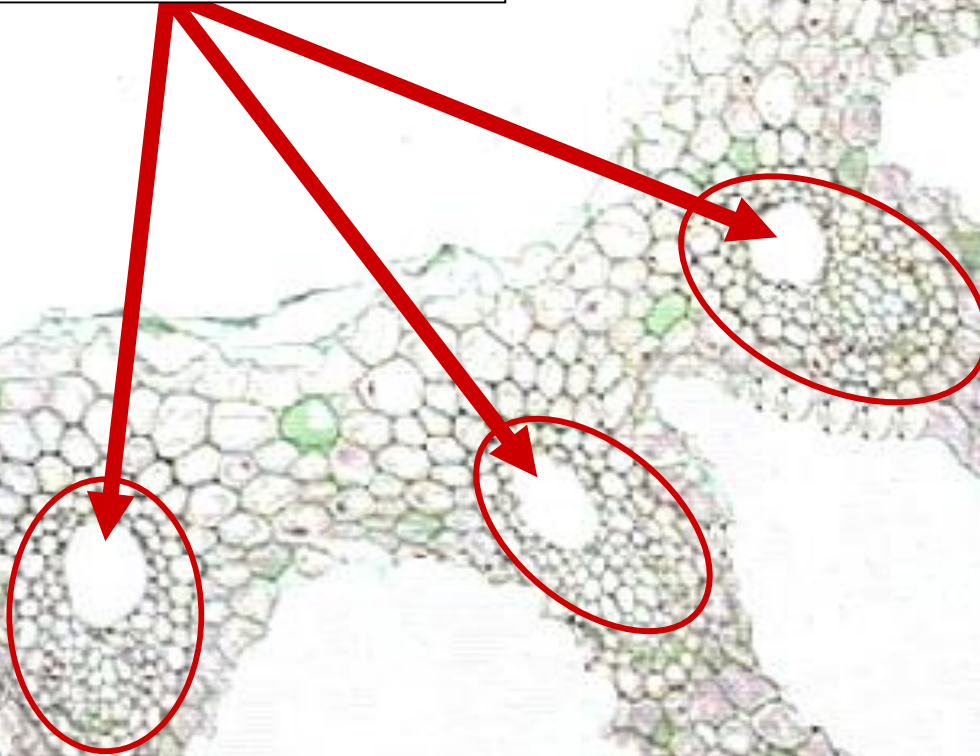
C.S.



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**VASCULAR
BUNDLES**

EQUISETUM



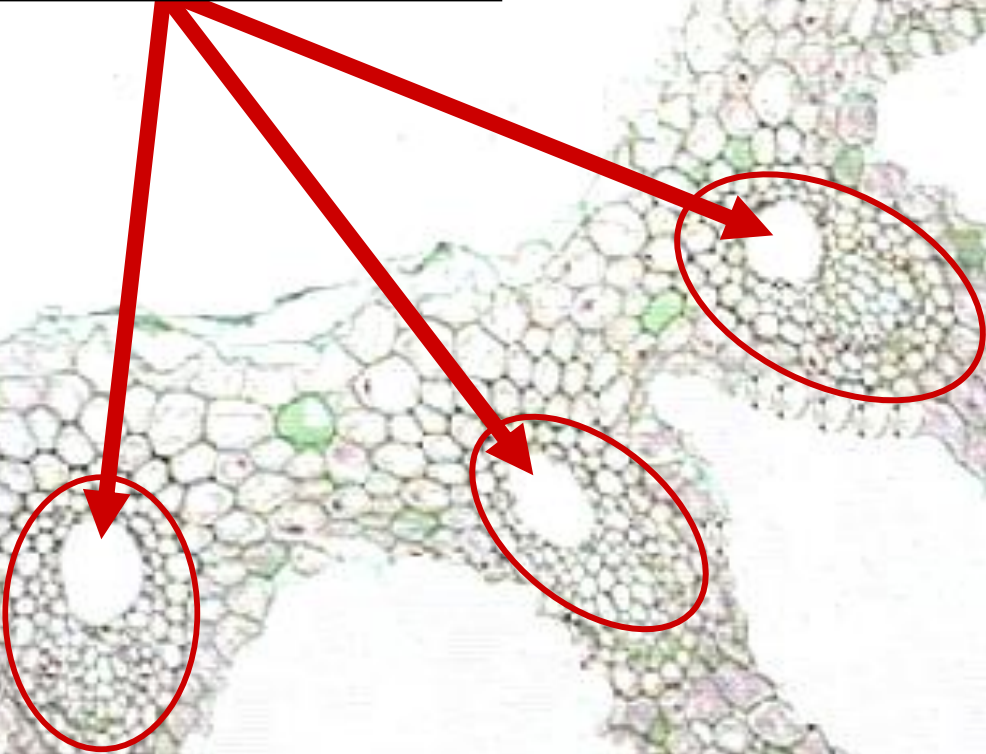
STEM

C.S.

C

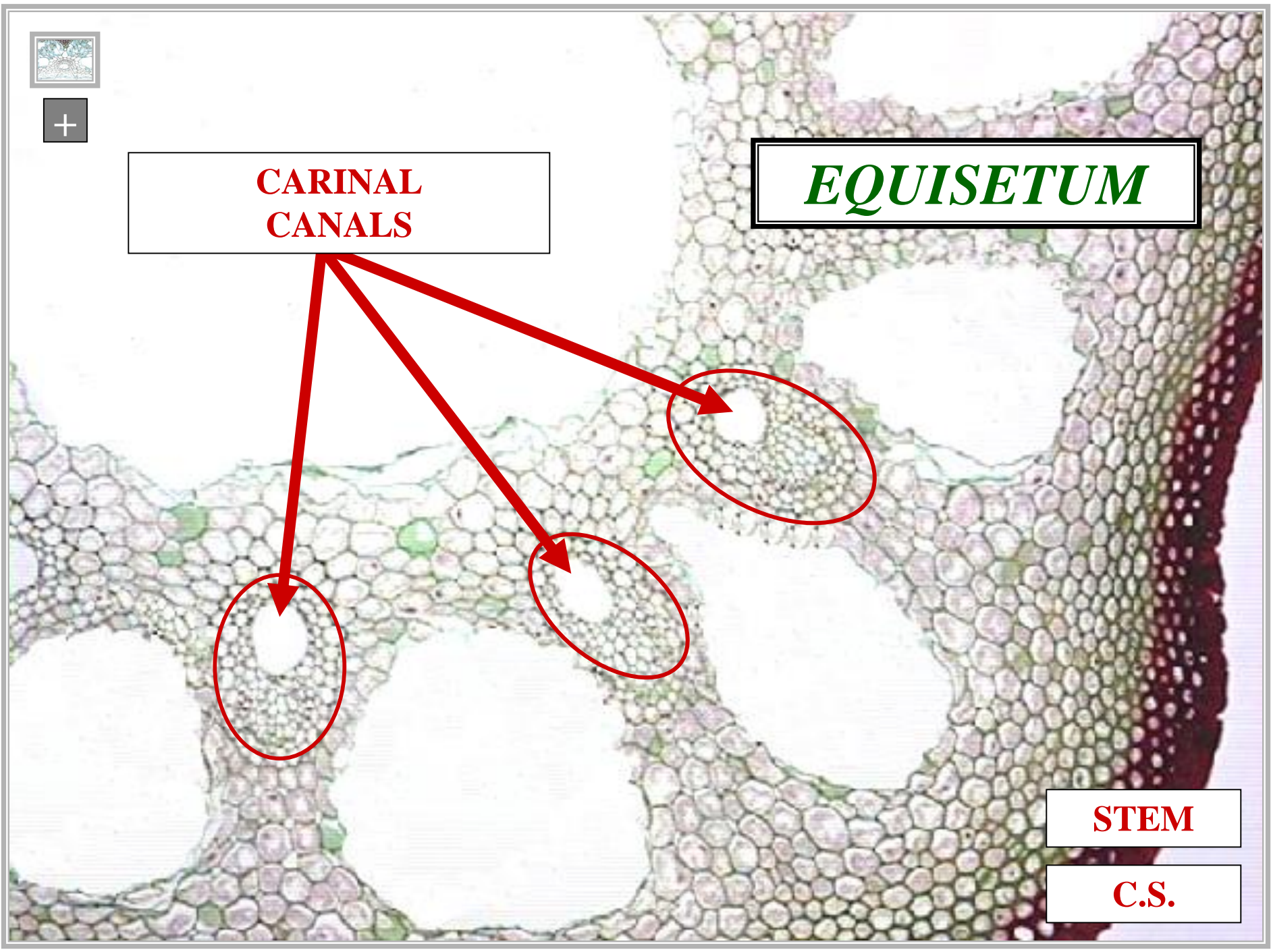
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EQUISETUM



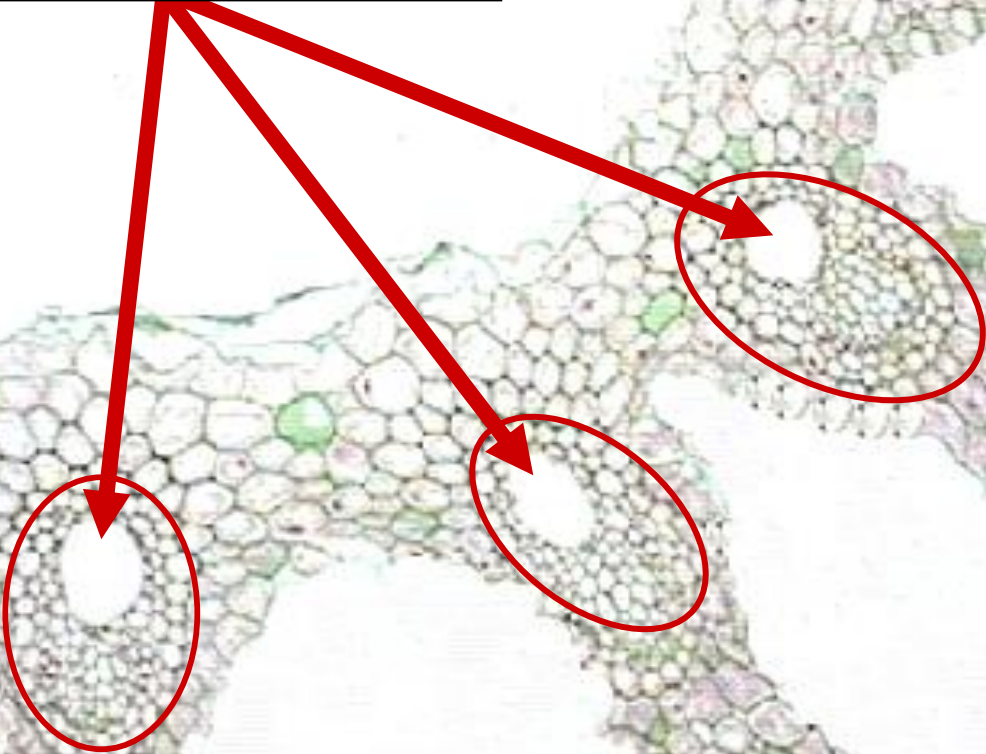
STEM

C.S.



**CARINAL
CANALS**

EQUISETUM



STEM

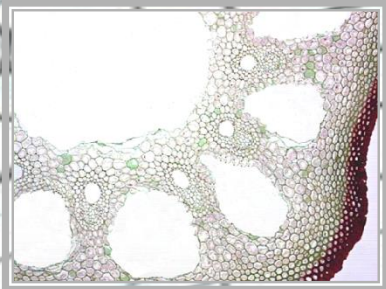
C.S.

PHLOEM

XYLEM

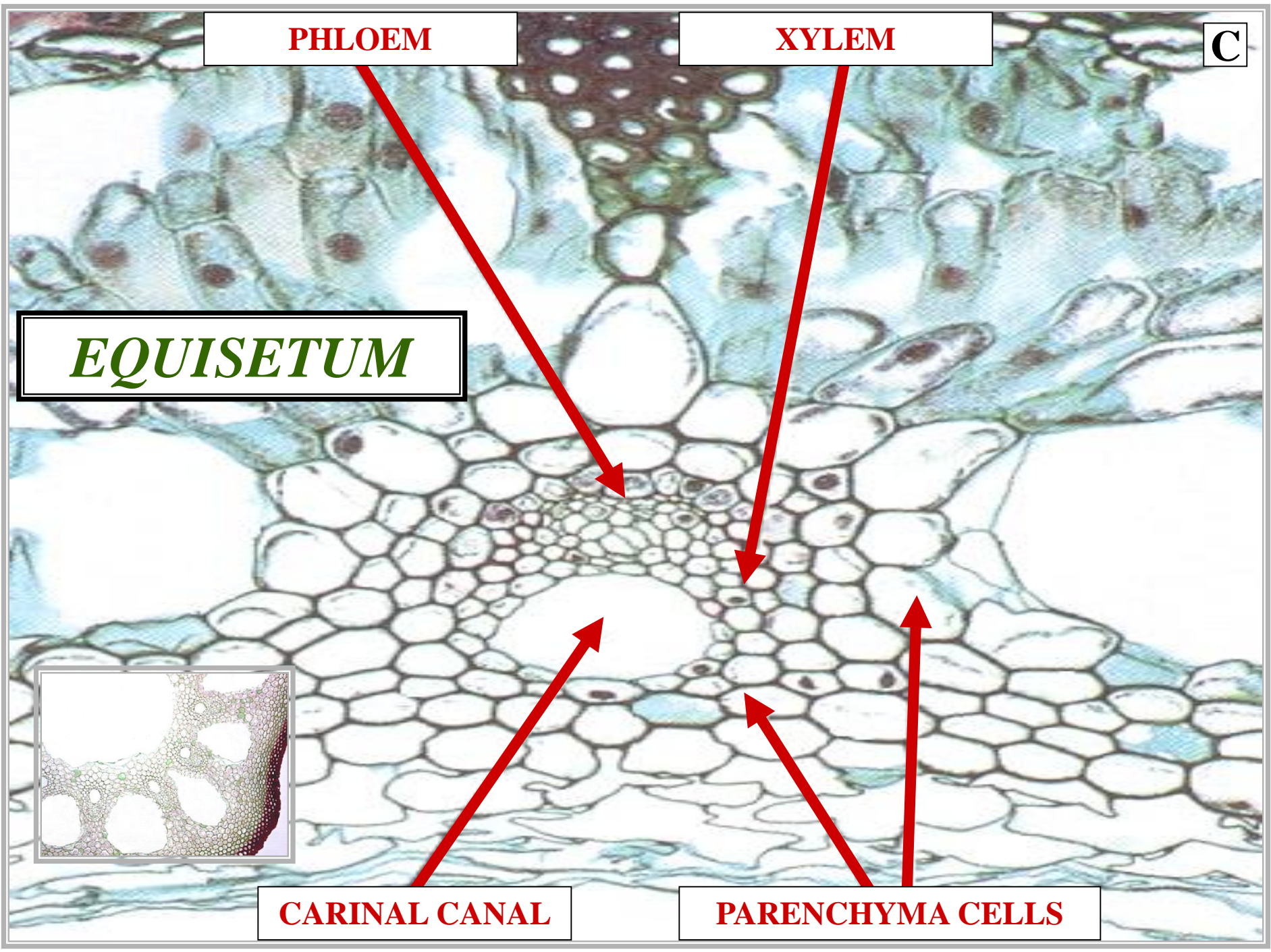
C

EQUISETUM



CARINAL CANAL

PARENCHYMA CELLS



CARINAL CANALS



EQUISETUM
CARINAL CANALS

XYLEM CAVITIES

EQUISETUM
CARINAL CANALS



STEM STELE

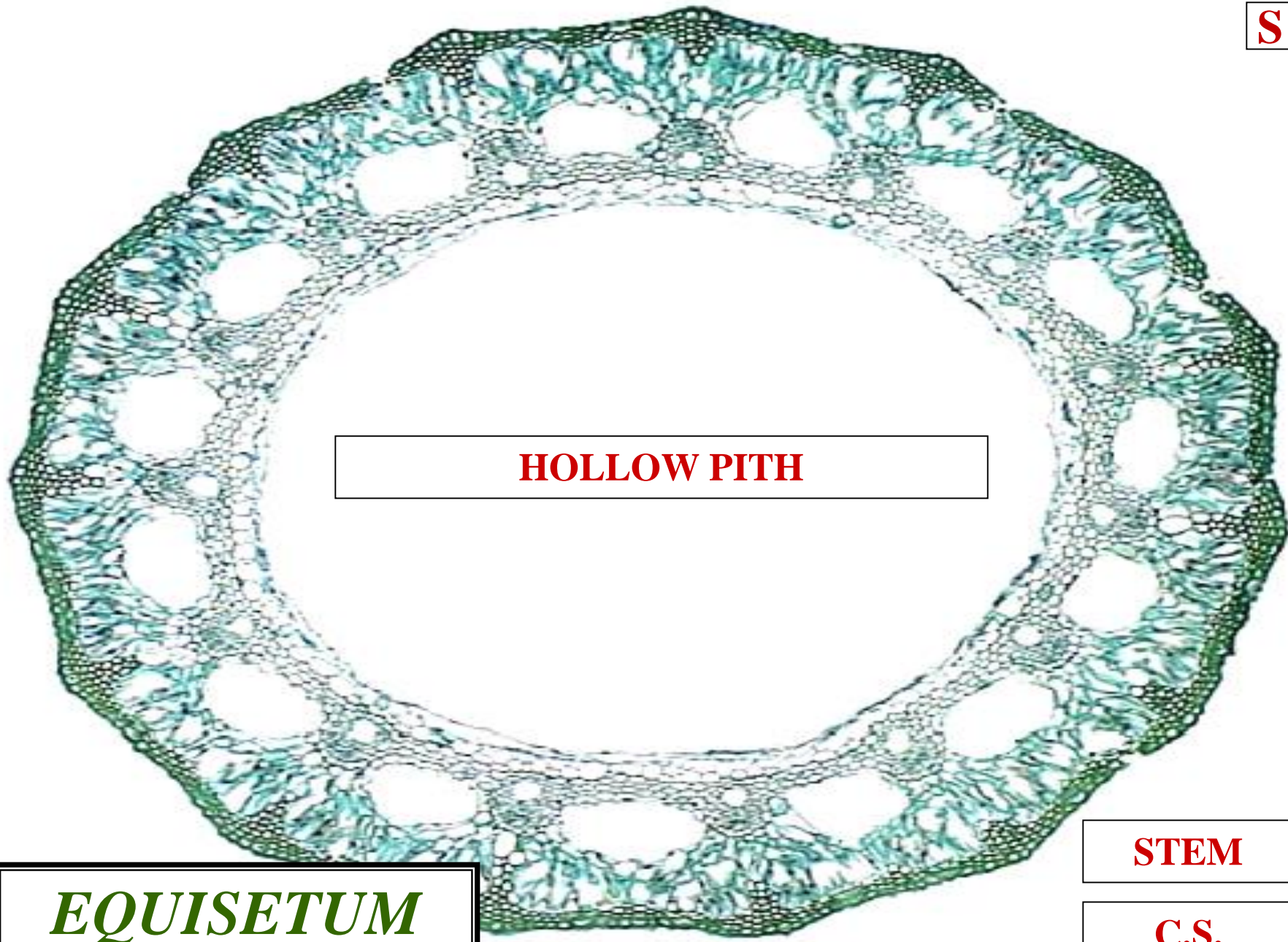
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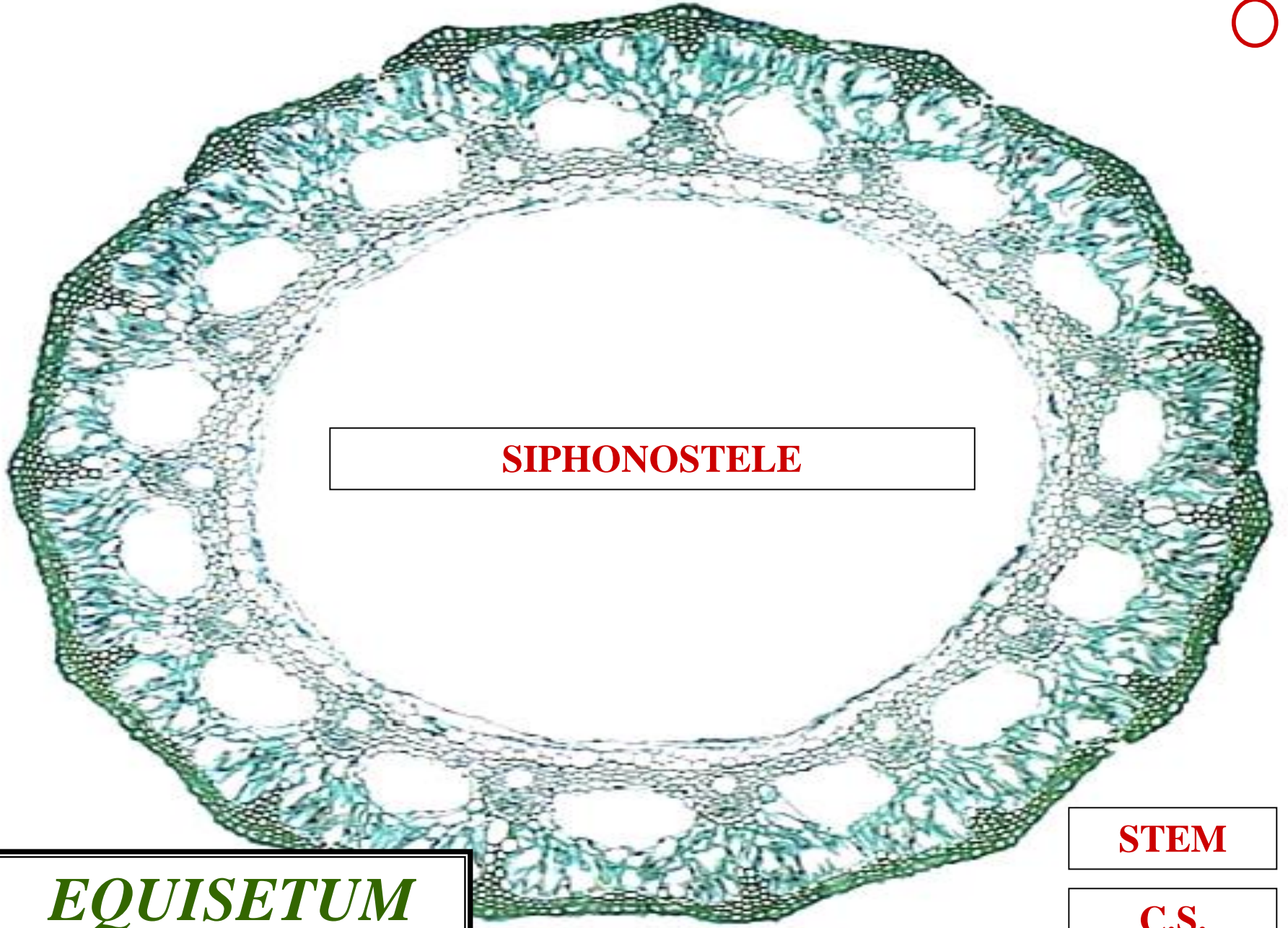
HOLLOW PITH

EQUISETUM

STEM

C.S.





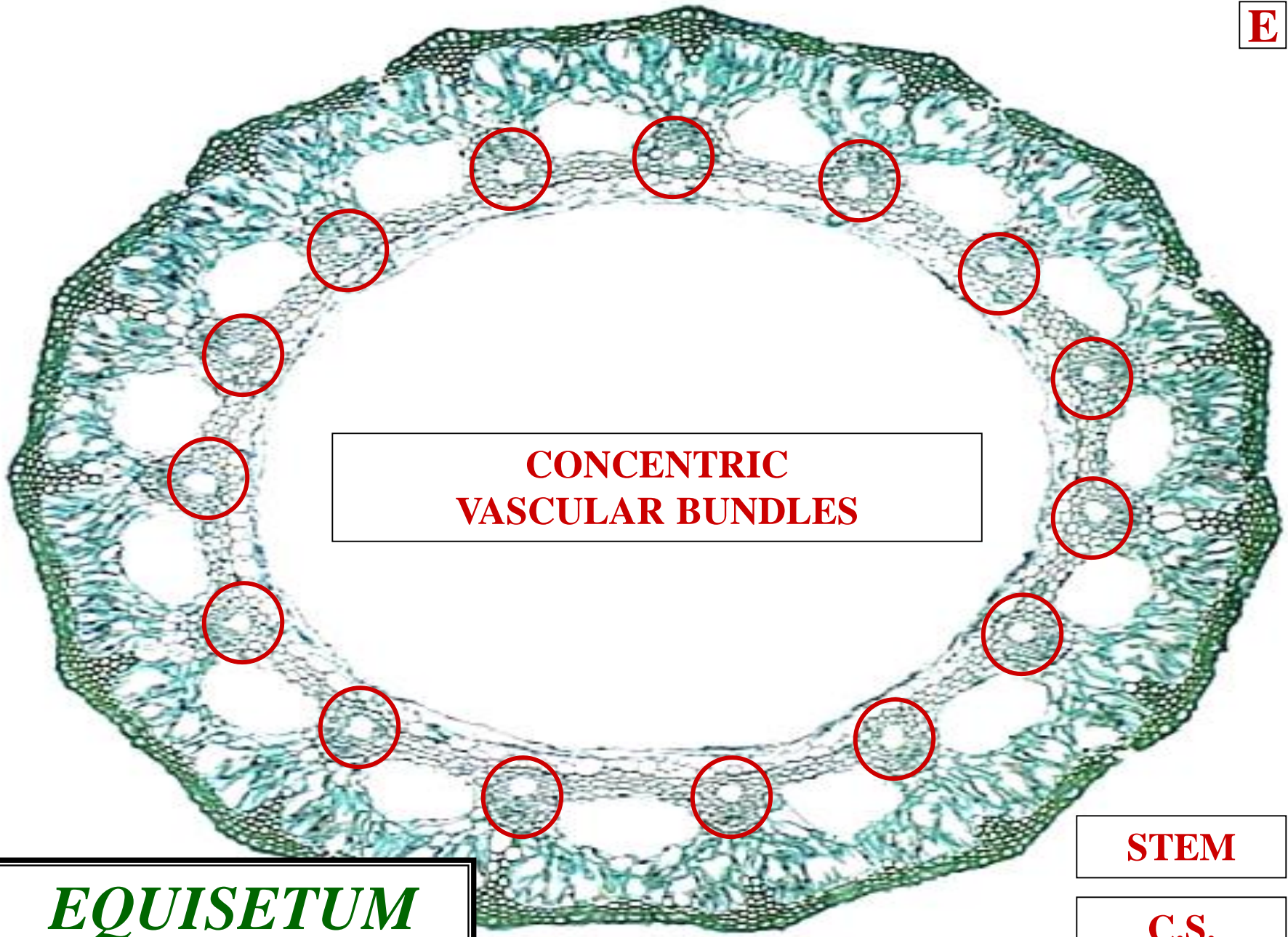
SIPHONOSTELE

EQUISETUM

STEM

C.S.

E

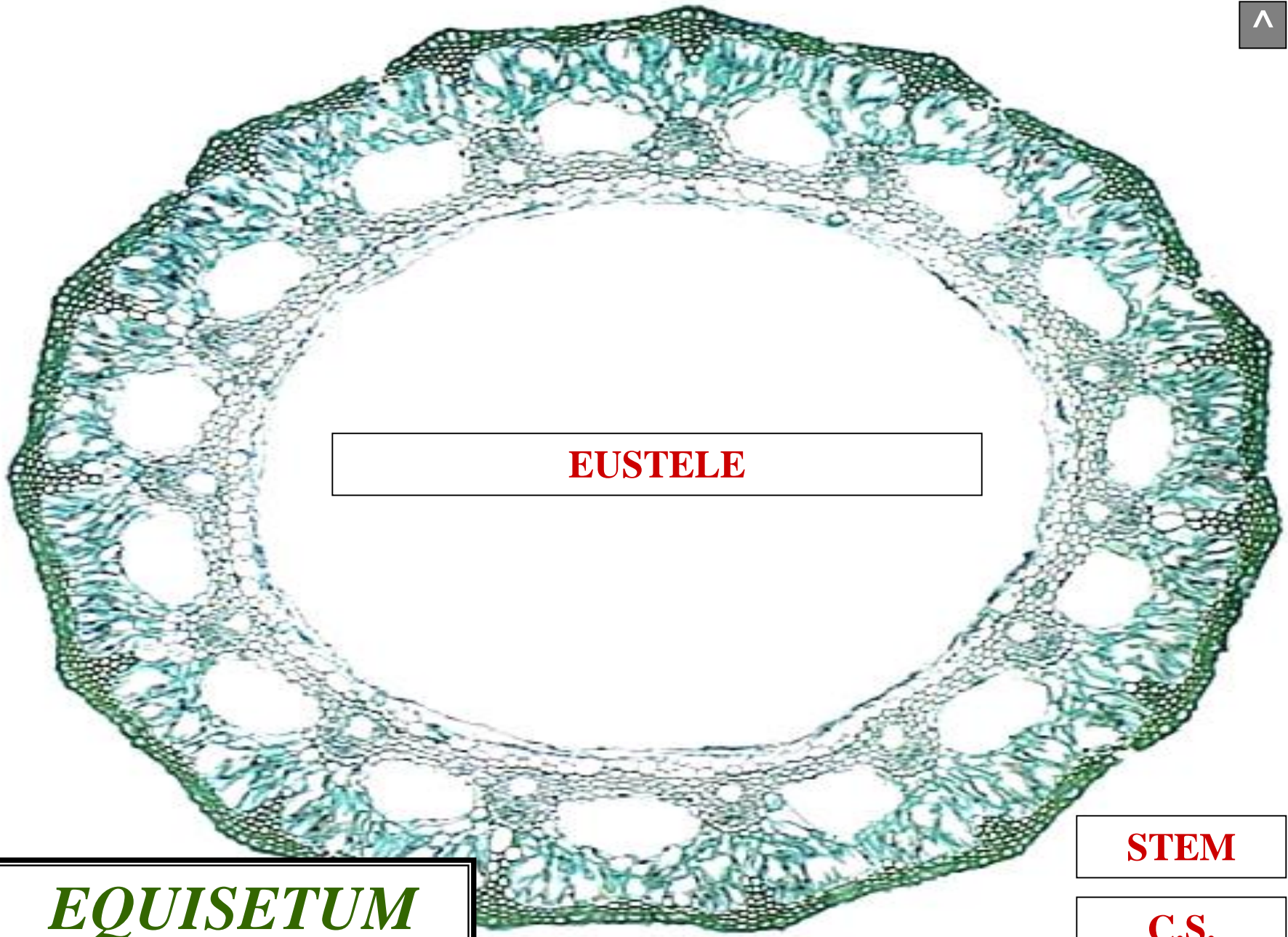


**CONCENTRIC
VASCULAR BUNDLES**

EQUISETUM

STEM

C.S.



EUSTELE

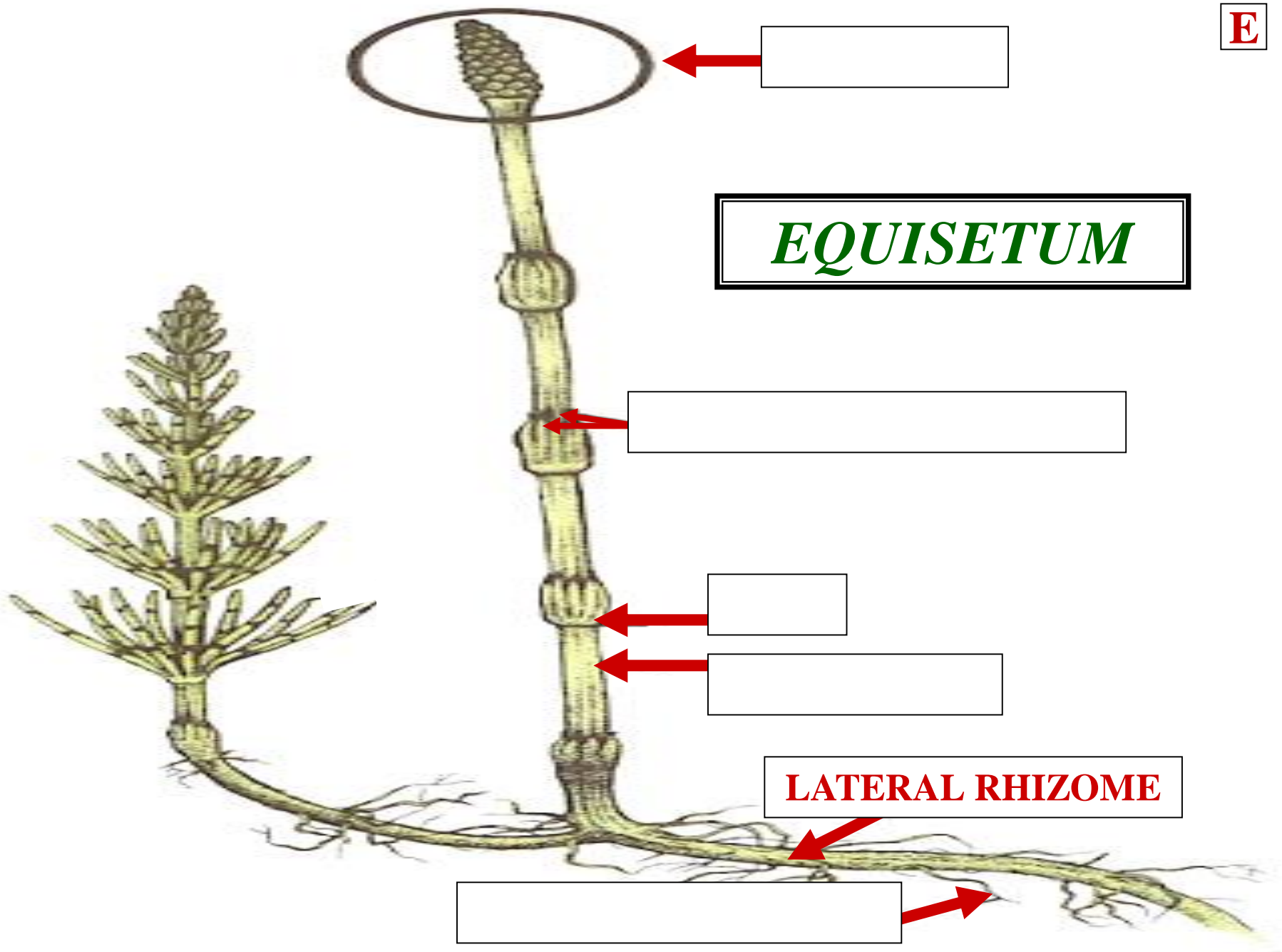
EQUISETUM

STEM

C.S.



RHIZOME



EQUISETUM

[]

[]

[]

[]

LATERAL RHIZOME

[]



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EQUISETUM



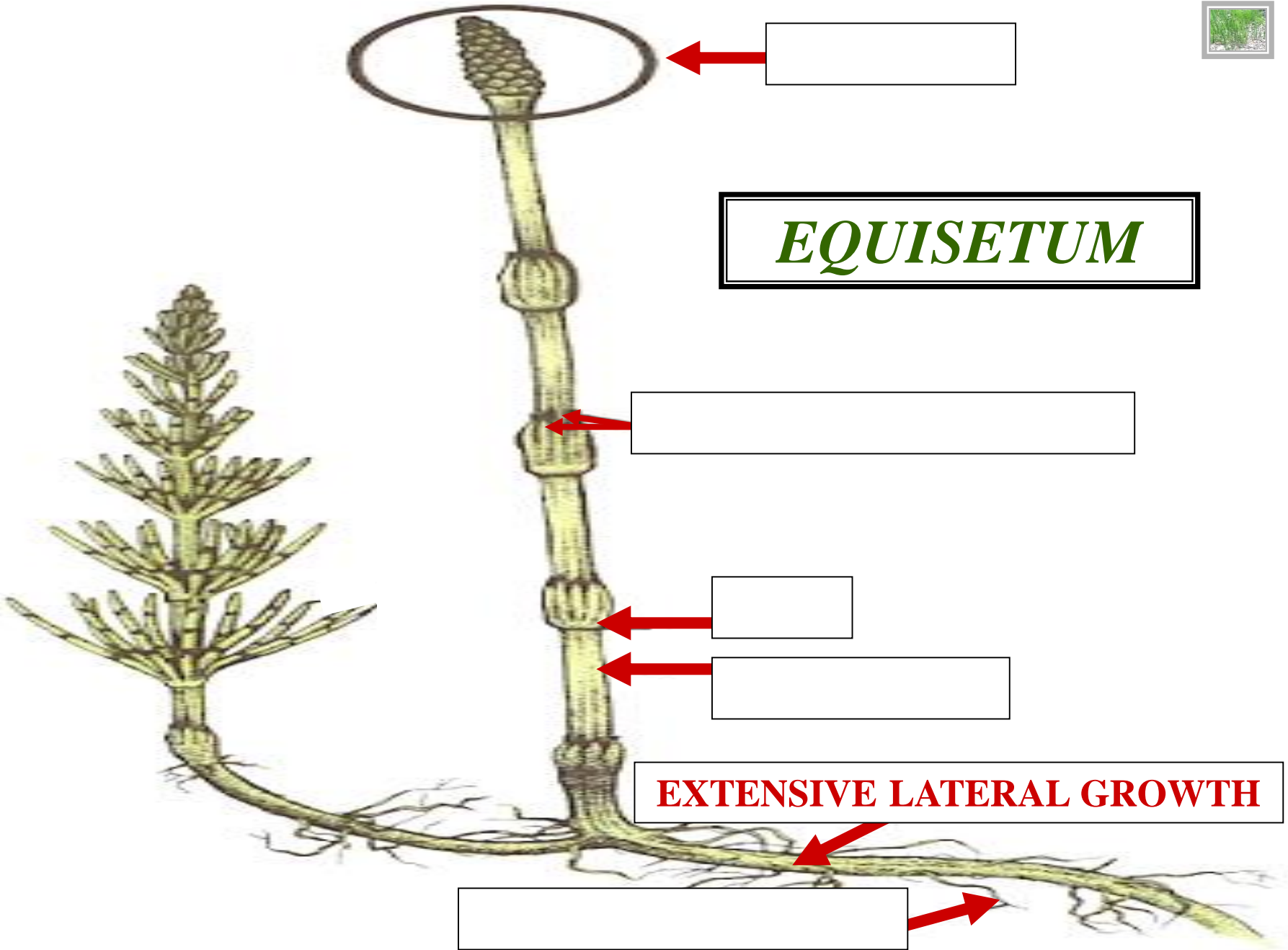
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EXTENSIVE LATERAL GROWTH

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RHIZOME EXTENSIVE LATERAL GROWTH



EQUISETUM



AERIAL STEM



[]

EQUISETUM

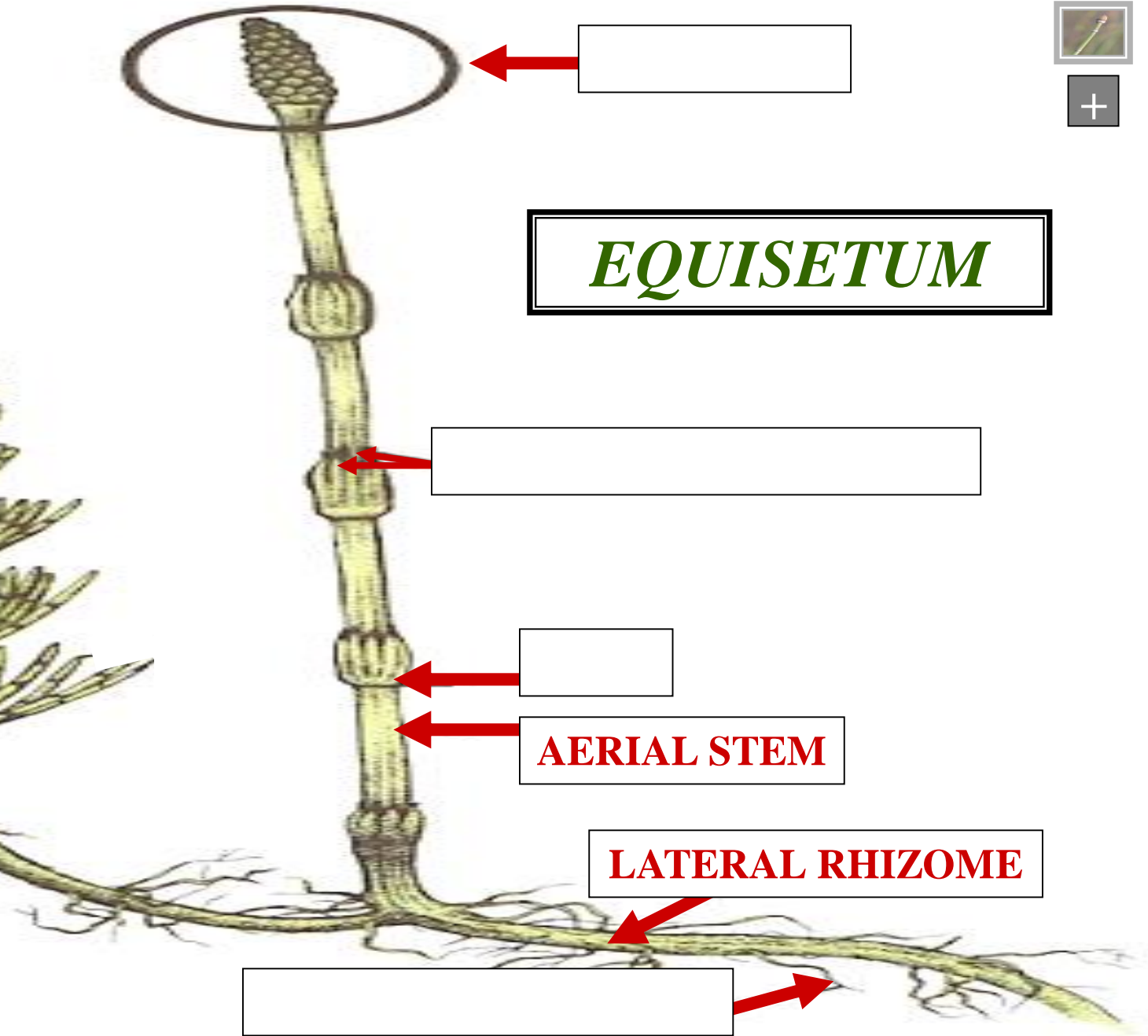
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AERIAL STEM

LATERAL RHIZOME

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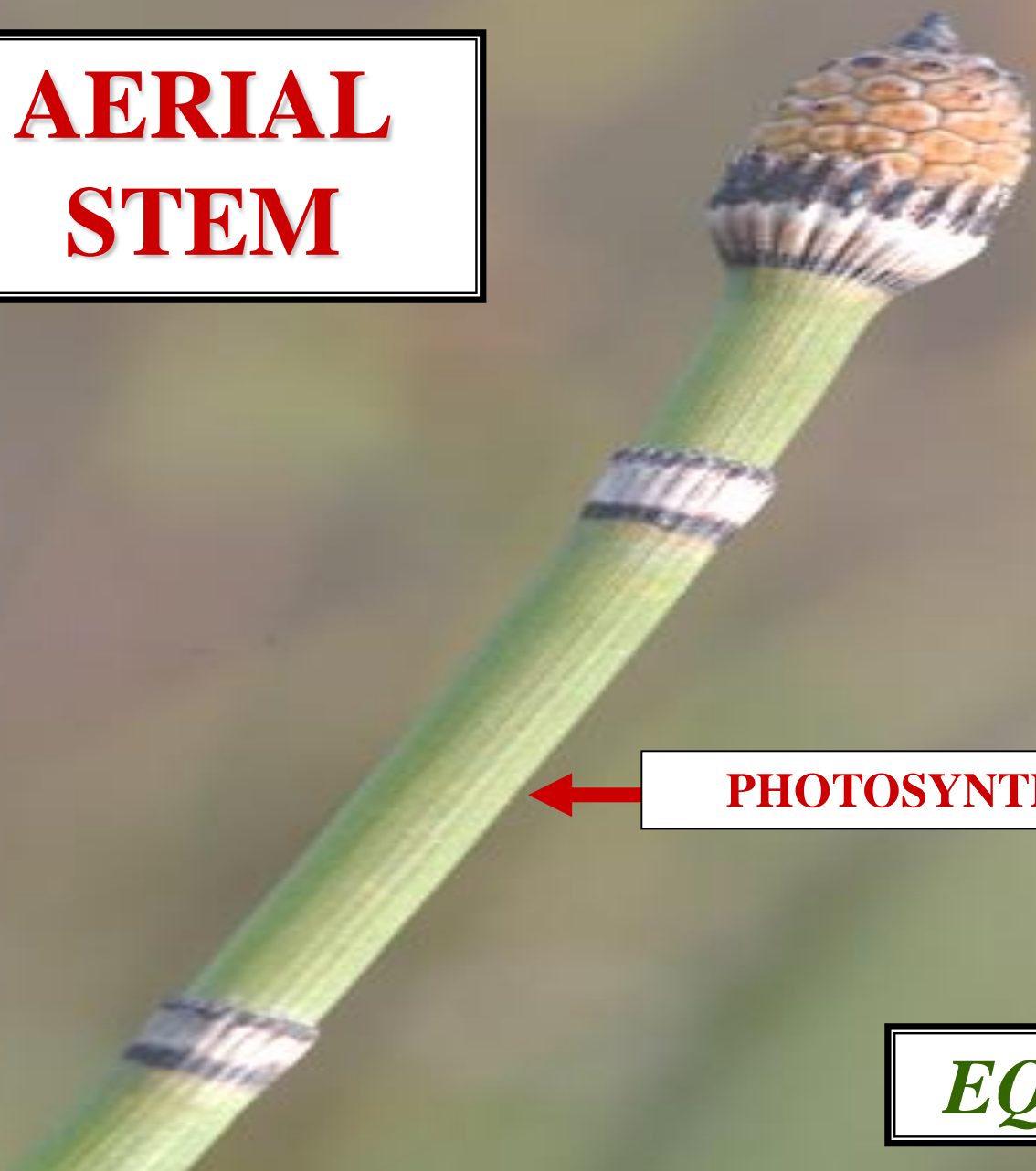


**AERIAL
STEM**



EQUISETUM

**AERIAL
STEM**



PHOTOSYNTHETIC



EQUISETUM

**AERIAL
STEM**

ARTICULATE STEM

EQUISETUM



ARTICULATE STEM

EQUISETUM
STEM ARTICULATE

**PROMINENT
NODES & INTERNODES**

EQUISETUM
STEM ARTICULATE

NODE

EQUISETUM
STEM NODE



N

LEAF ORIGIN
UPON STEM

EQUISETUM
STEM NODE

**AERIAL
STEM**

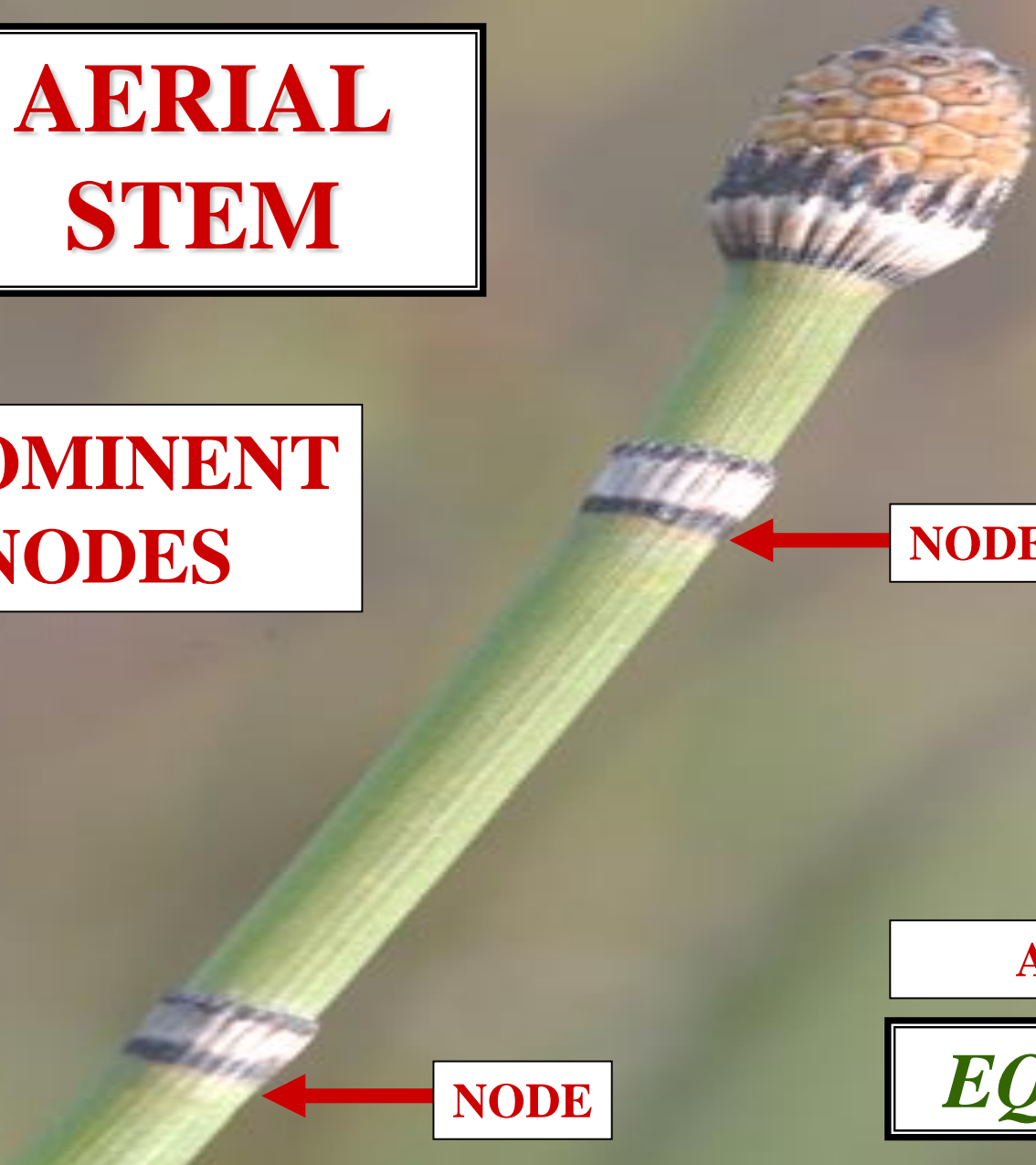
**PROMINENT
NODES**

NODE

ARTICULATE

NODE

EQUISETUM



INTERNODE

EQUISETUM
STEM INTERNODE



I

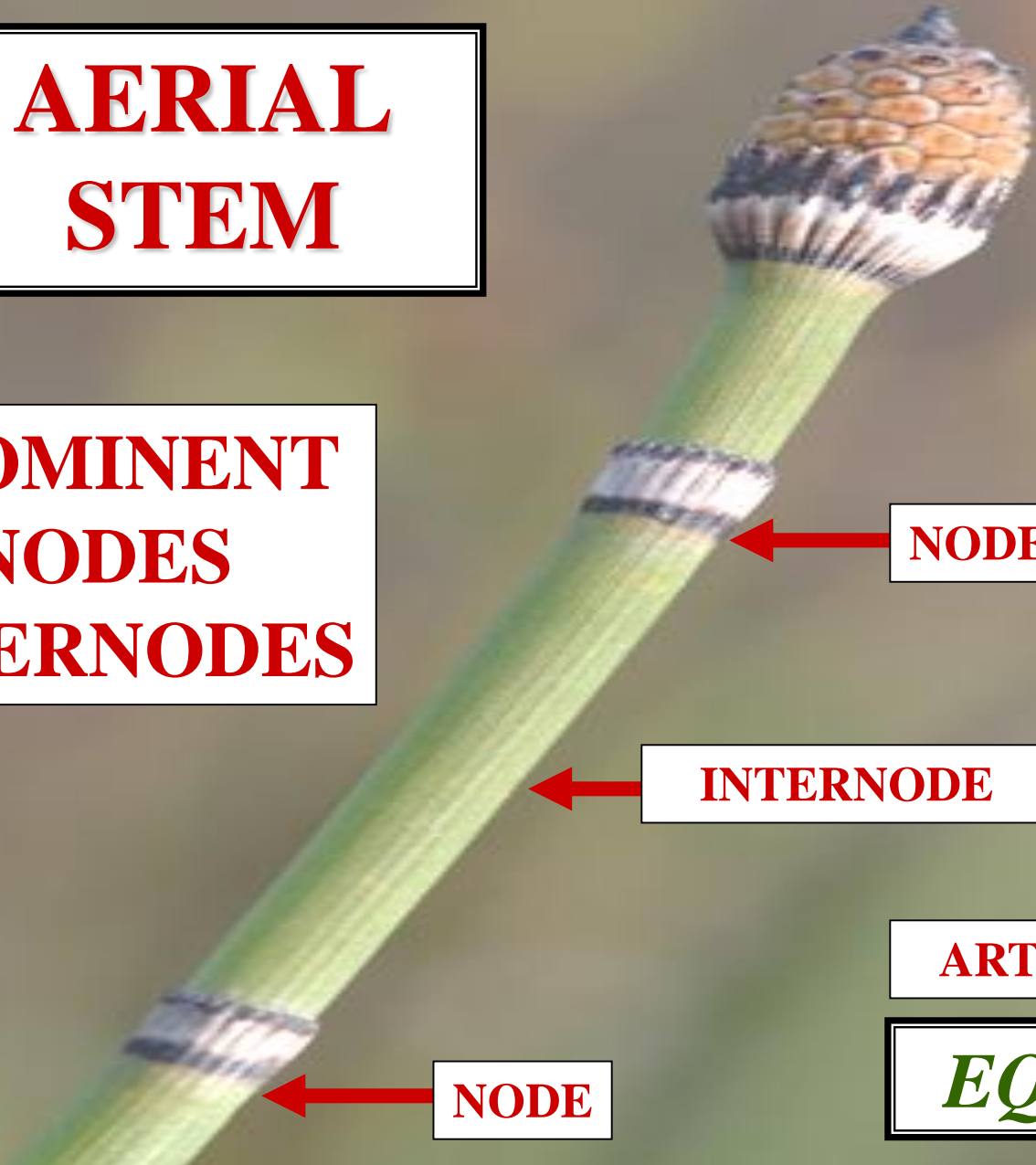
**STEM AREA
BETWEEN NODES**

EQUISETUM
STEM INTERNODE



**AERIAL
STEM**

**PROMINENT
NODES
INTERNODES**



NODE

INTERNODE

NODE

ARTICULATE STEM

EQUISETUM



LATERAL BRANCHES



AB

AERIAL STEM

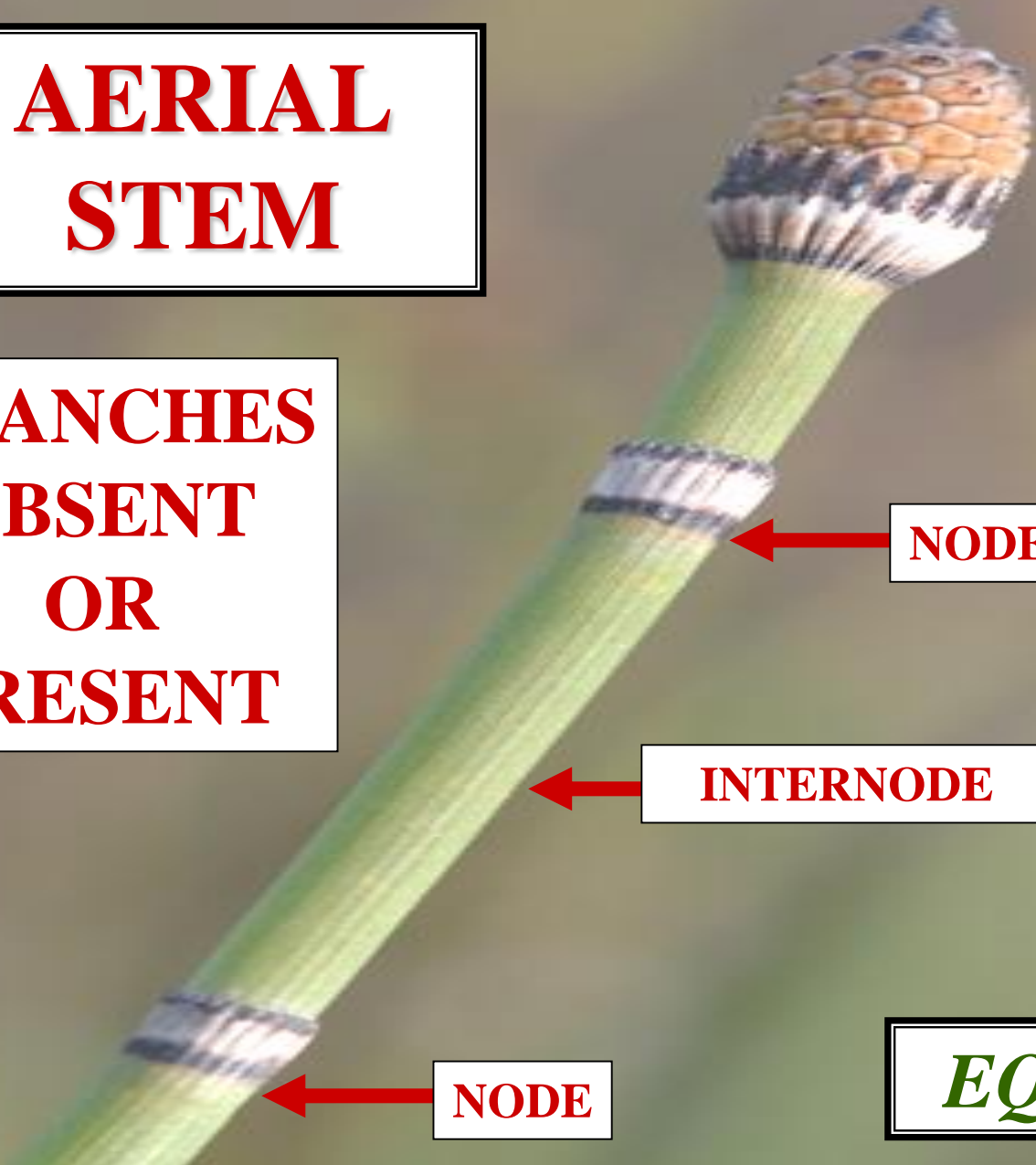
**BRANCHES
ABSENT
OR
PRESENT**

NODE

INTERNODE

NODE

EQUISETUM





PR

**AERIAL
STEM**

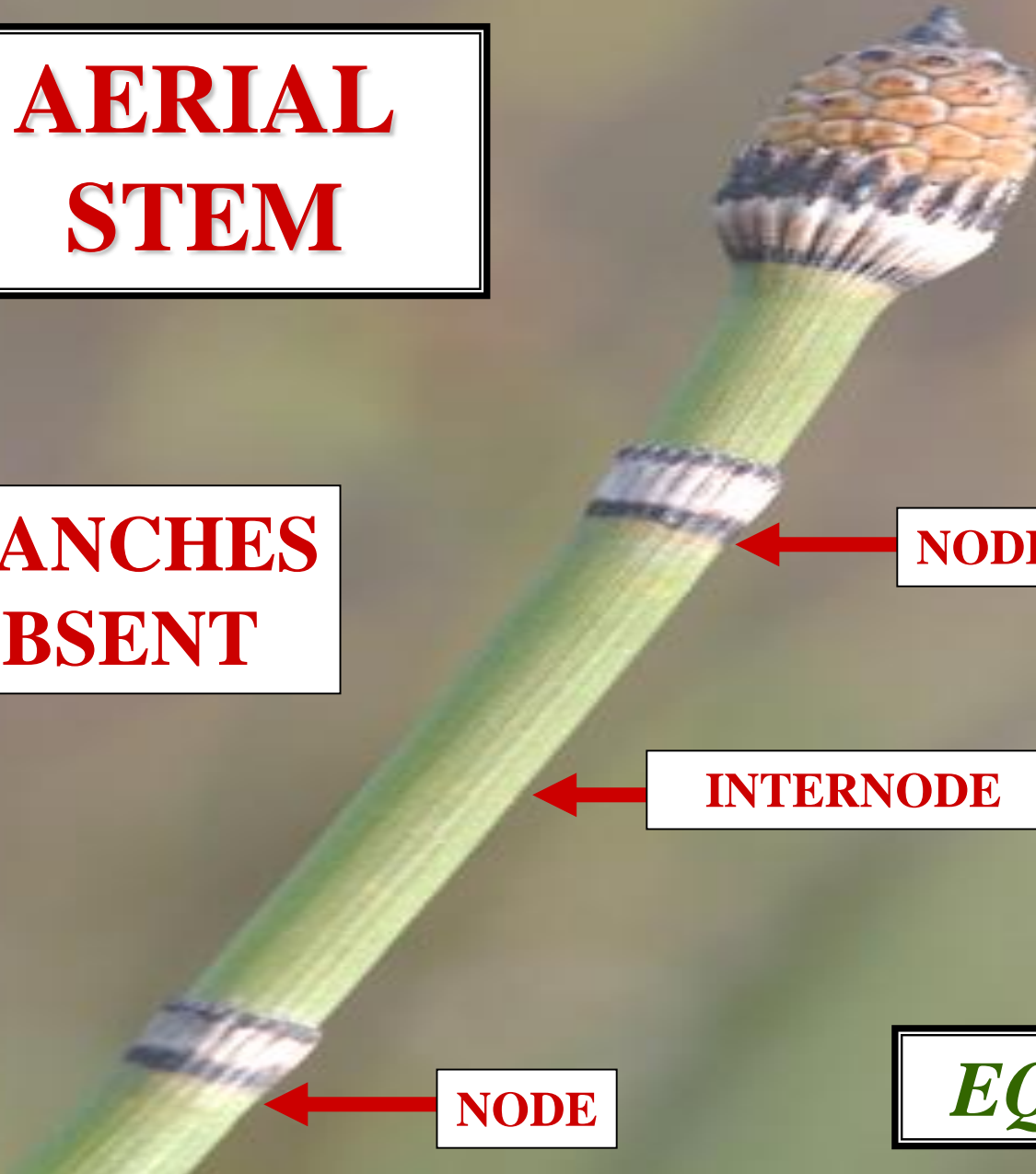
**BRANCHES
ABSENT**

NODE

INTERNODE

NODE

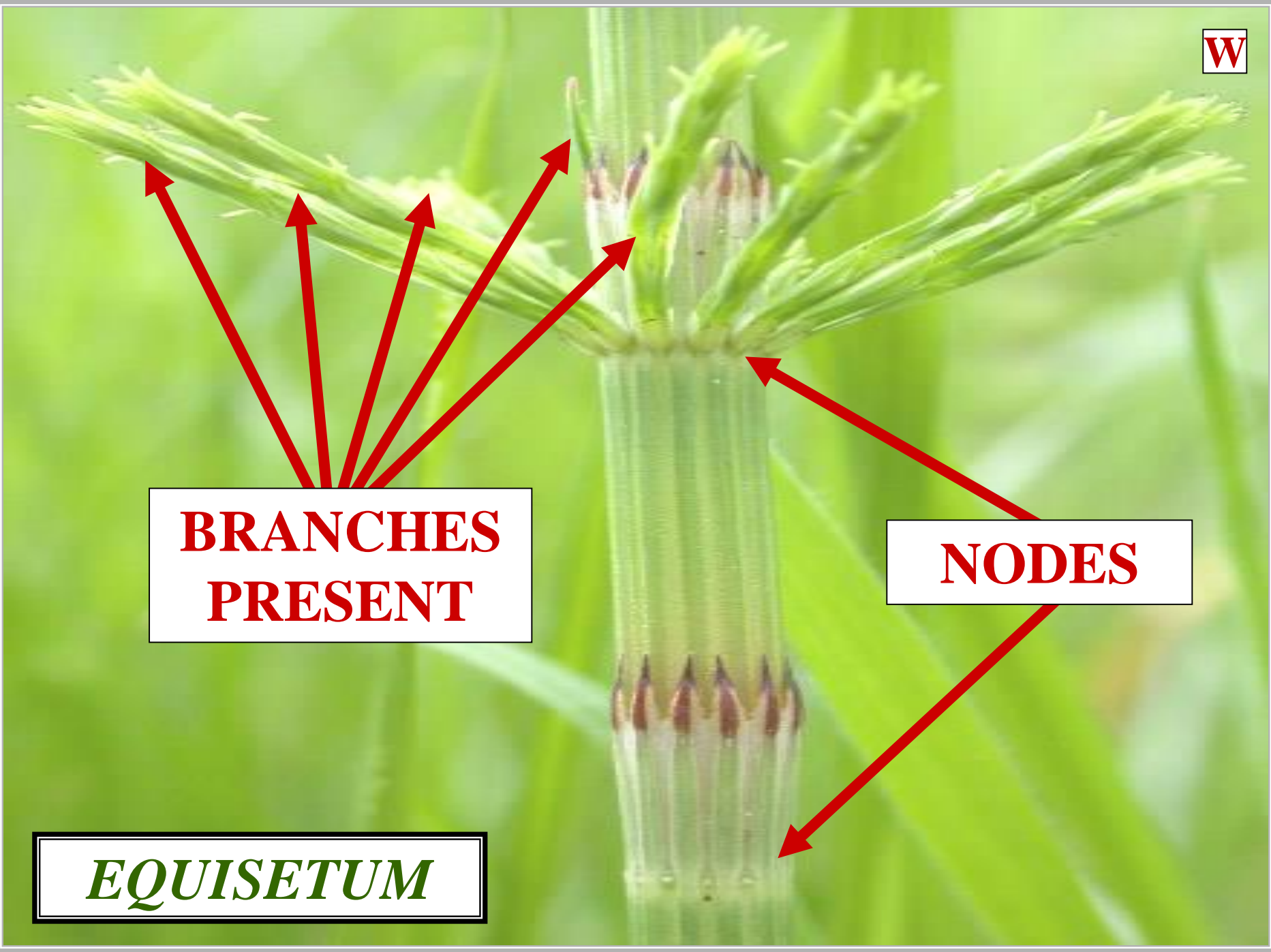
EQUISETUM



**BRANCHES
PRESENT**

NODES

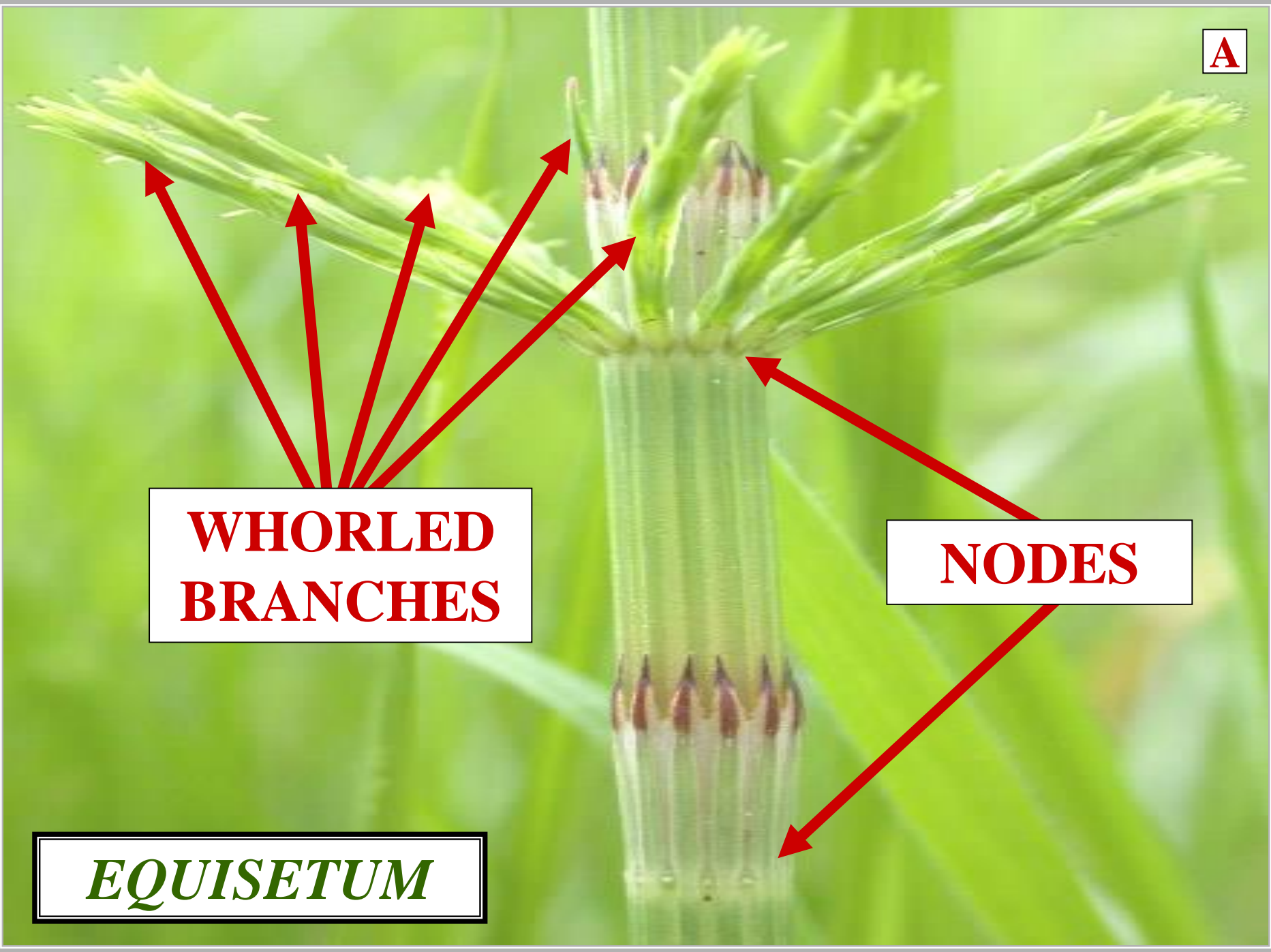
EQUISETUM



**WHORLED
BRANCHES**

NODES

EQUISETUM

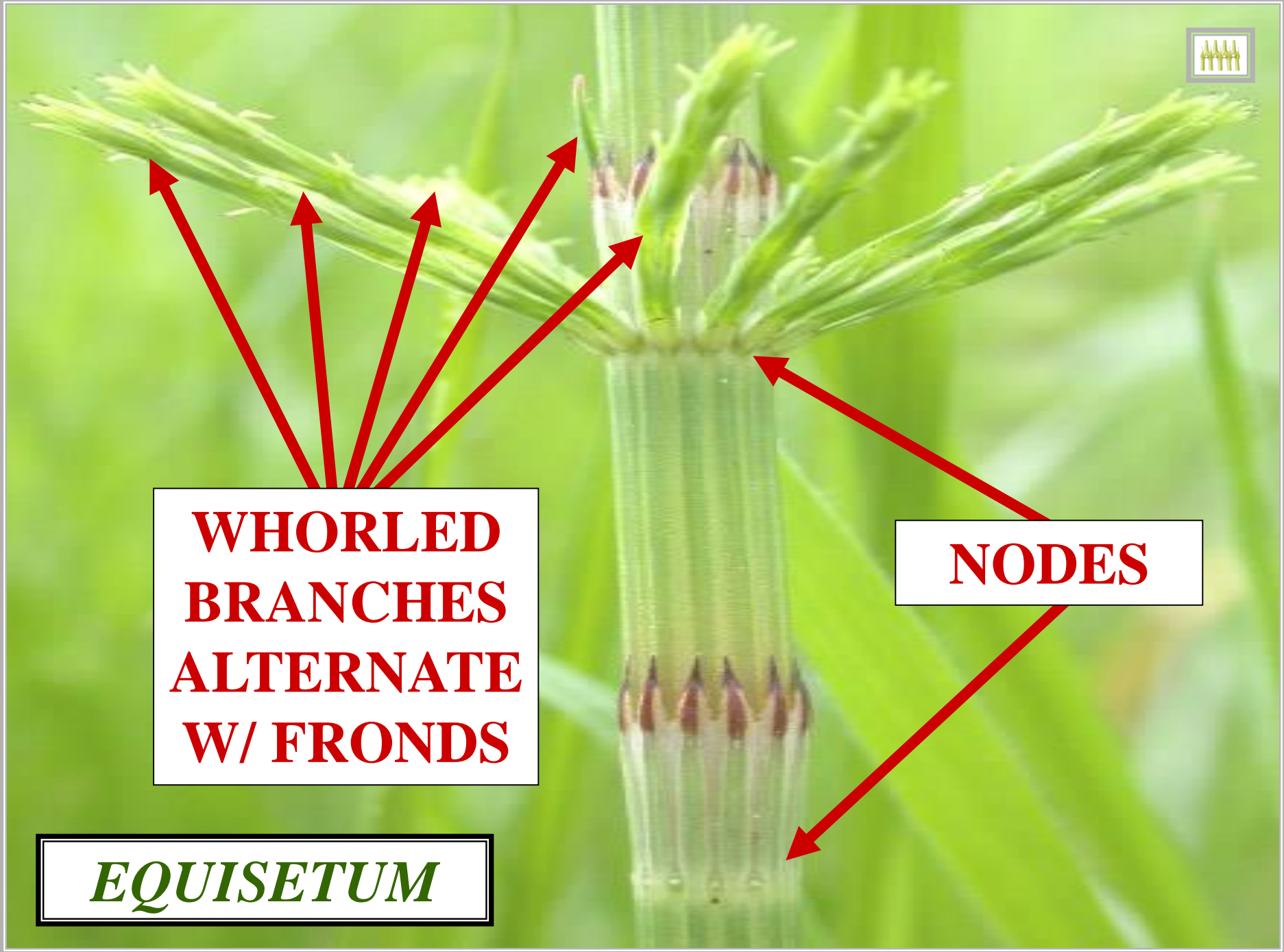




**WHORLED
BRANCHES
ALTERNATE
W/ FRONDS**

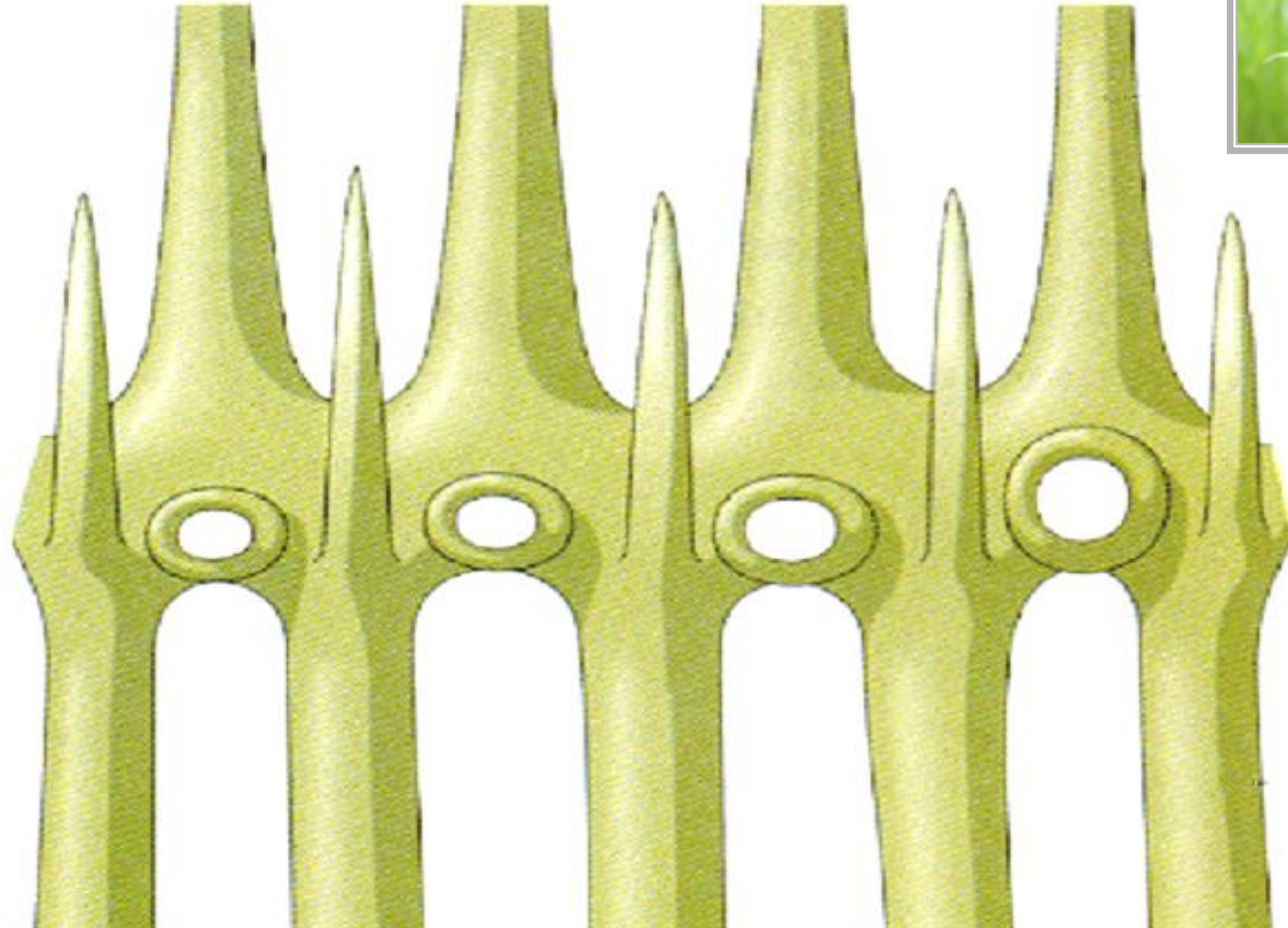
NODES

EQUISETUM





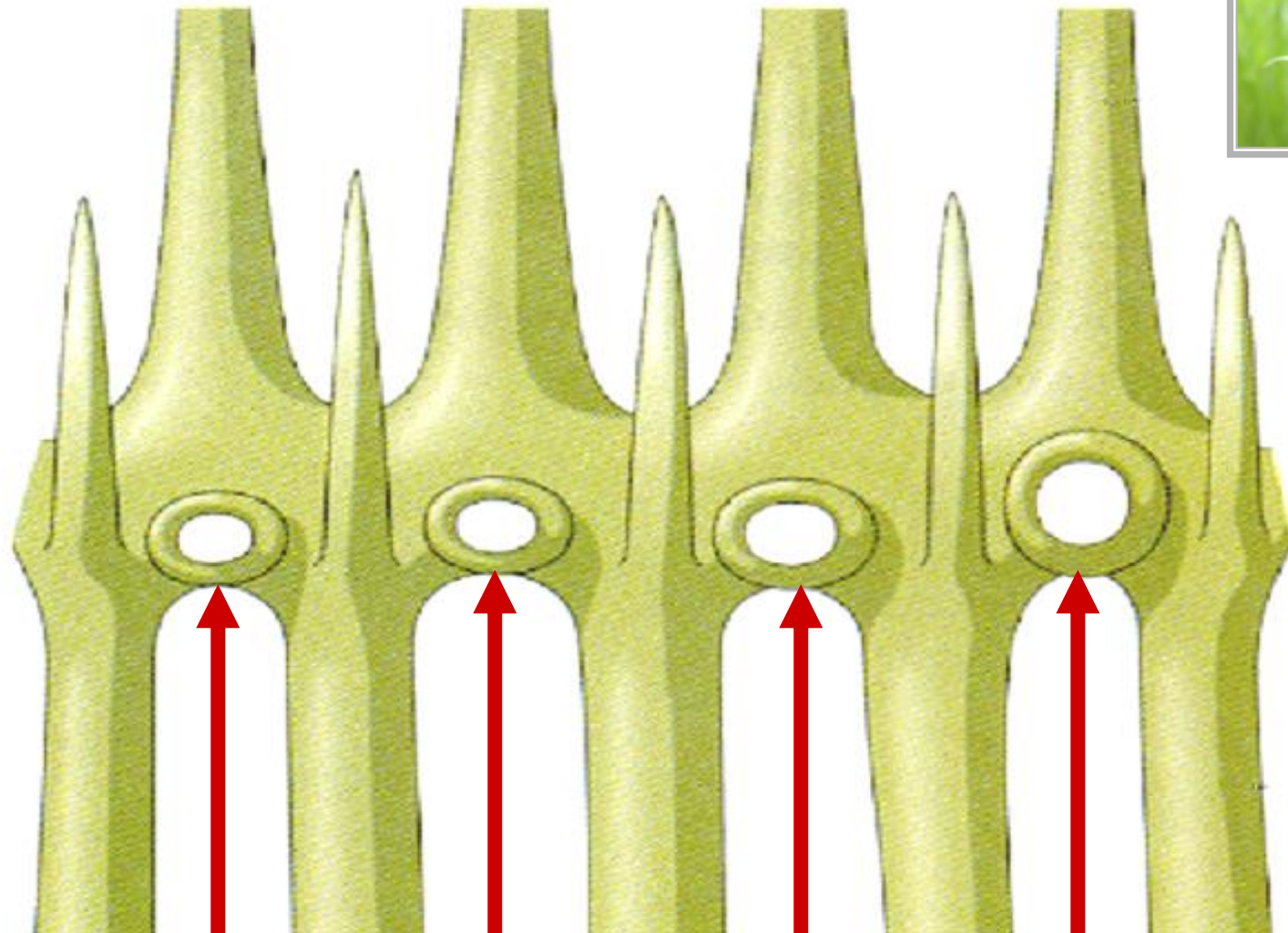
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NODE



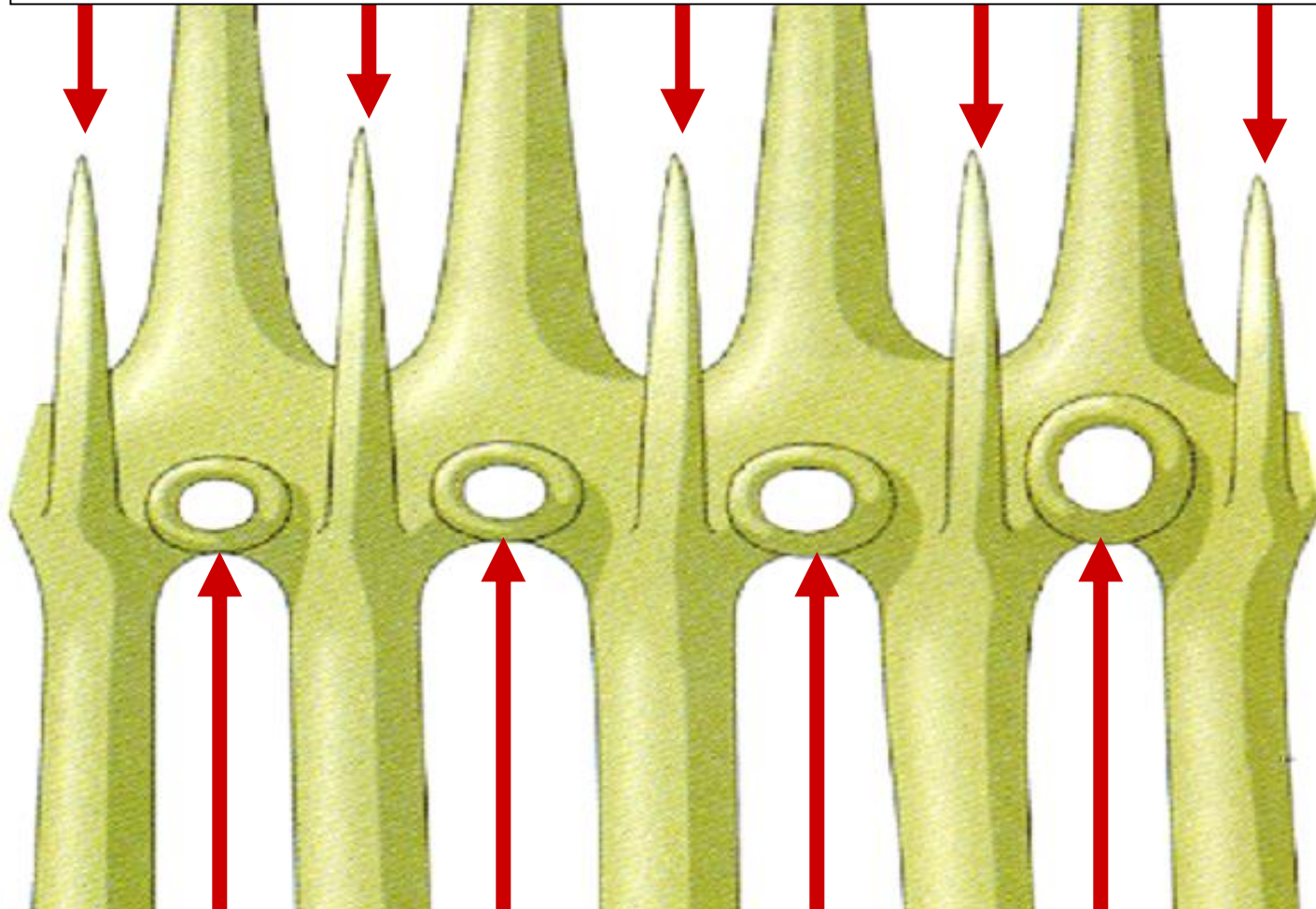
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BRANCH ORIGIN POINT



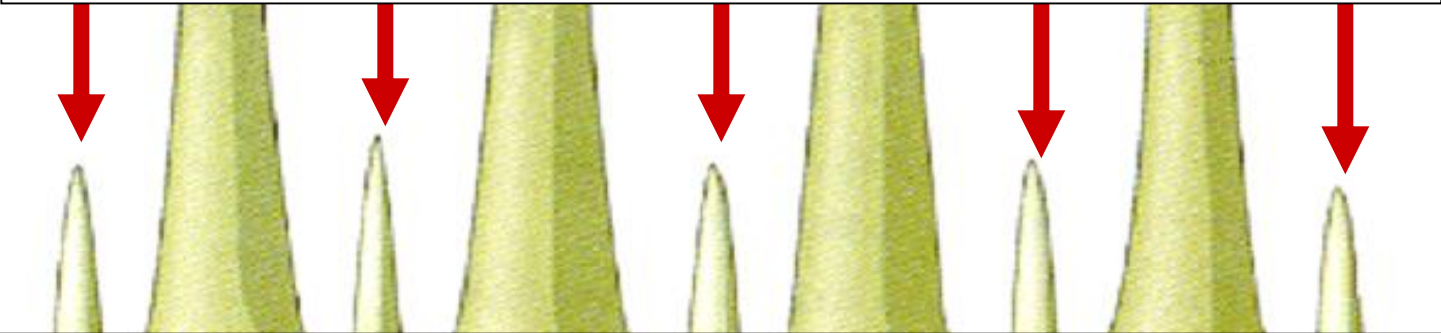
LEAF / FROND



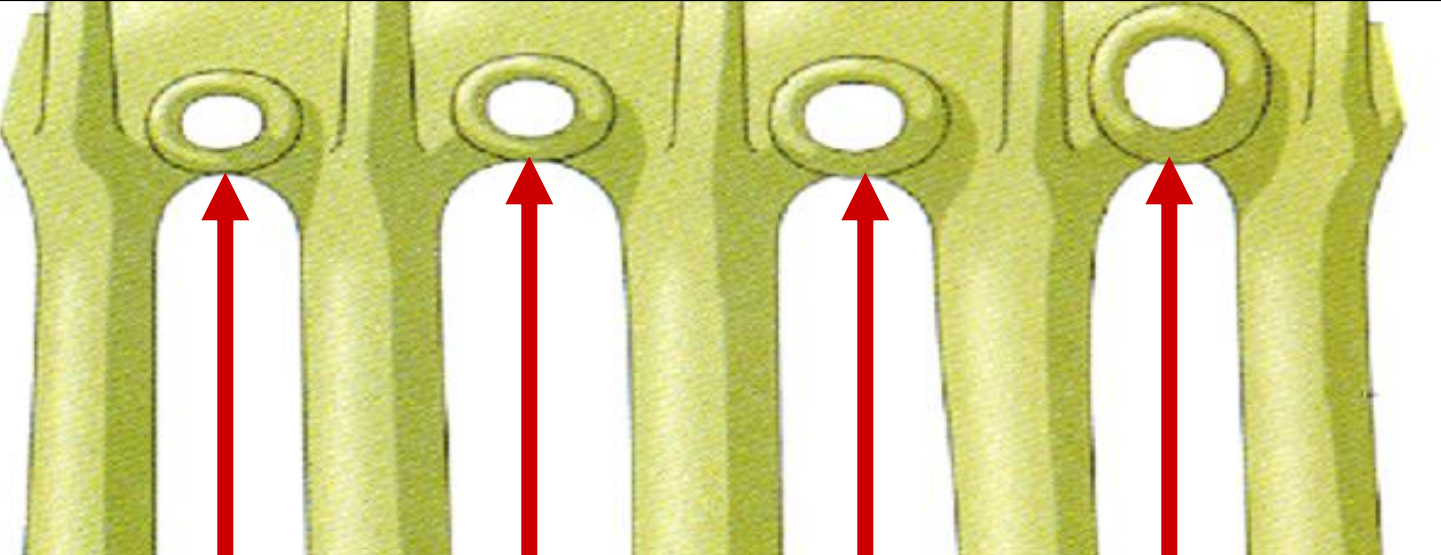
BRANCH ORIGIN POINT



LEAF / FROND



BRANCHES ALTERNATE W/ FRONDS



BRANCH ORIGIN POINT



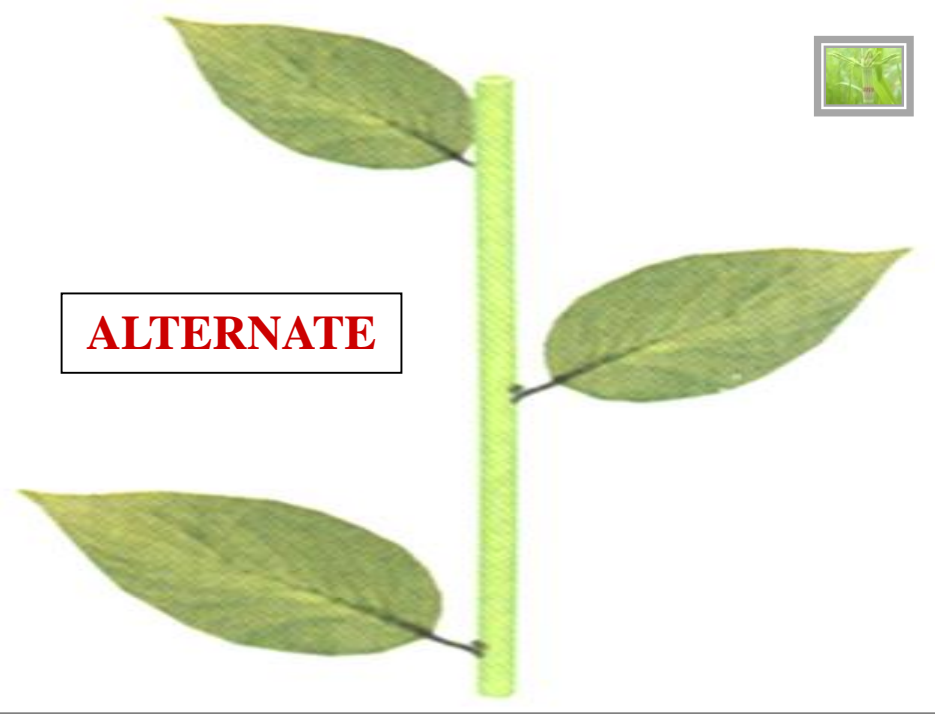
FROND



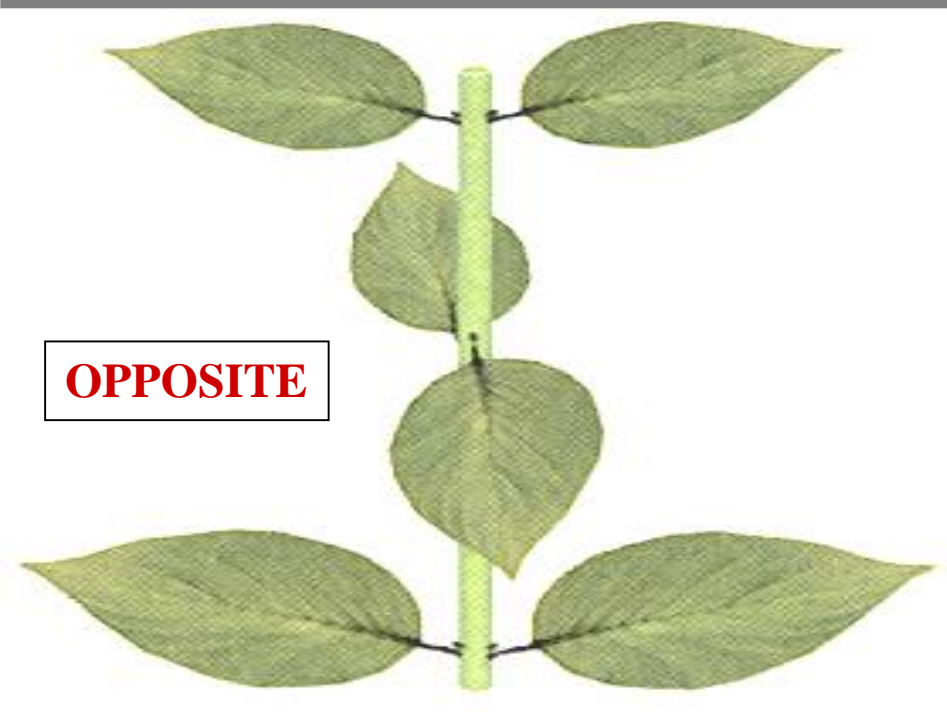
PHYLLOTAXY



EQUISETUM



ALTERNATE



OPPOSITE

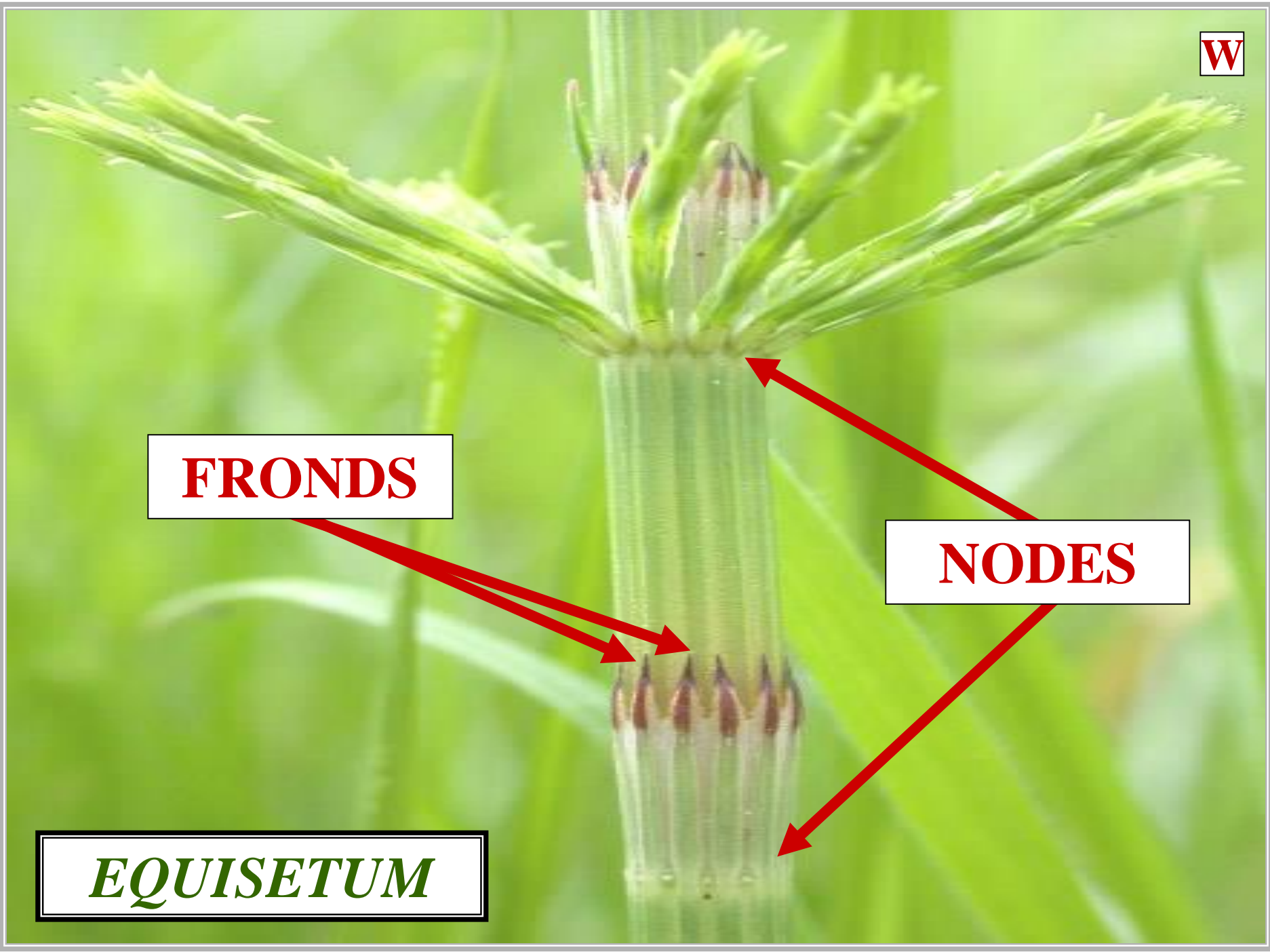


WHORLED

FRONDS

NODES

EQUISETUM

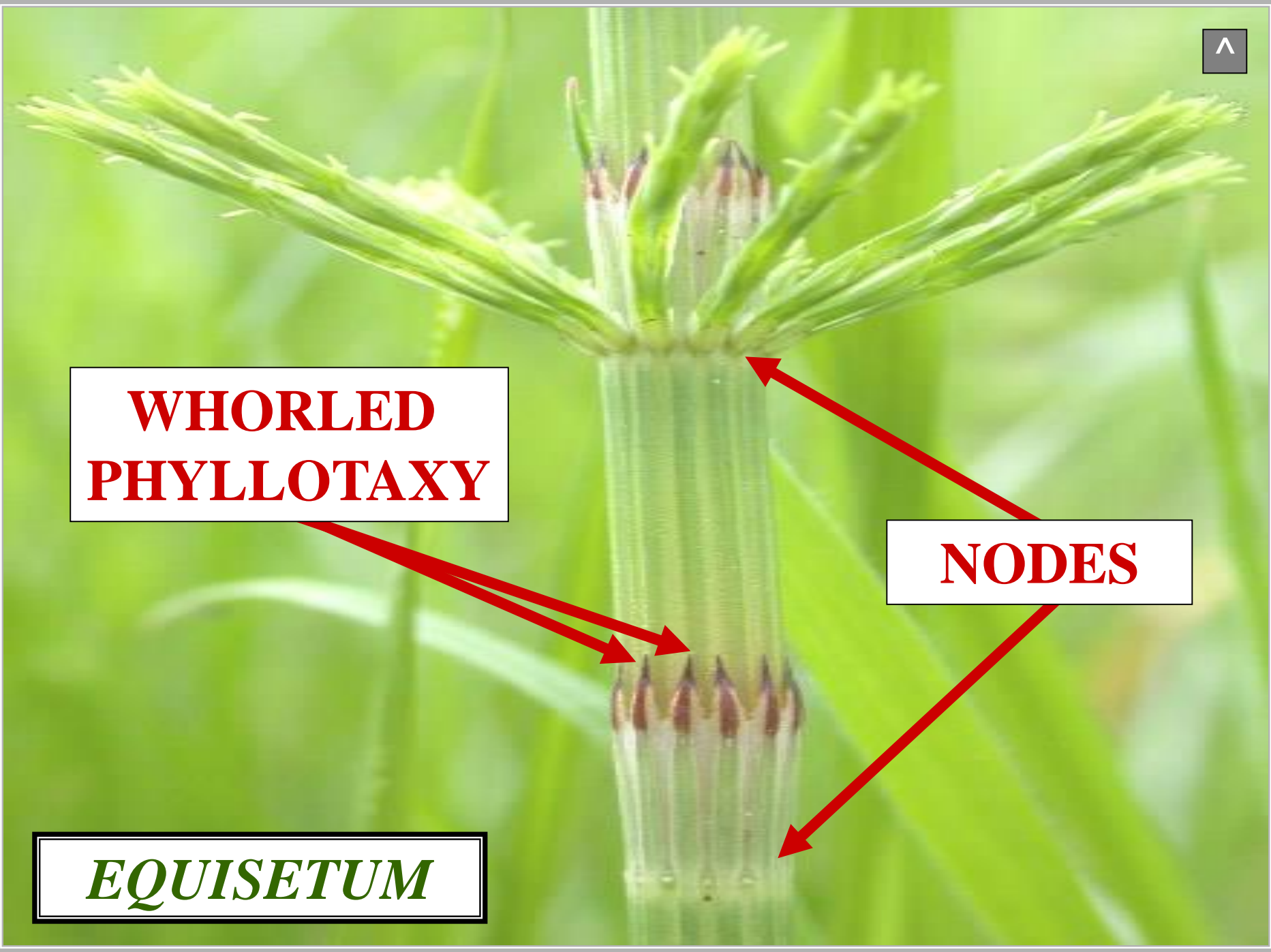




**WHORLED
PHYLLOTAXY**

NODES

EQUISETUM



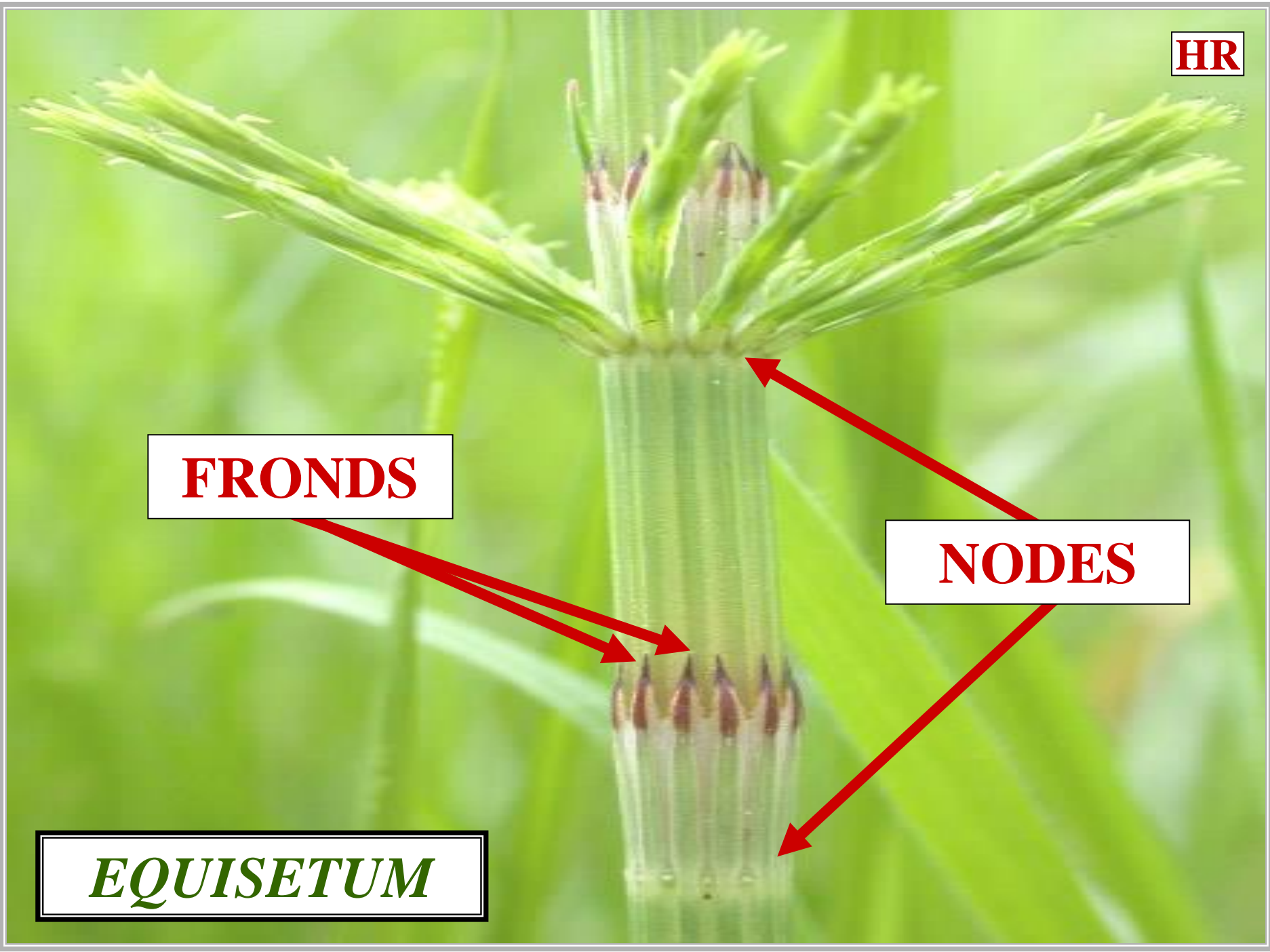


MORPHOLOGY

FRONDS

NODES

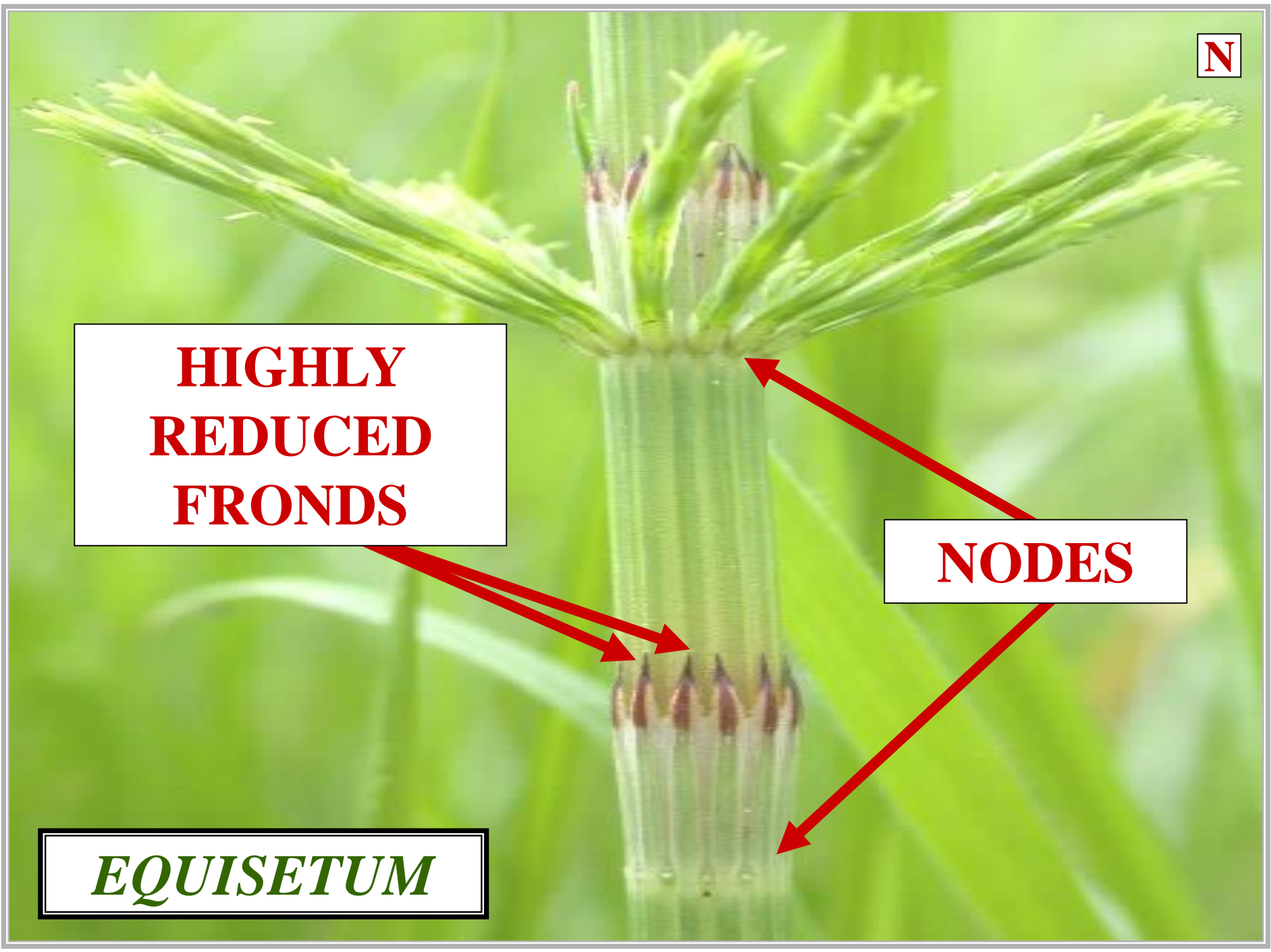
EQUISETUM



**HIGHLY
REDUCED
FRONDS**

NODES

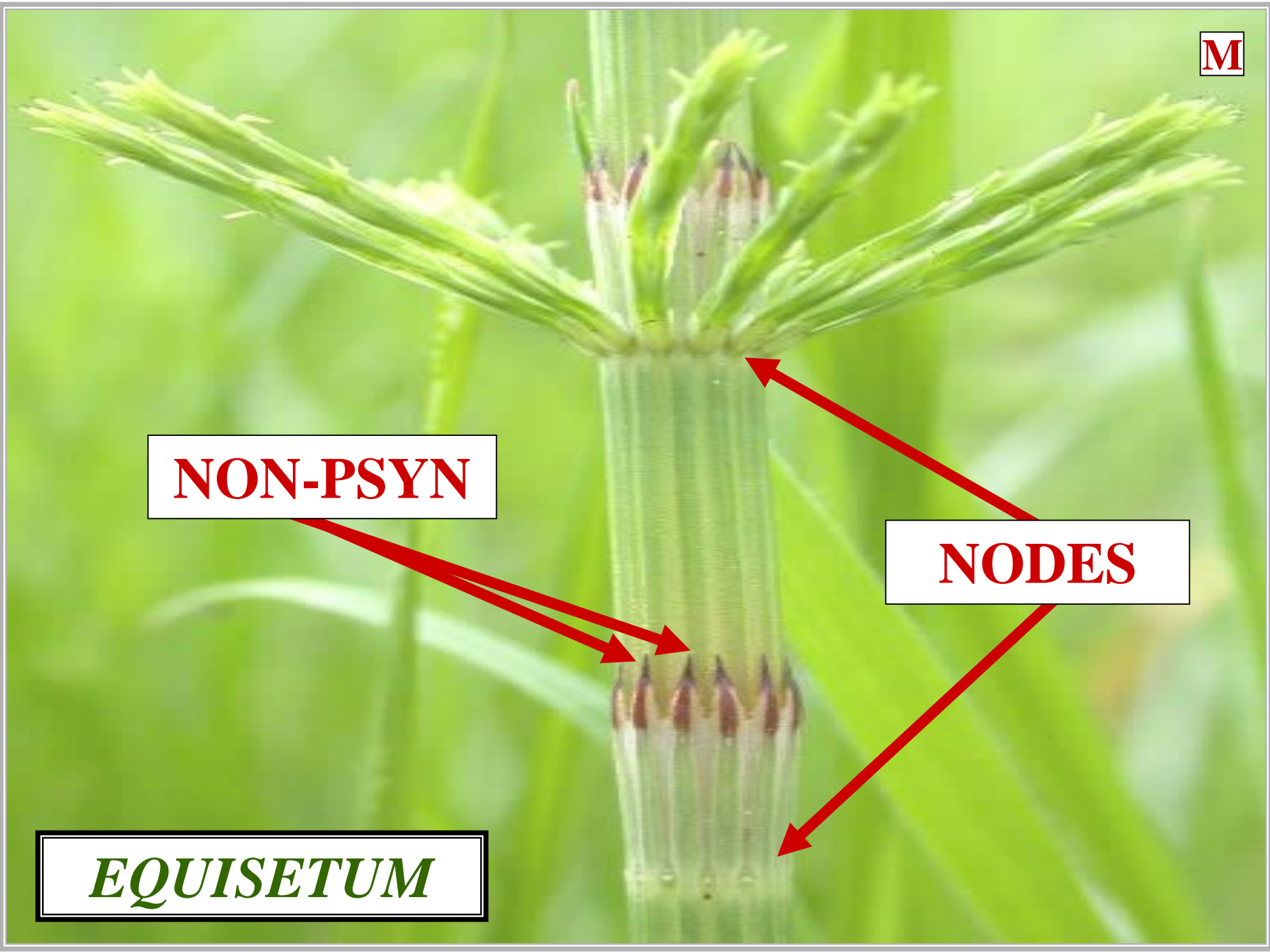
EQUISETUM



NON-PSYN

NODES

EQUISETUM

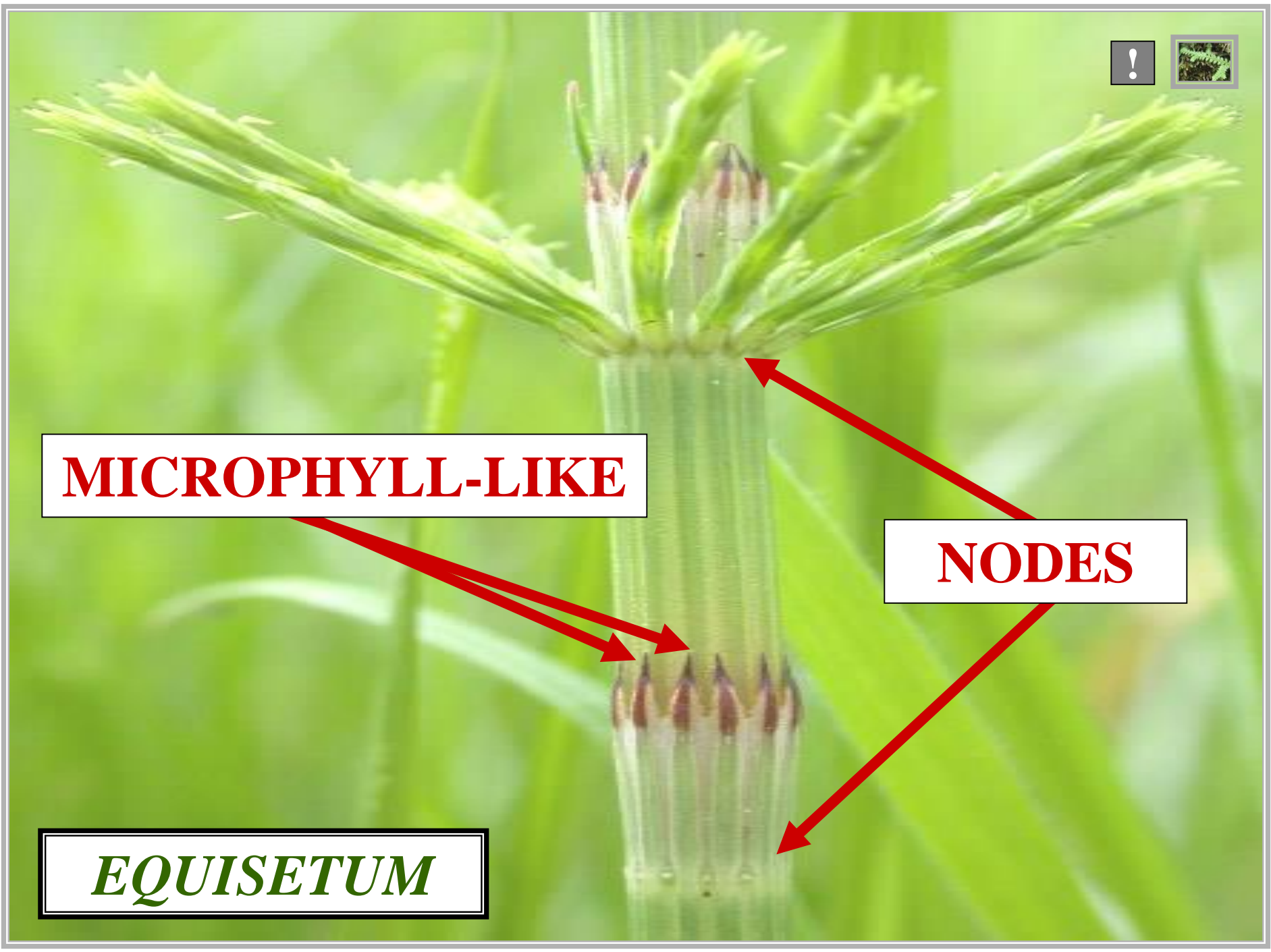




MICROPHYLL-LIKE

NODES

EQUISETUM

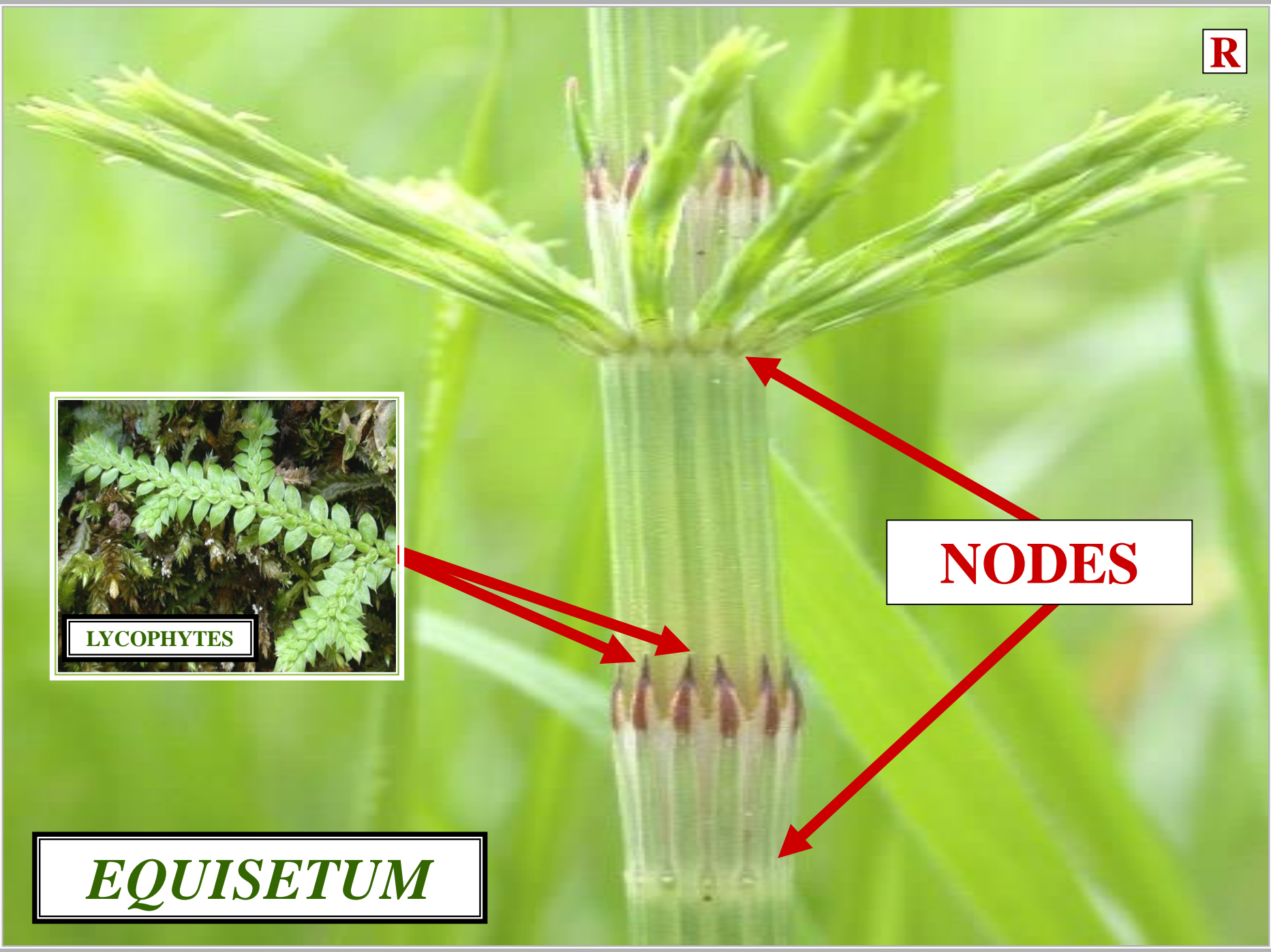




LYCOPHYTES

EQUISETUM

NODES

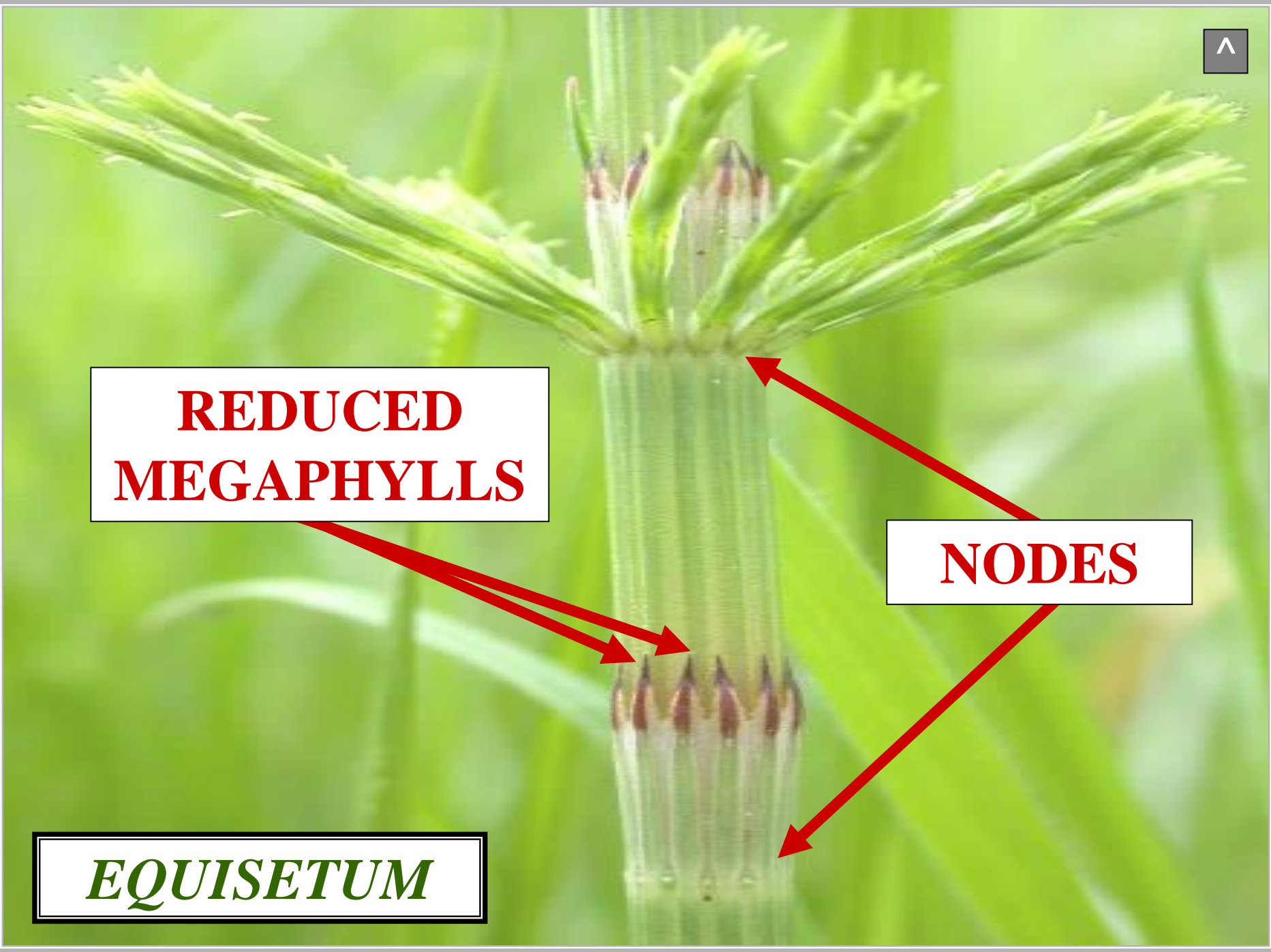




**REDUCED
MEGAPHYLLS**

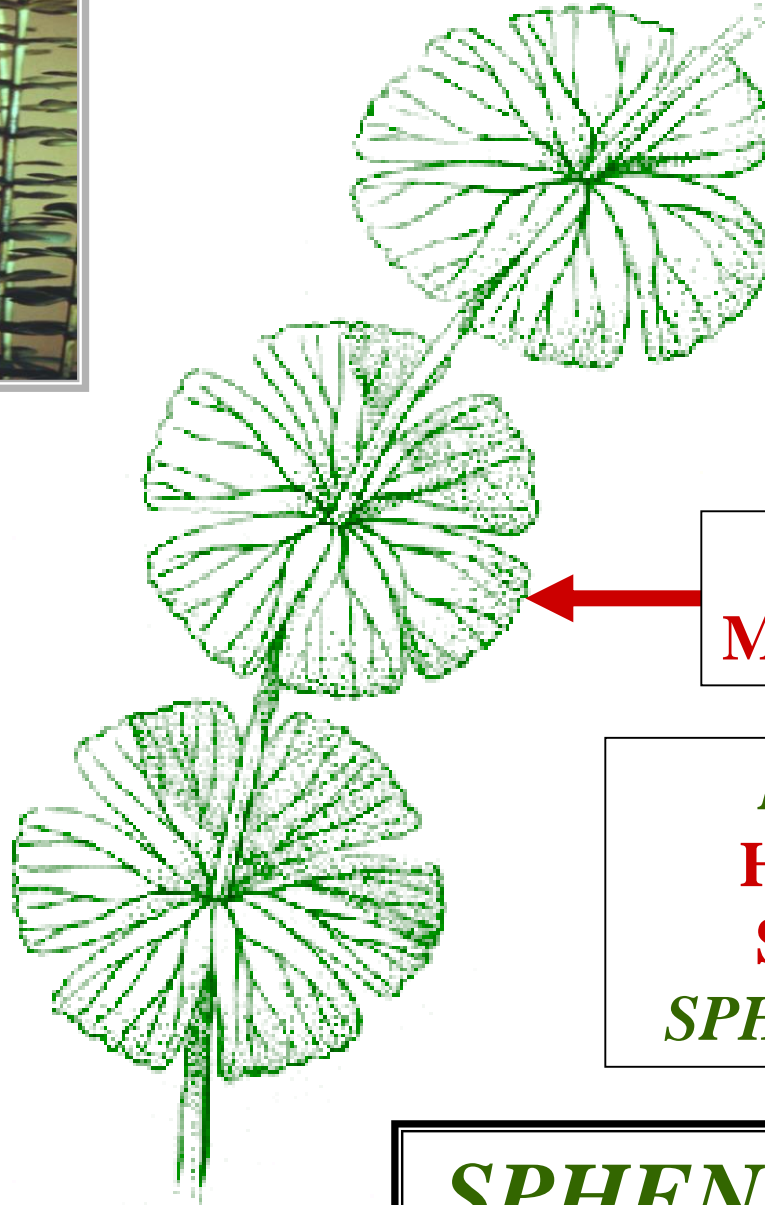
NODES

EQUISETUM





FROND EVOLUTION

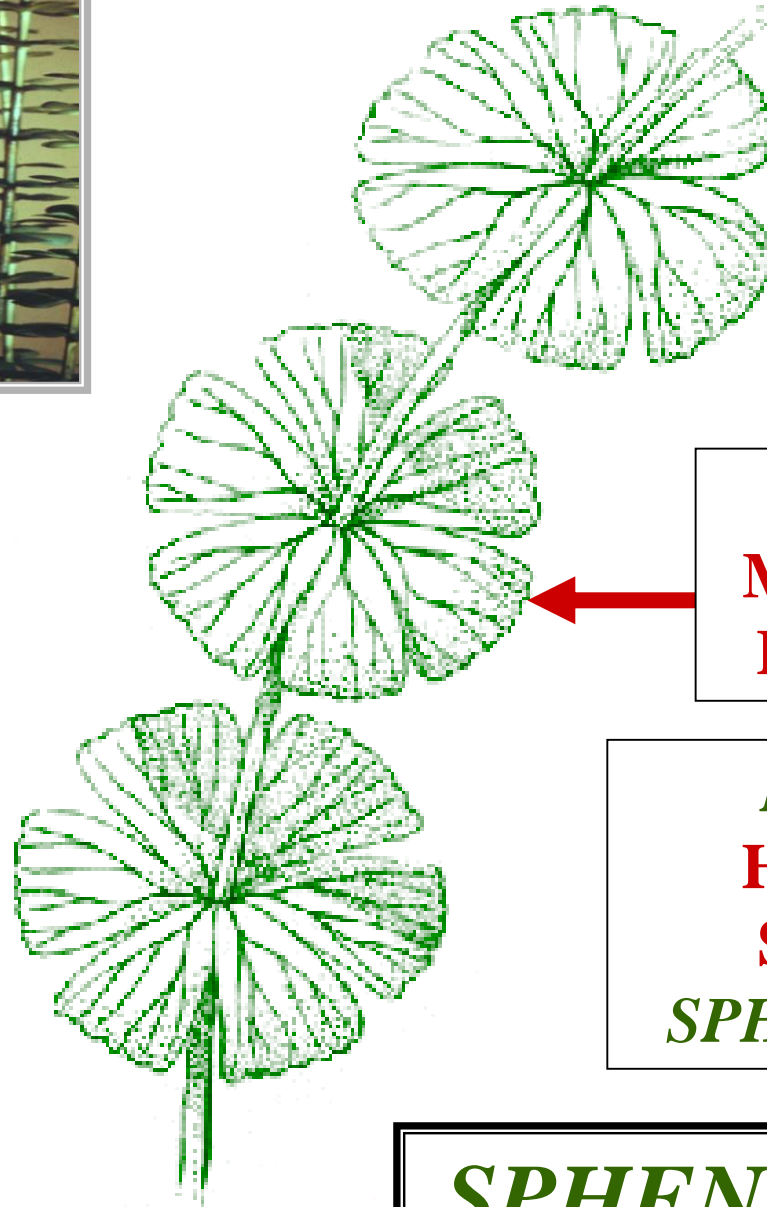


**WHORLED
MEGAPHYLLS**

*EQUISETUM
HAD FRONDS
SIMILAR TO
SPHENOPHYLLUM*

SPHENOPHYLLUM





**VIA
MEGAPHYLL
REDUCTION**

***EQUISETUM
HAD FRONDS
SIMILAR TO
SPHENOPHYLLUM***



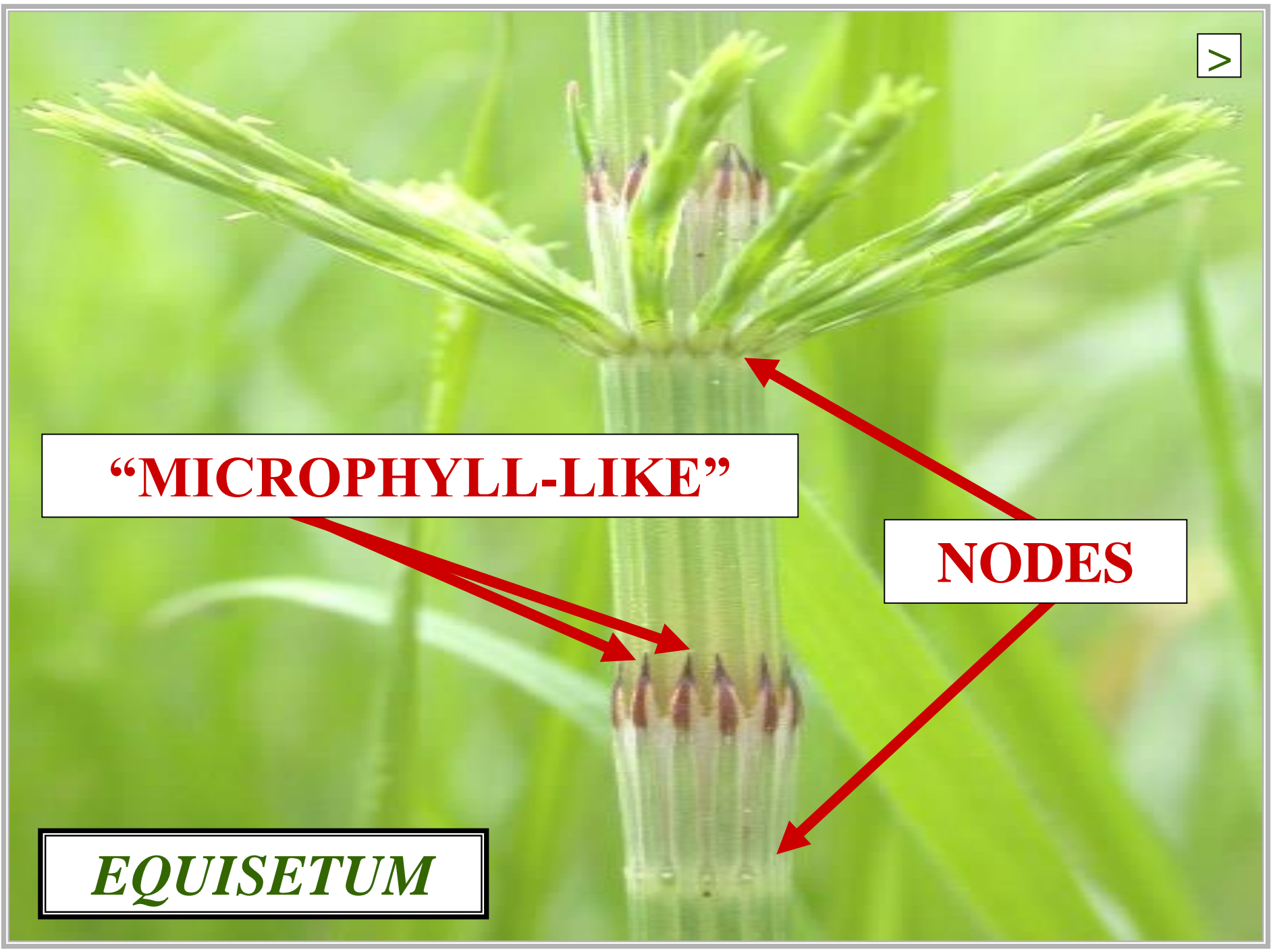
SPHENOPHYLLUM



“MICROPHYLL-LIKE”

NODES

EQUISETUM

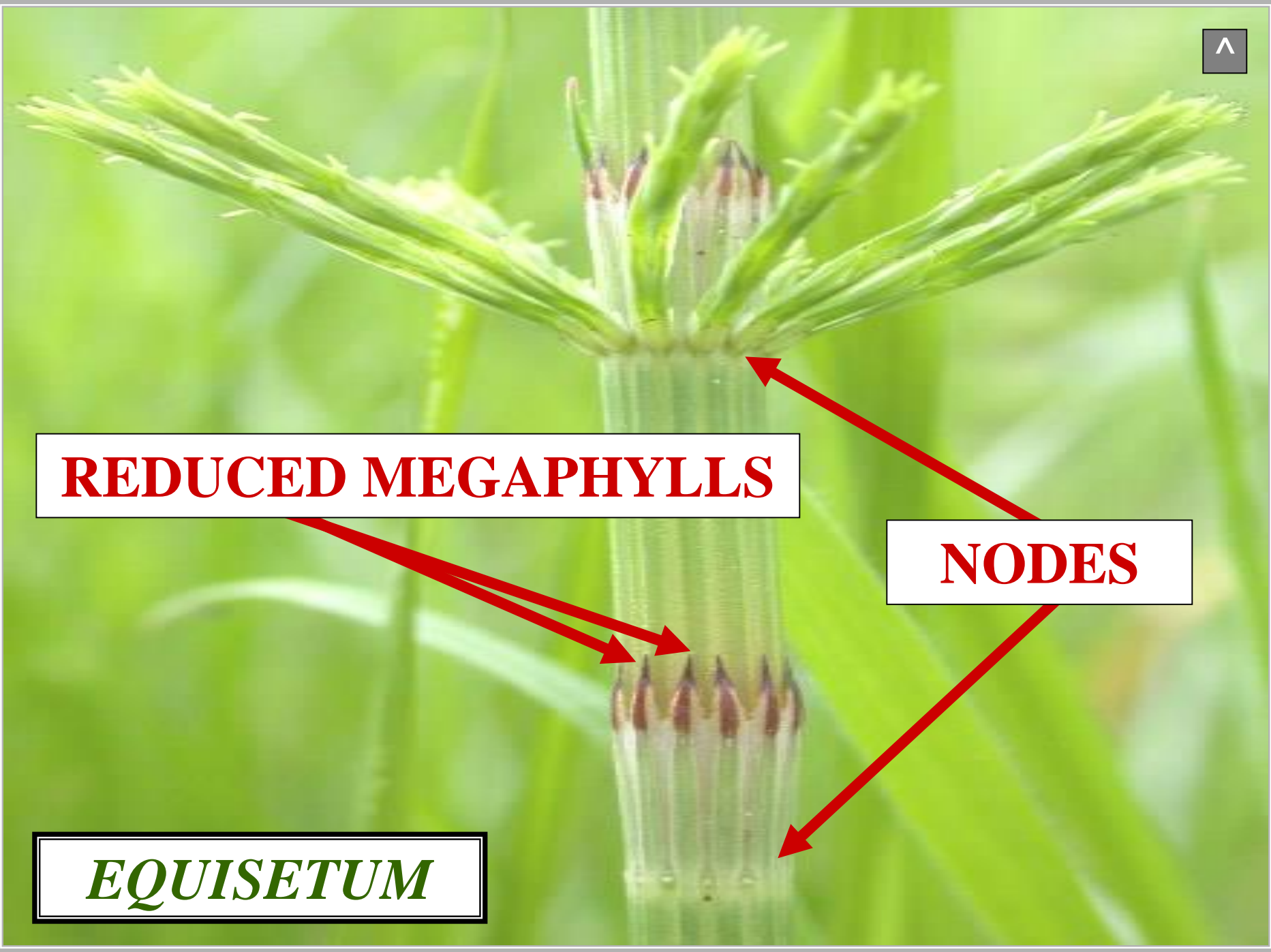




REDUCED MEGAPHYLLS

NODES

EQUISETUM



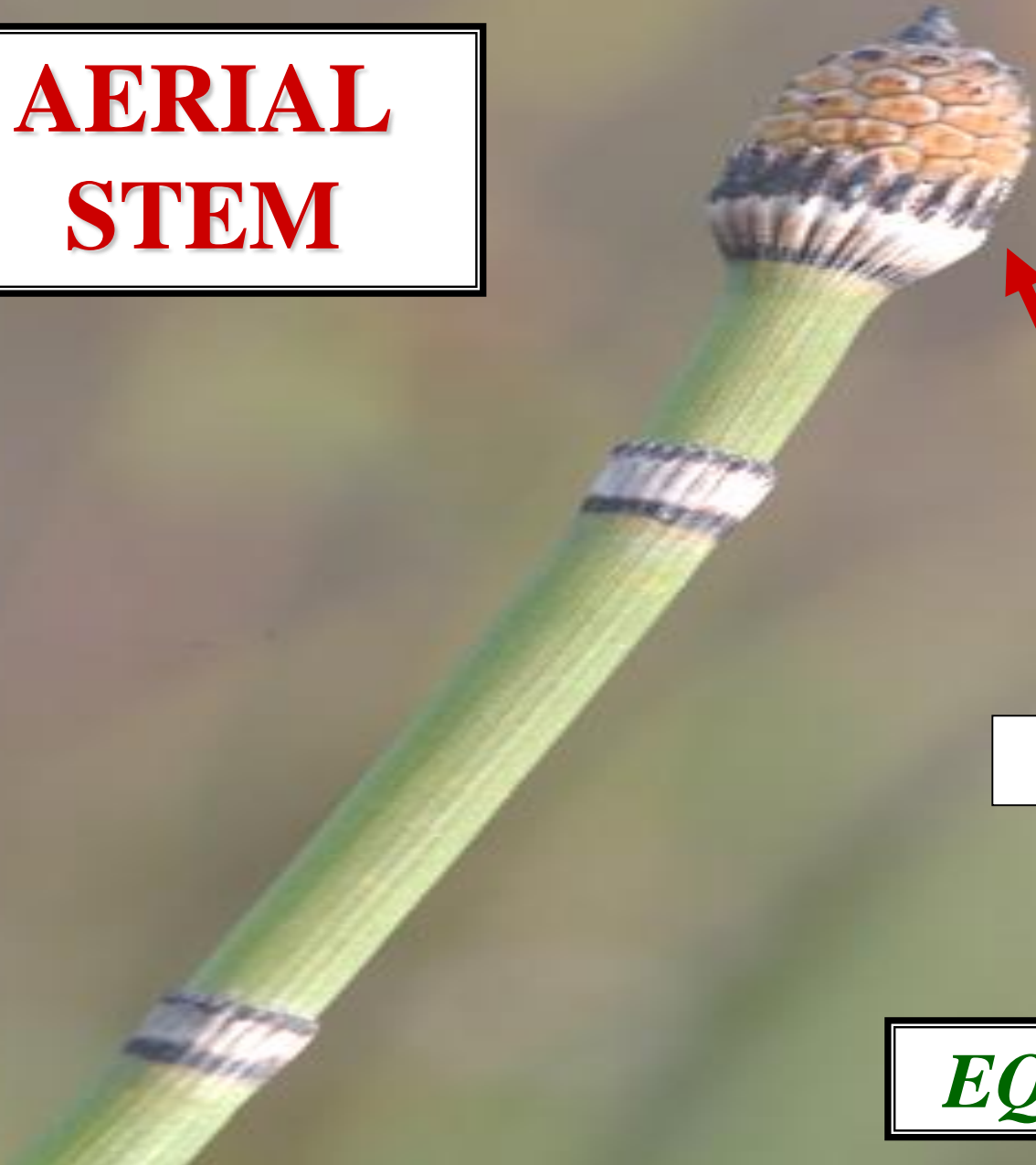


STROBILUS

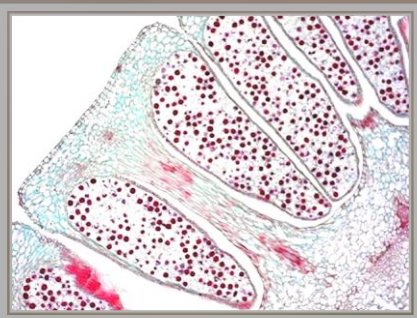
**AERIAL
STEM**

STROBILUS

EQUISETUM

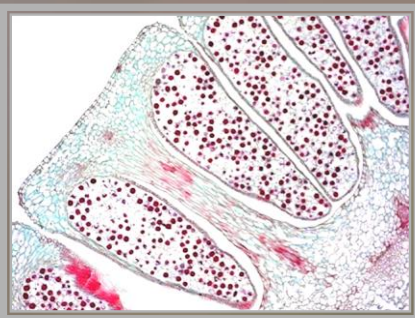


S



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EQUISETUM



SPORANGIOPHORE

EQUISETUM

SPORANGIOPHORE

SPORANGIOPHORE



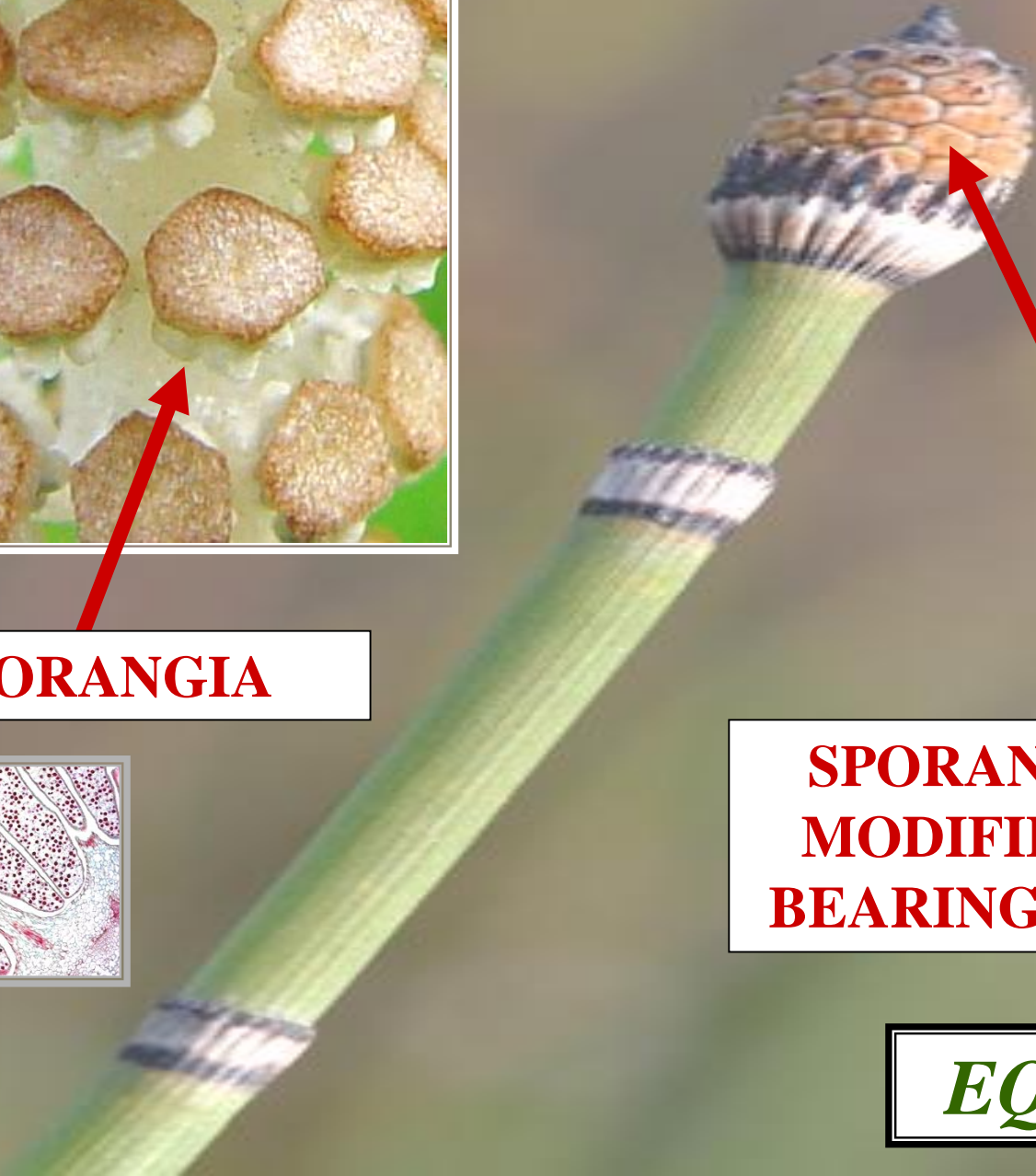
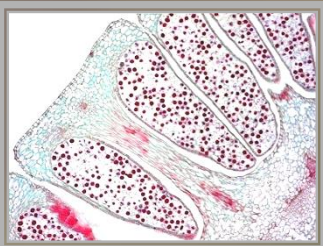
EQISETUM
SPORANGIOPHORE

MODIFIED
BRANCH/STEM
BEARING
SPORANGIA

EQISETUM
SPORANGIOPHORE



SPORANGIA

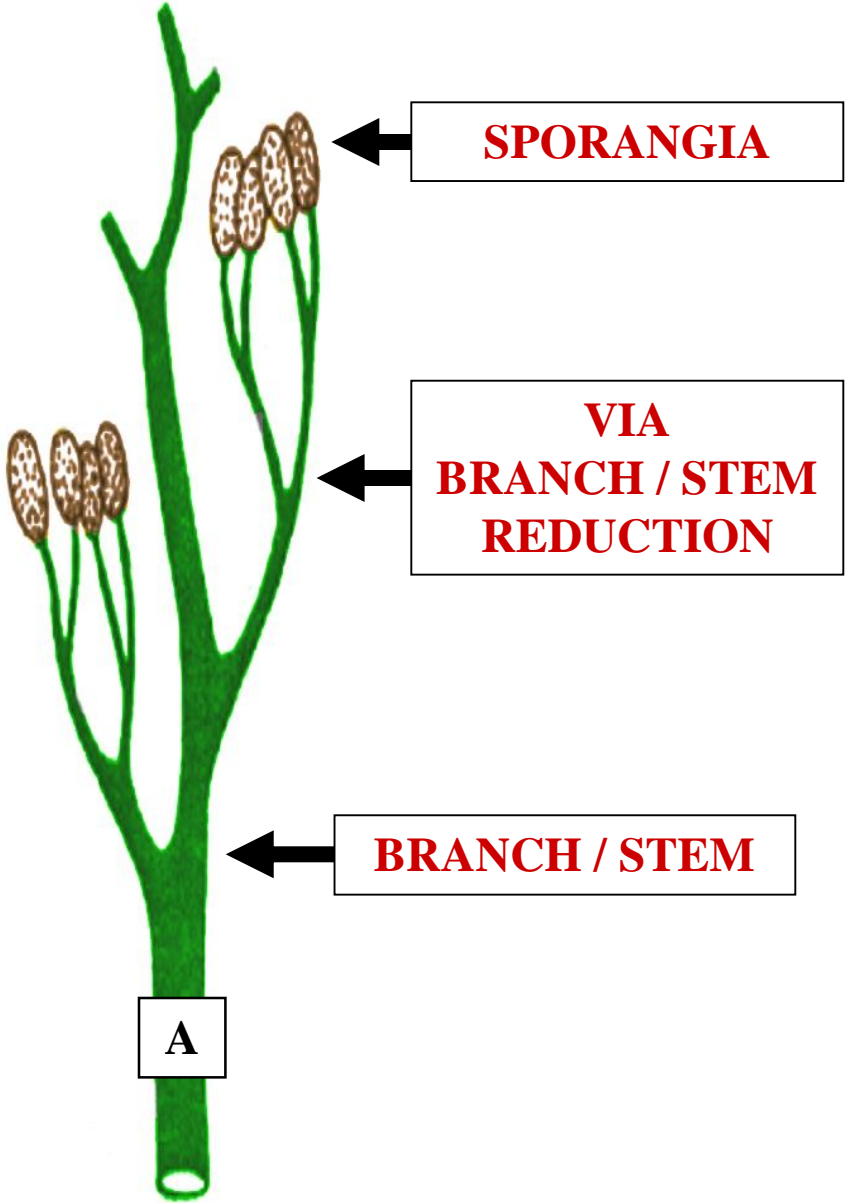


**SPORANGIOPHORE
MODIFIED BRANCH
BEARING SPORANGIA**

EQUISETUM



SPORANGIOPHORE EVOLUTION



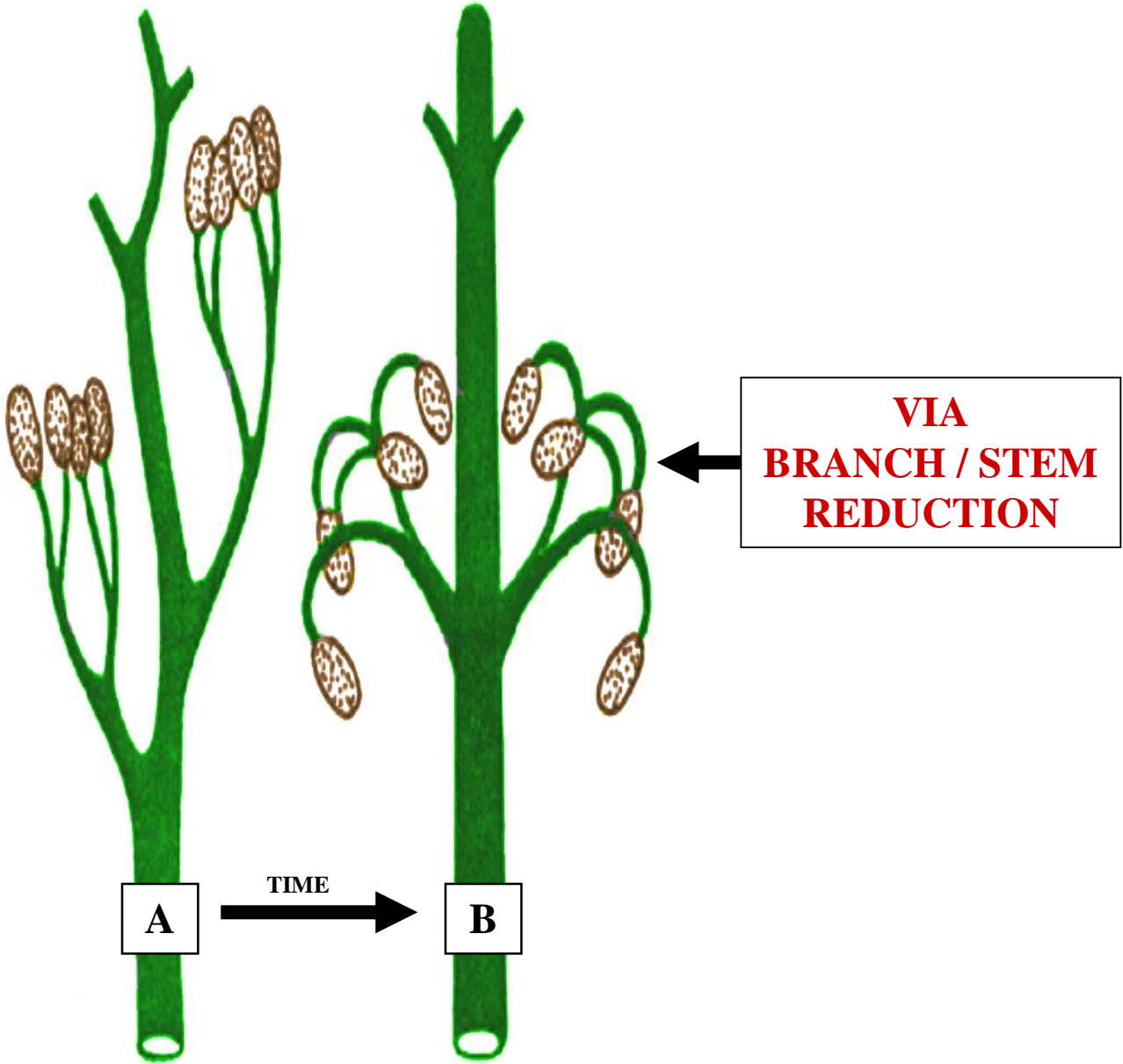
SPORANGIA

**VIA
BRANCH / STEM
REDUCTION**

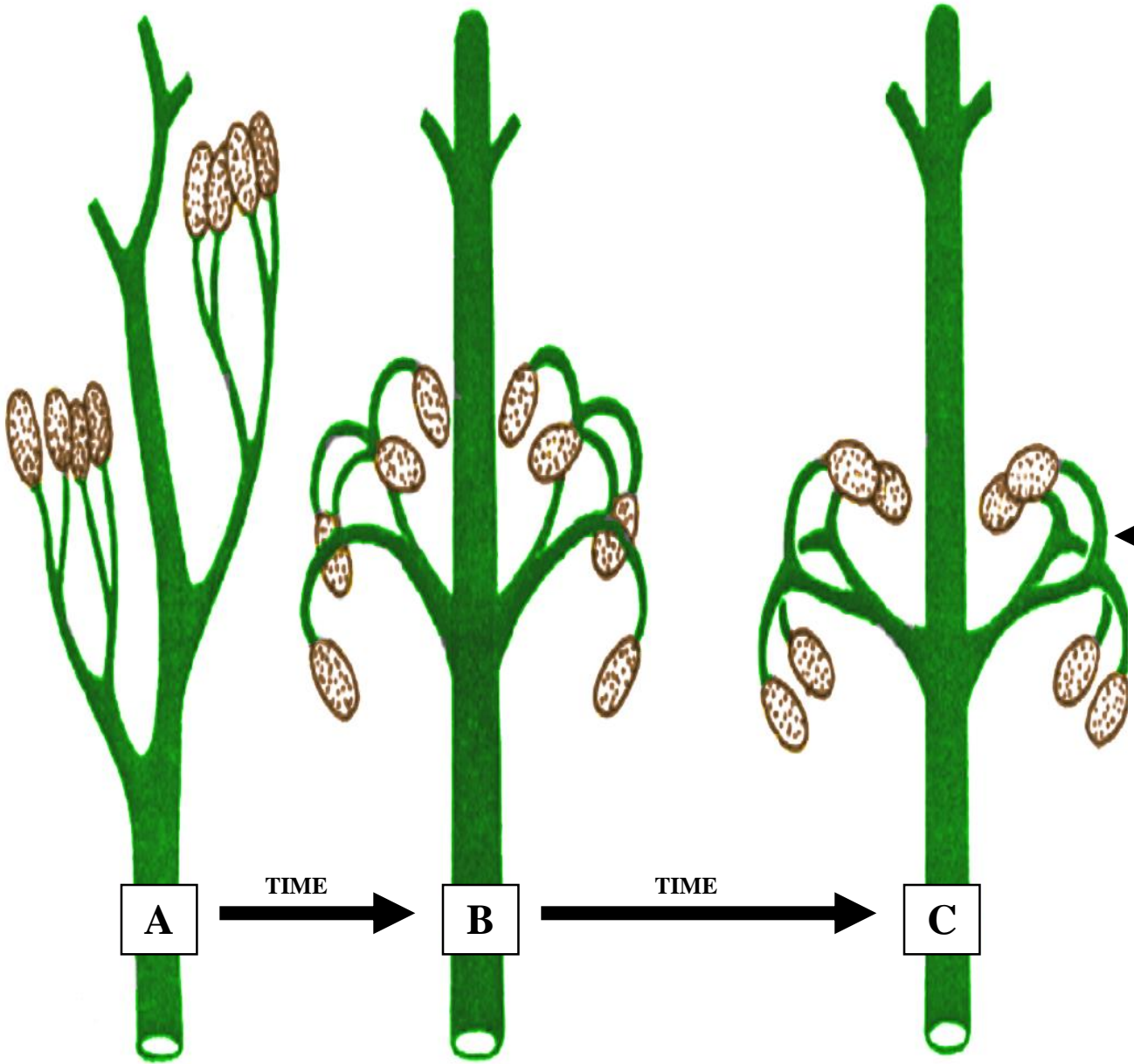
BRANCH / STEM

A

EVOLVED VIA BRANCH/STEM REDUCTION

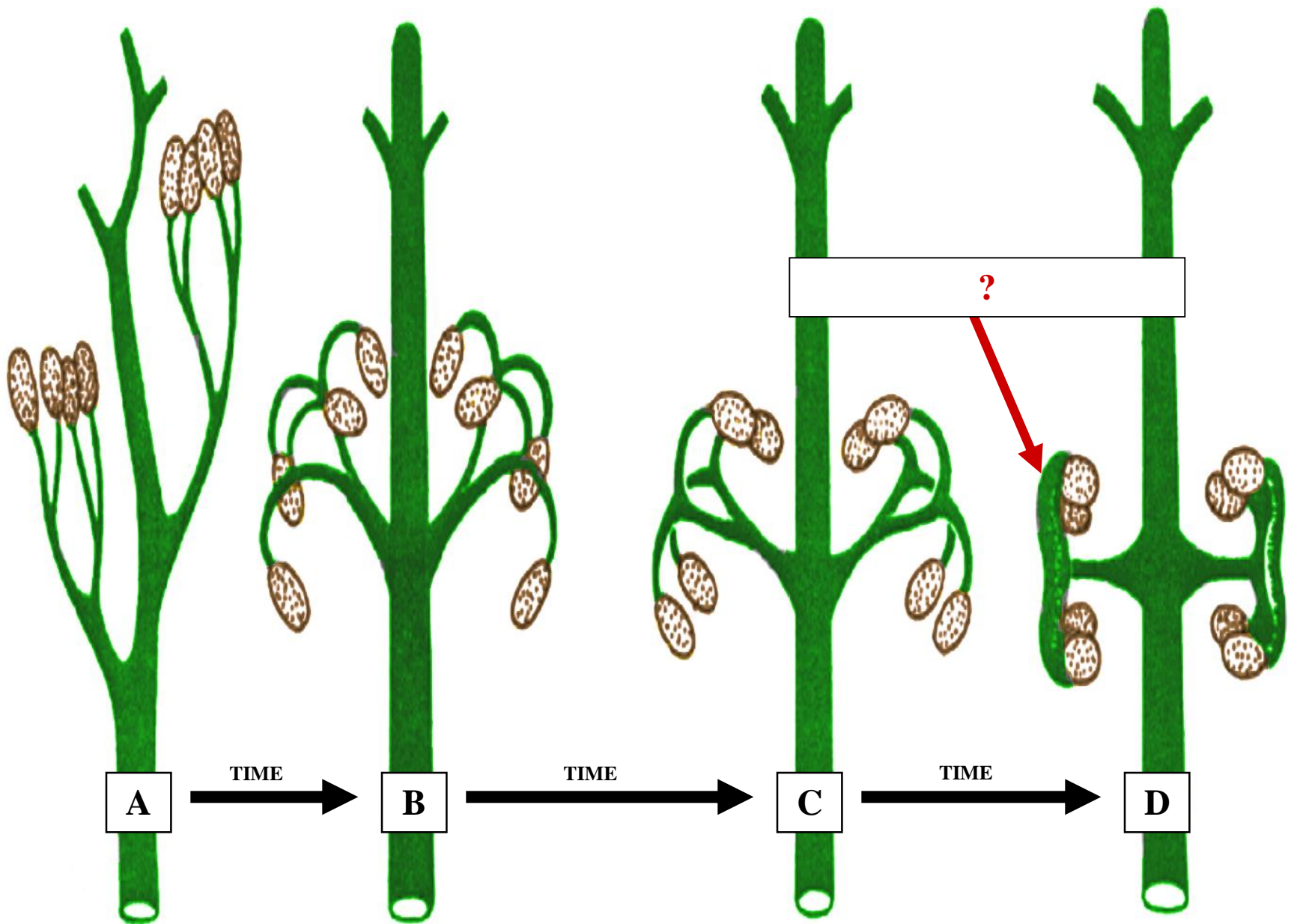


EVOLVED VIA BRANCH/STEM REDUCTION

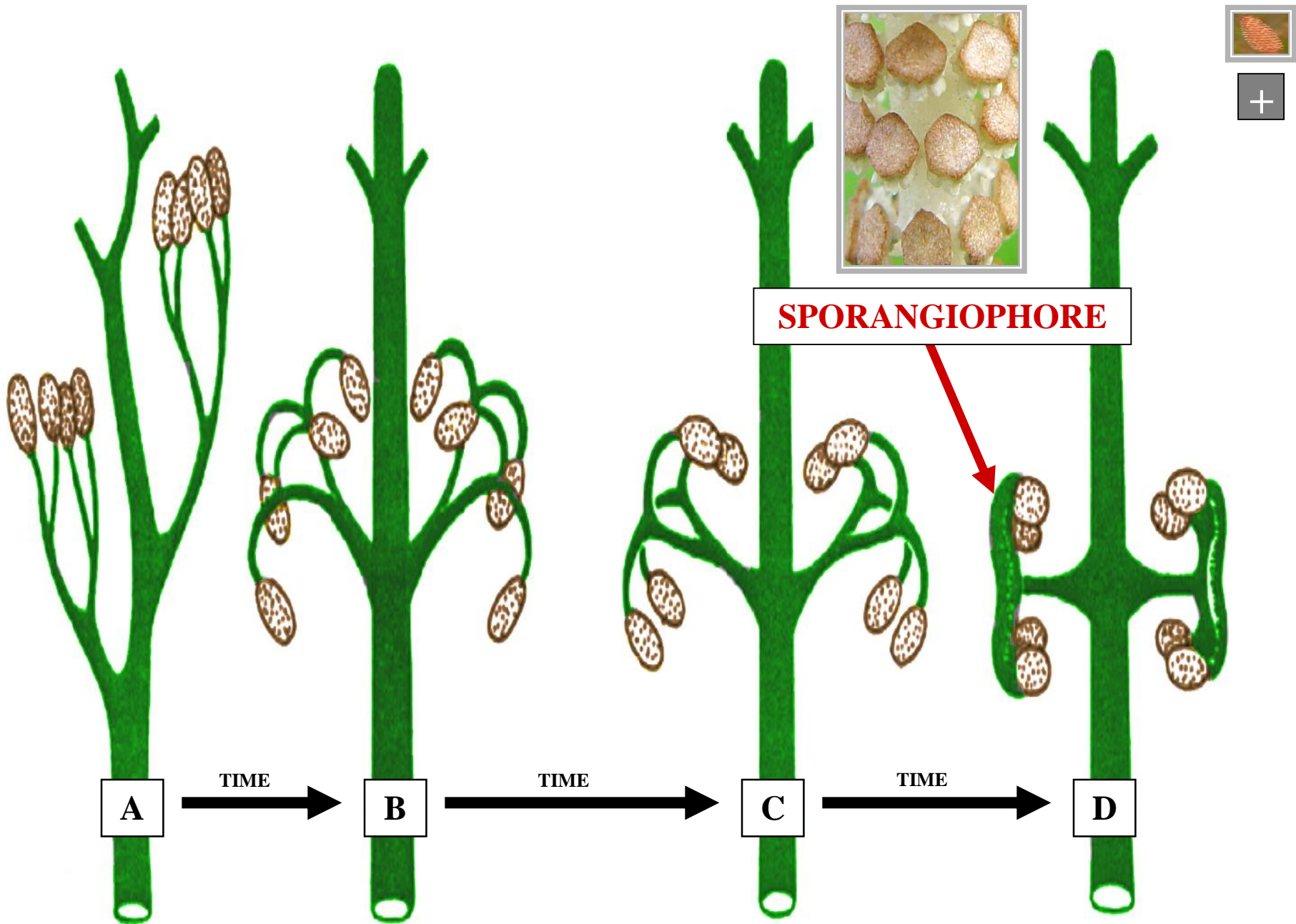


**VIA
BRANCH / STEM
REDUCTION**

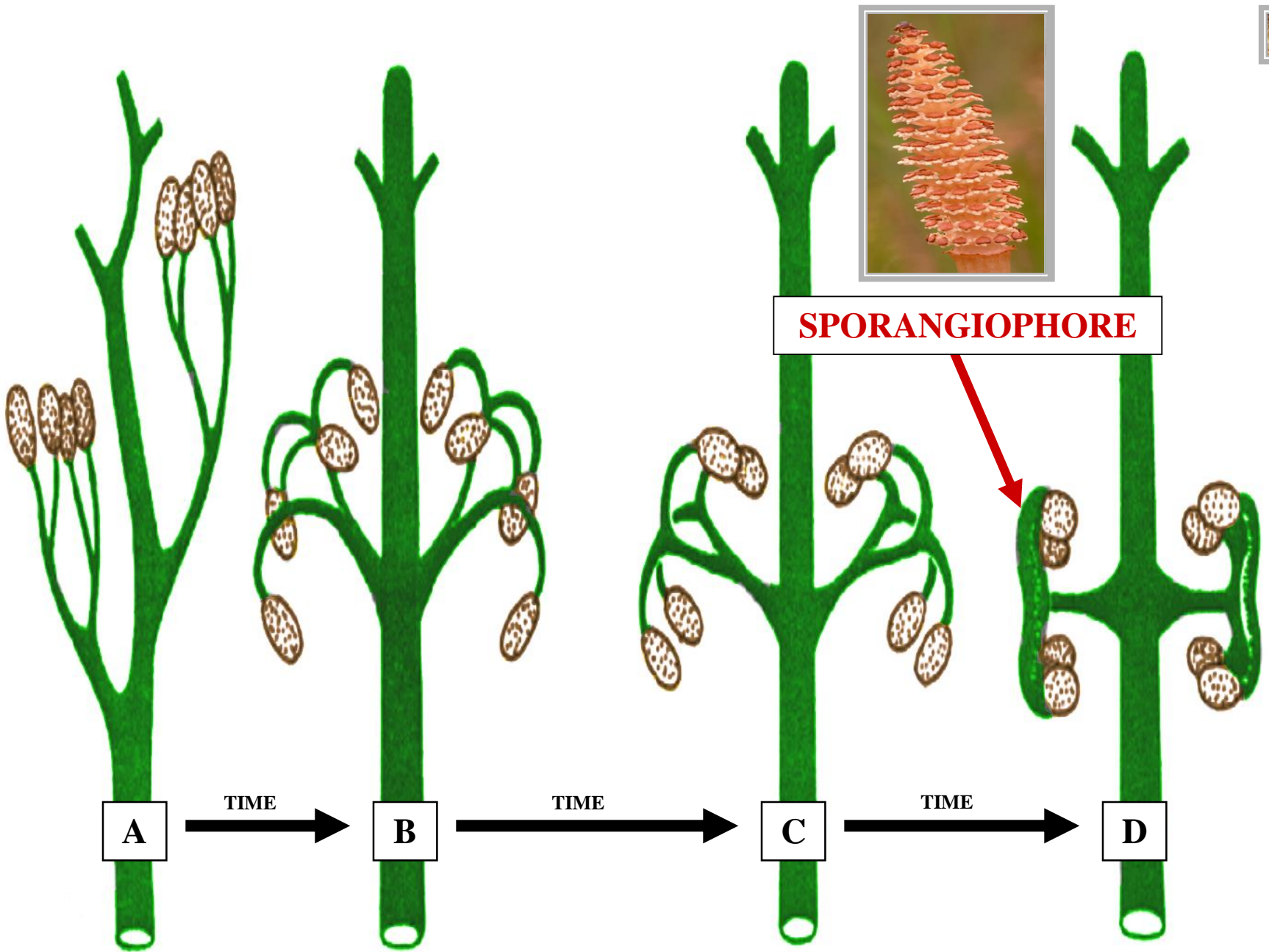
EVOLVED VIA BRANCH/STEM REDUCTION



EVOLVED VIA BRANCH/STEM REDUCTION



EVOLVED VIA BRANCH/STEM REDUCTION



SPORANGIOPHORE

A

TIME →

B

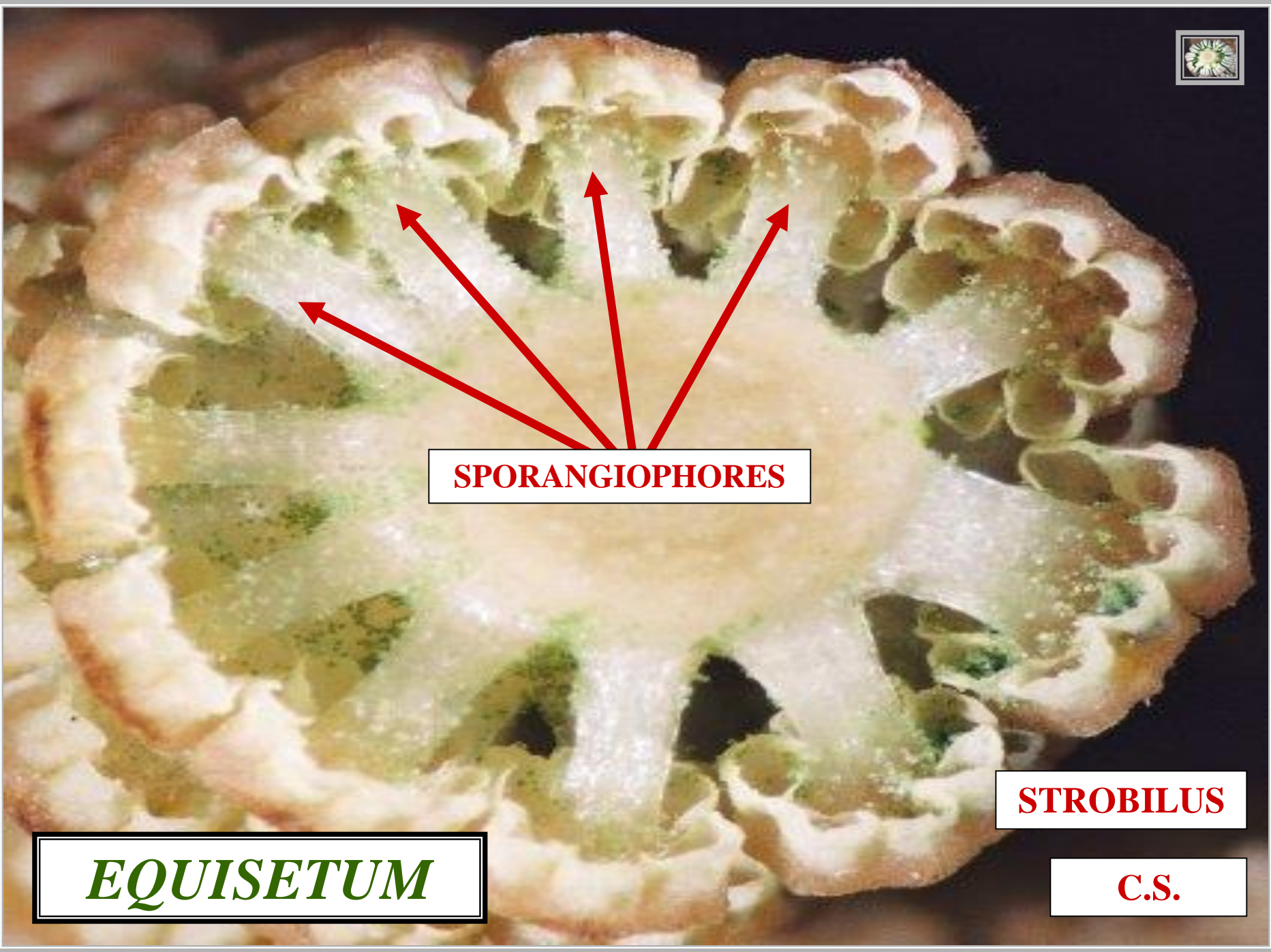
TIME →

C

TIME →

D

EVOLVED VIA BRANCH/STEM REDUCTION

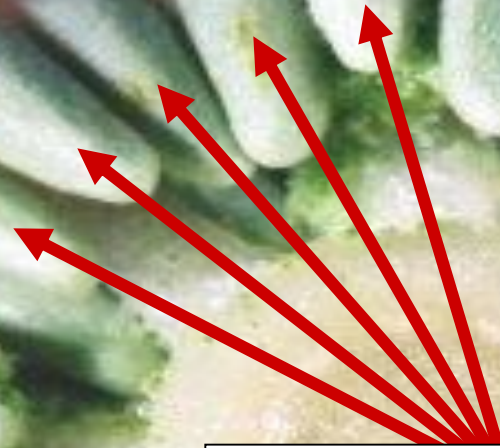


SPORANGIOPHORES

STROBILUS

EQUISETUM

C.S.

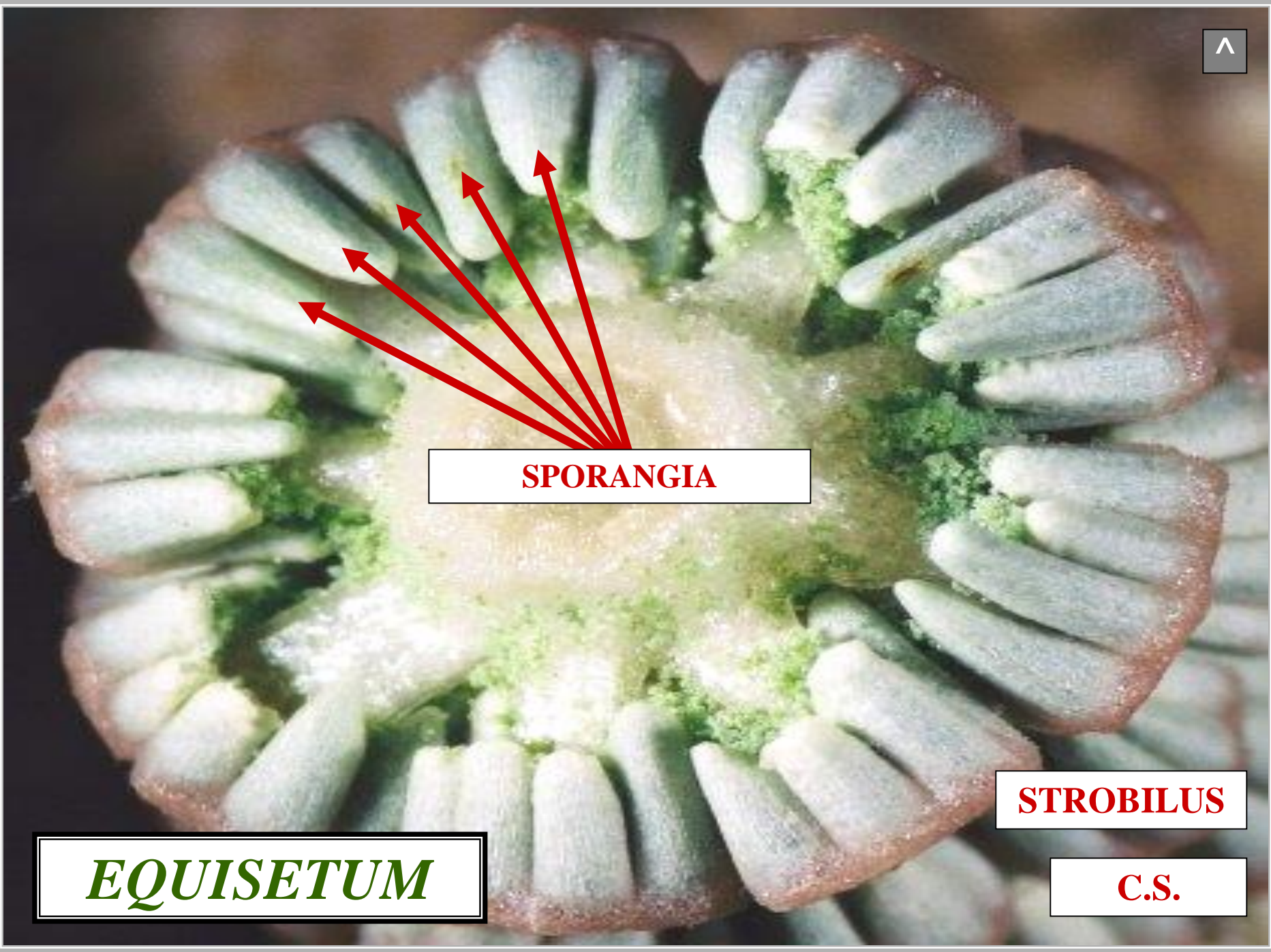


SPORANGIA

STROBILUS

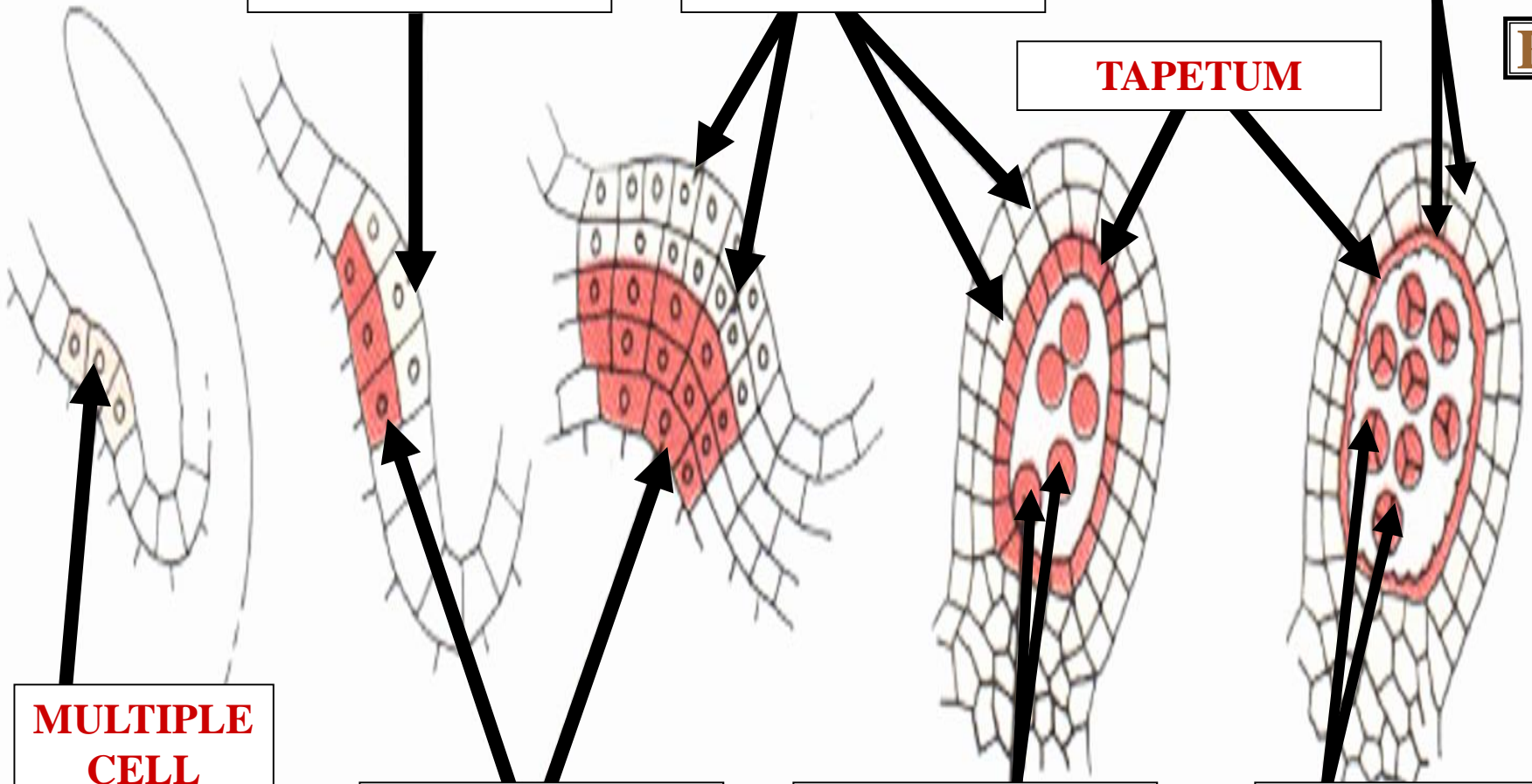
EQUISETUM

C.S.





SPORANGIUM



WALL CELLS

WALL CELLS

LARGE SIZE

THICK WALL

E

TAPETUM

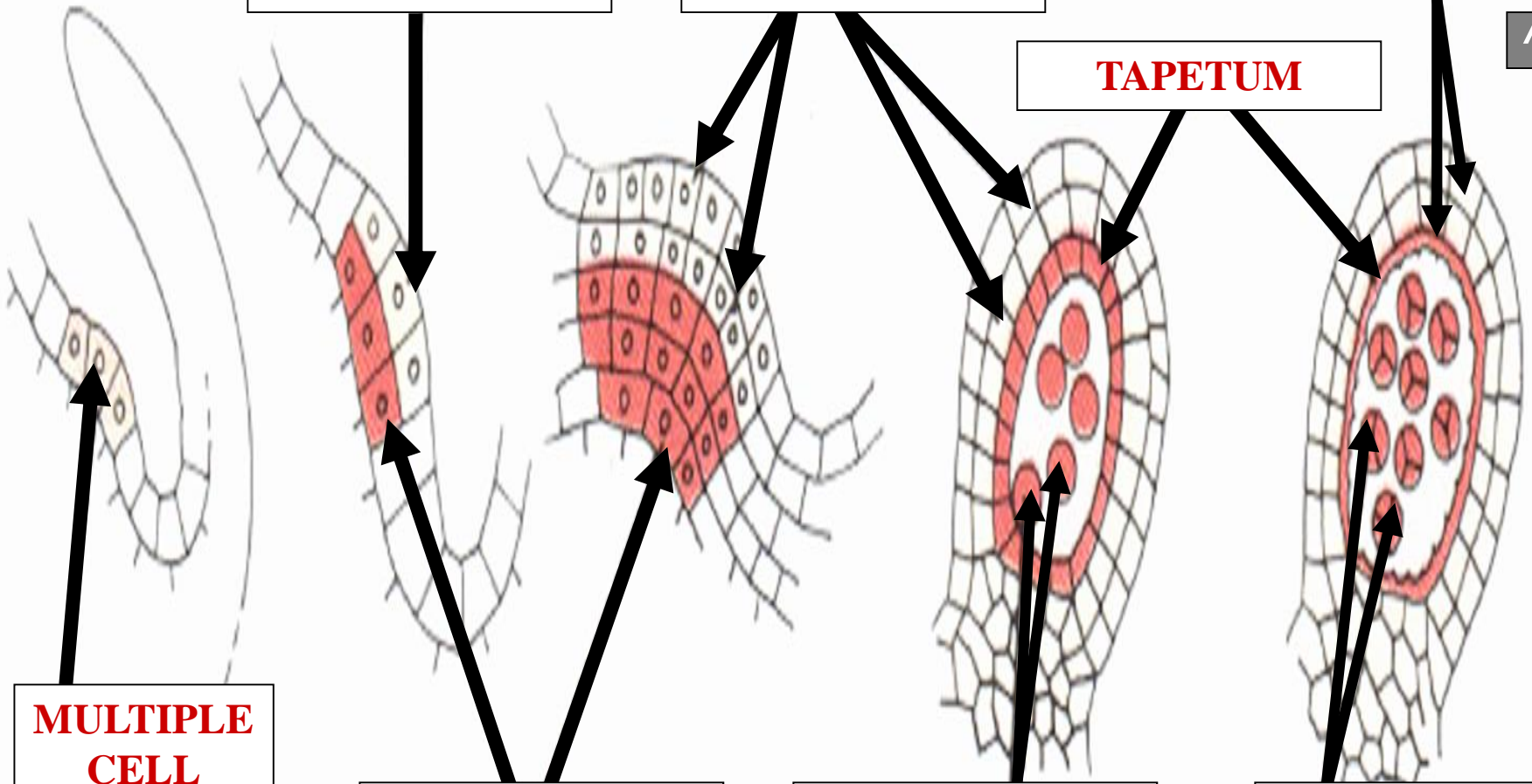
**MULTIPLE
CELL
INITIALS**

SPOROCYTES

SPOROCYTES

**NUMEROUS
SPORES**

L.S.



WALL CELLS

WALL CELLS

LARGE SIZE

THICK WALL



TAPETUM

**MULTIPLE
CELL
INITIALS**

SPOROCTES

SPOROCTES

**NUMEROUS
SPORES**

EUSPORANGIUM

L.S.

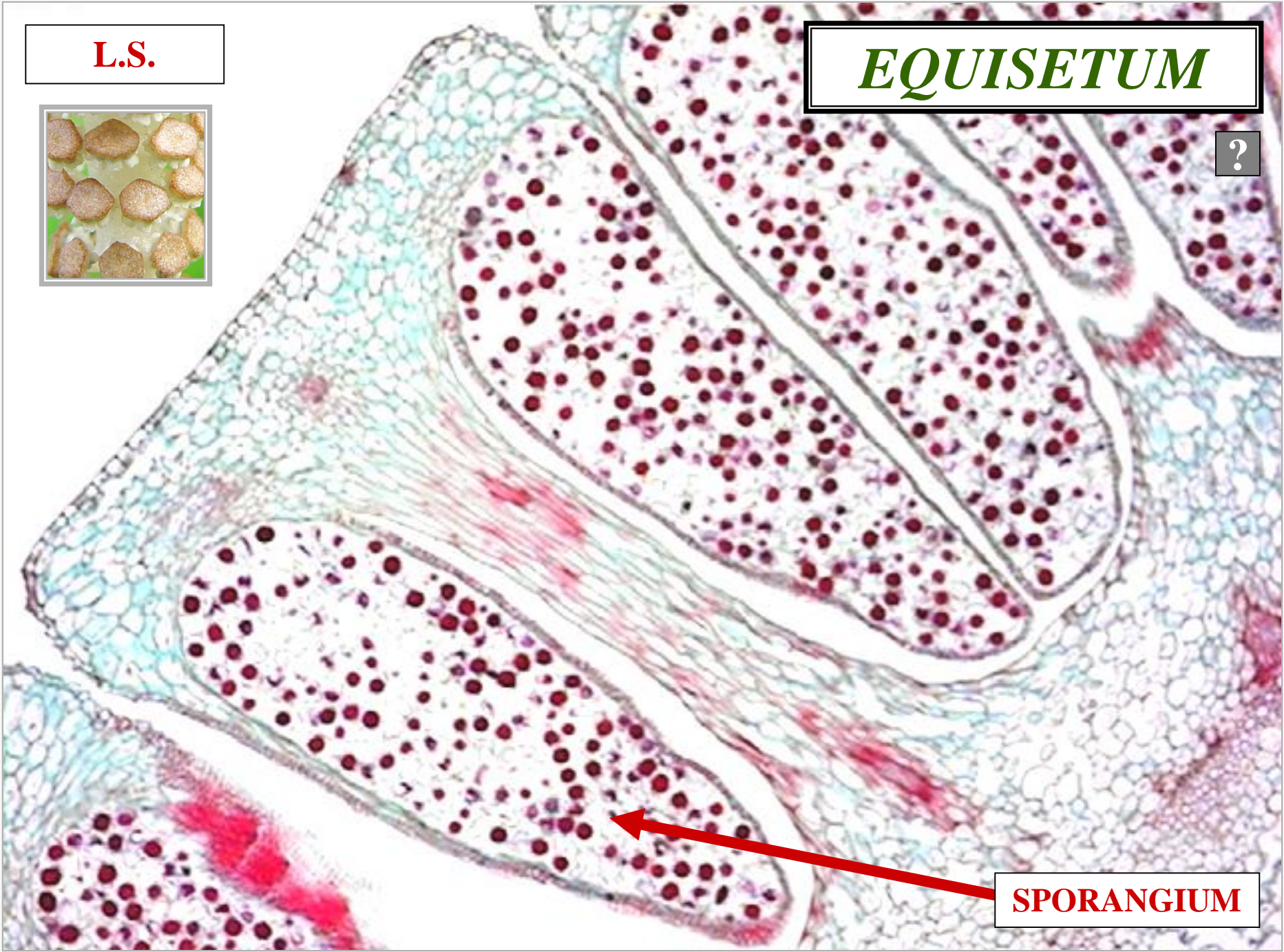
SPORANGIUM POSITION

L.S.



EQUISETUM

?



SPORANGIUM

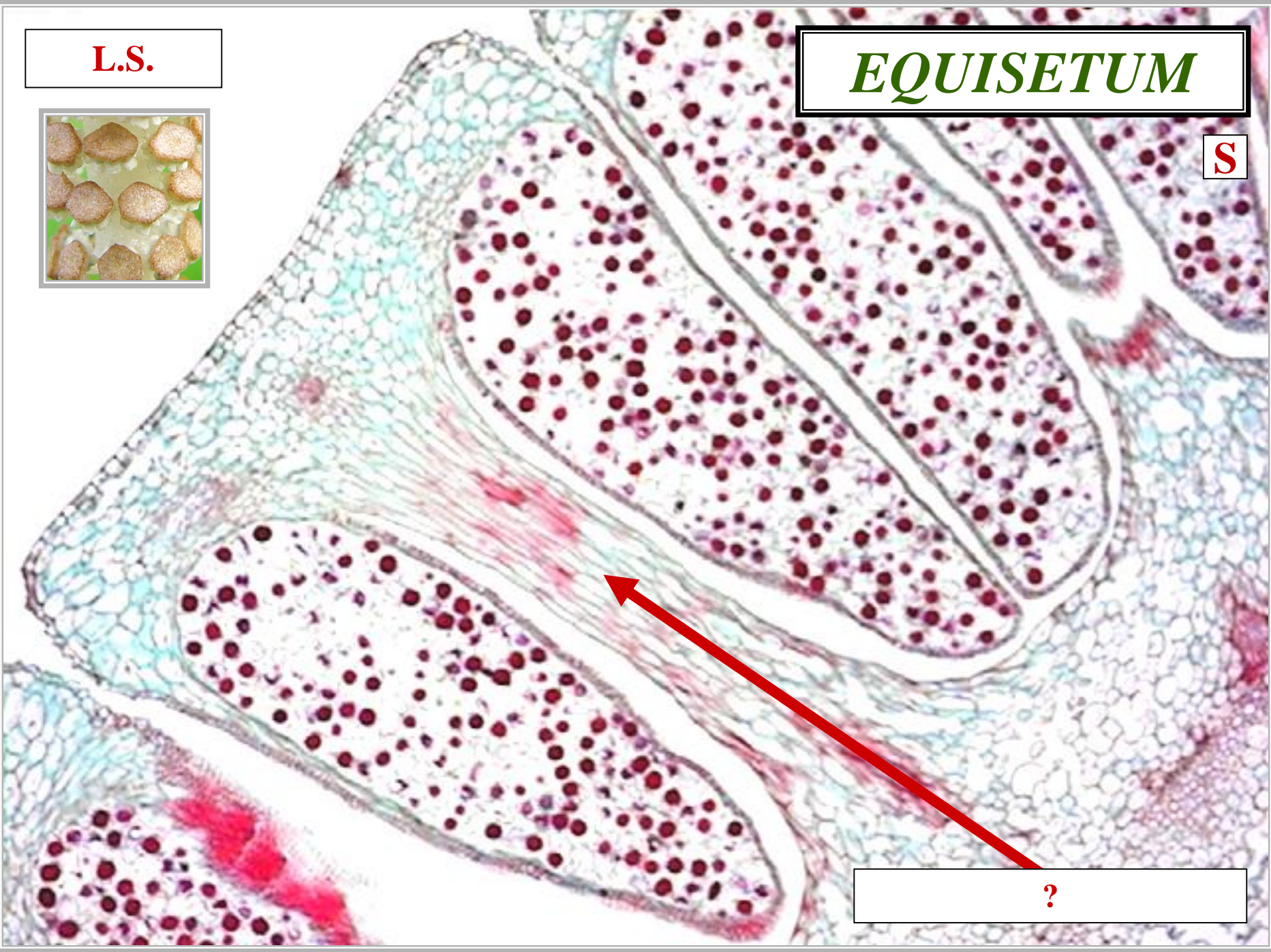


L.S.



EQUISETUM

S



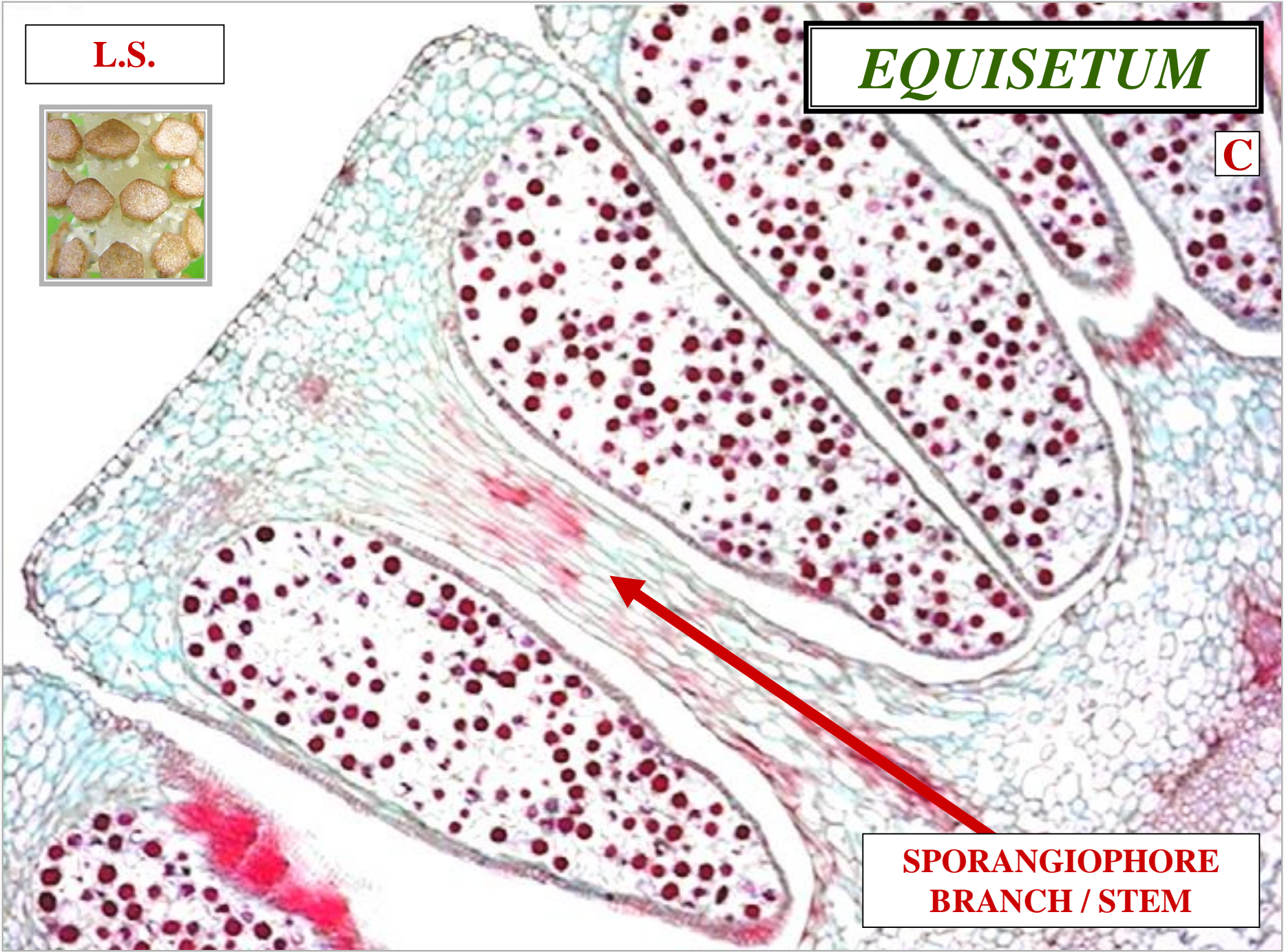
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L.S.



EQUISETUM

C



**SPORANGIOPHORE
BRANCH / STEM**

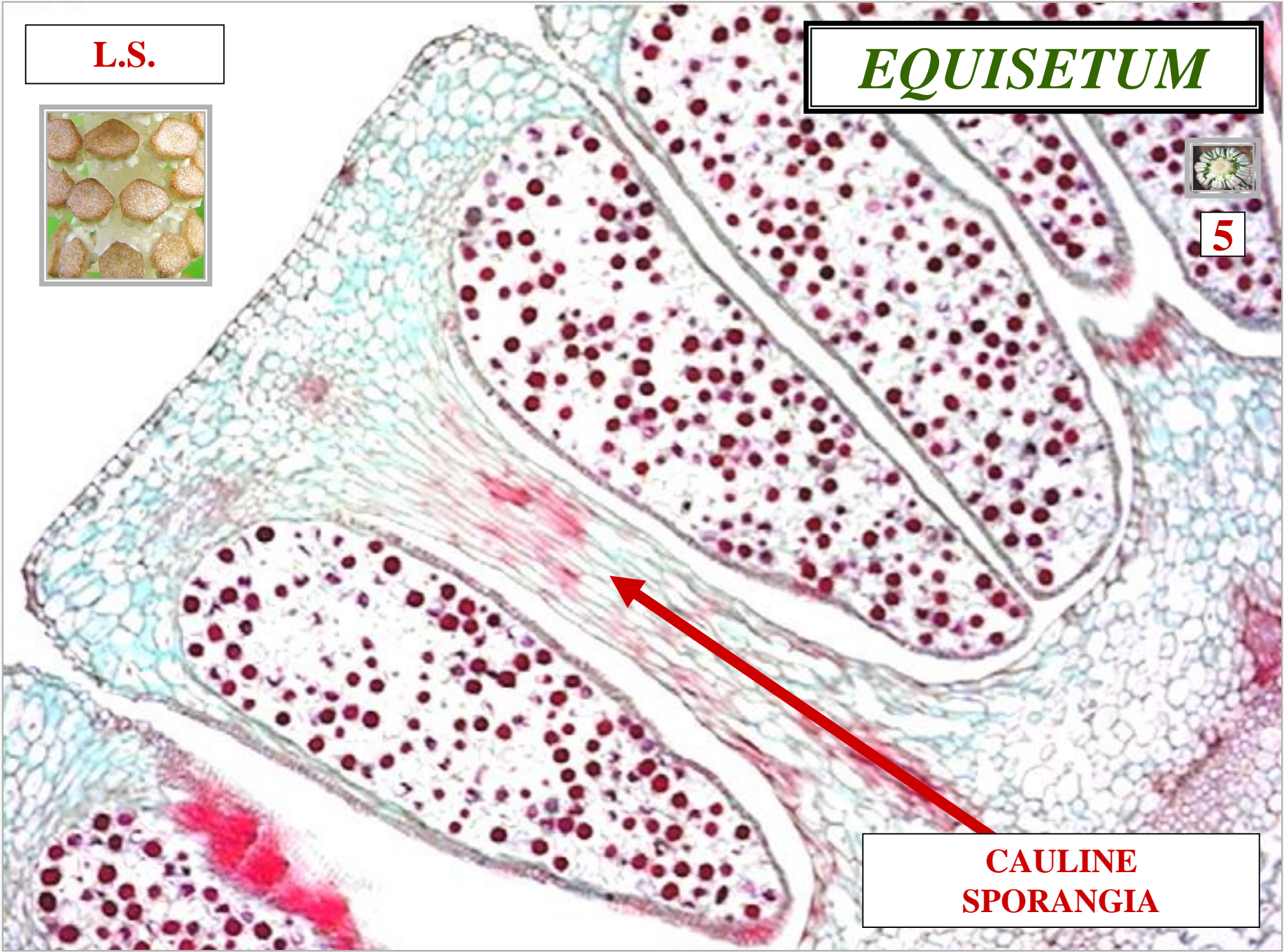
L.S.



EQUISETUM



5



**CAULINE
SPORANGIA**



5-10 SPORANGIA / SPORANGIOPHORE

EQUISETUM

C.S.



SPORE HABIT

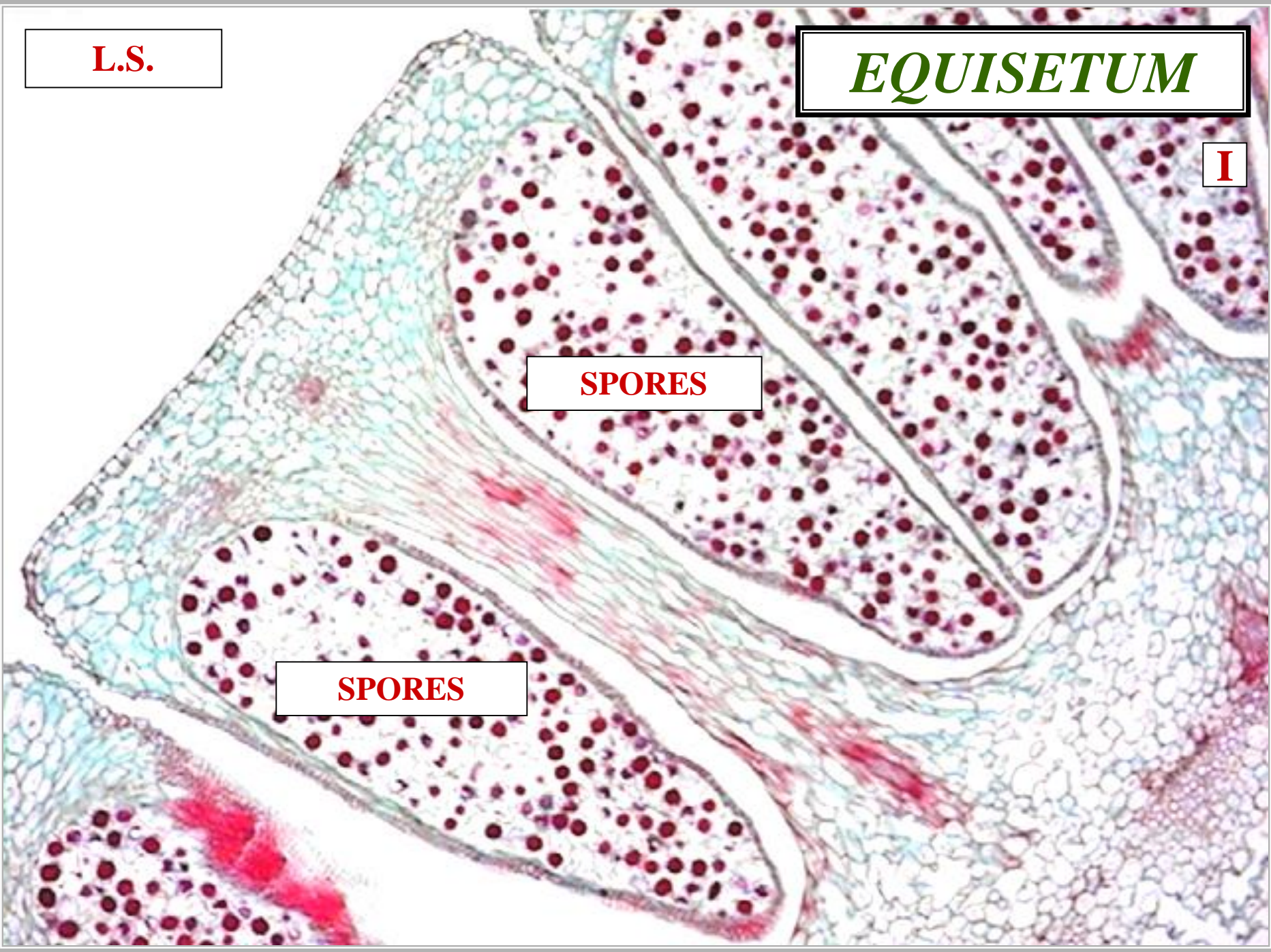
L.S.

EQUISETUM

I

SPORES

SPORES



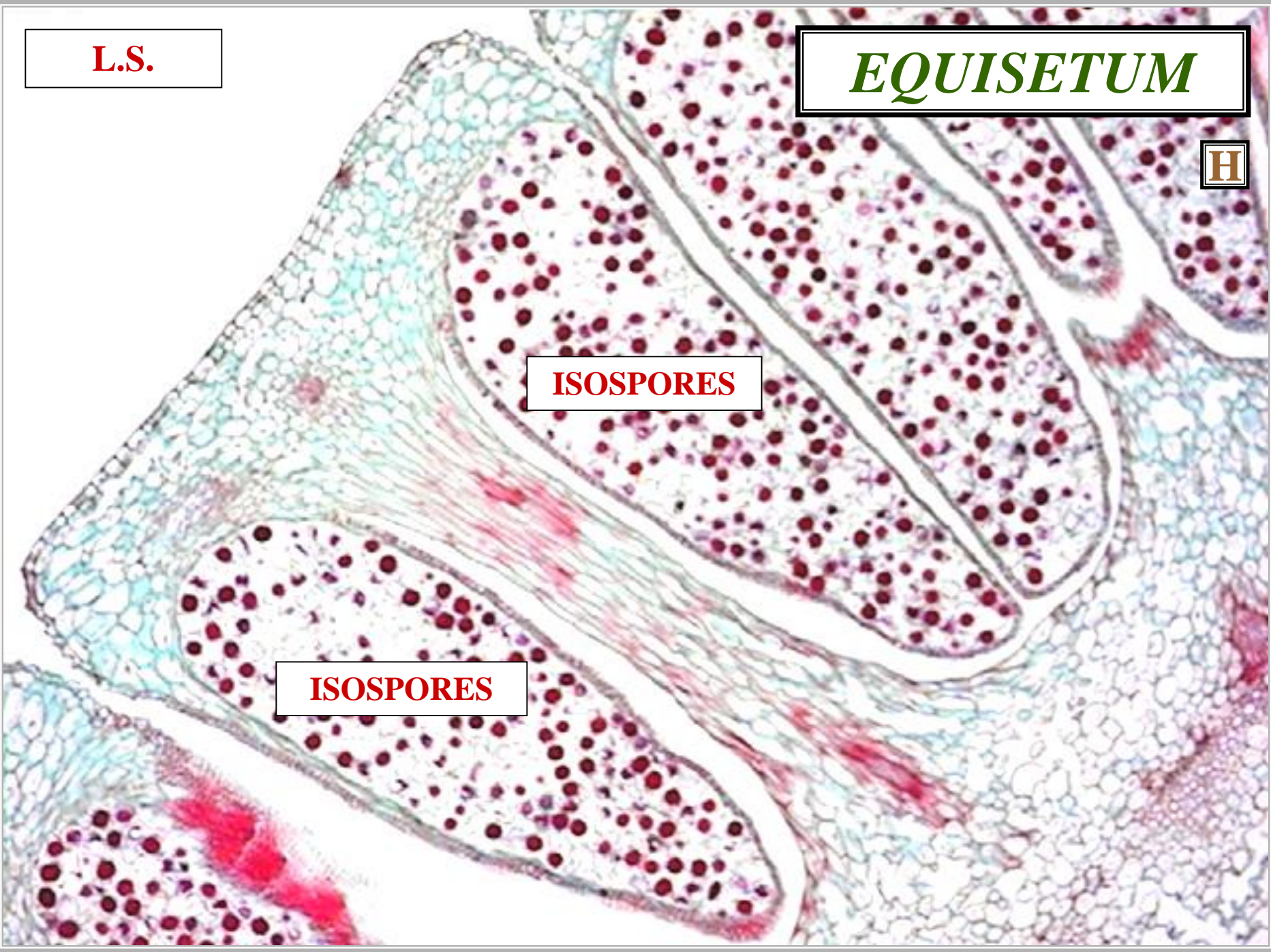
L.S.

EQUISETUM

H

ISOSPORES

ISOSPORES



?

ISOSPORE

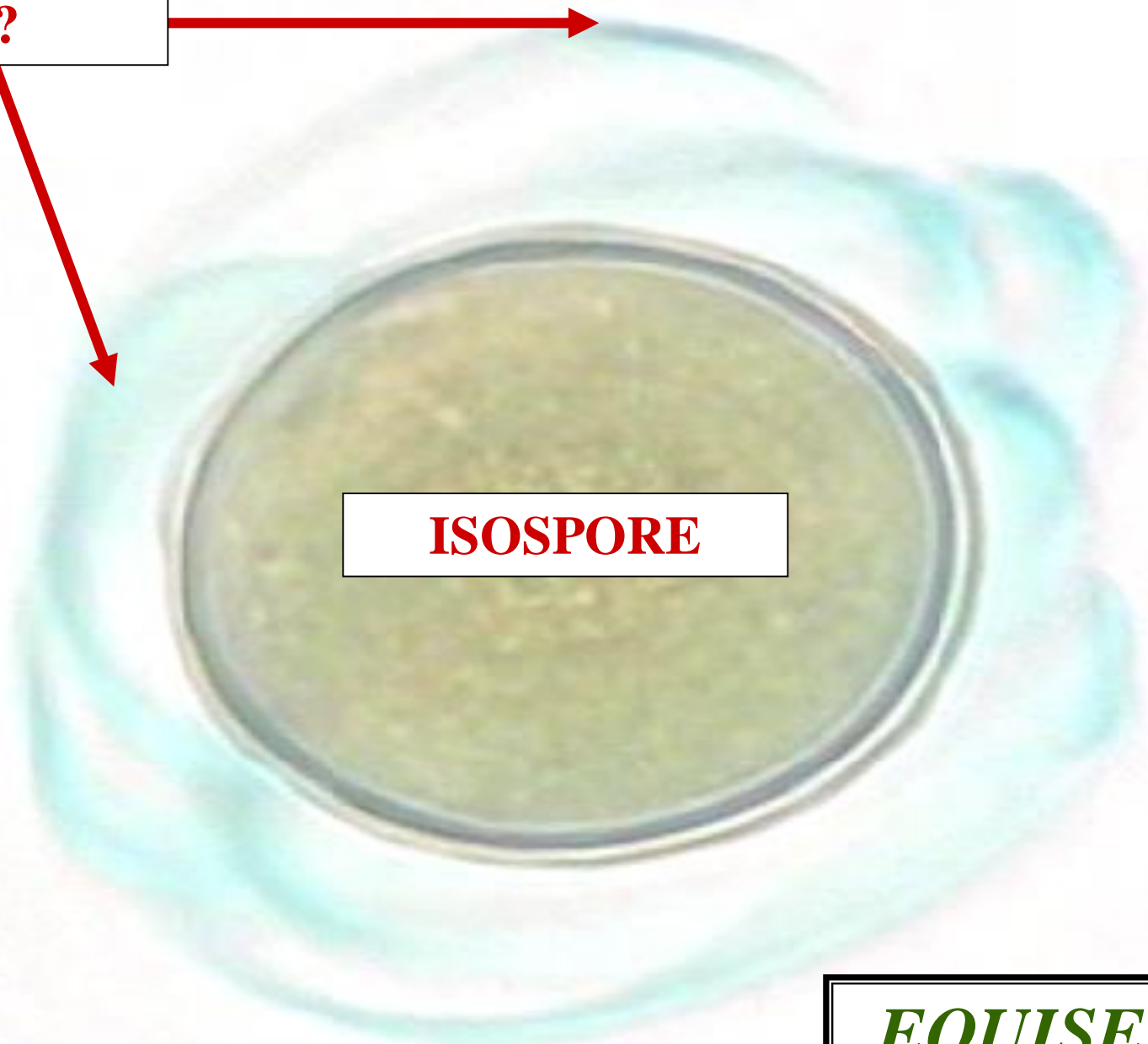
EQUISETUM

?



ISOSPORE

EQUISETUM

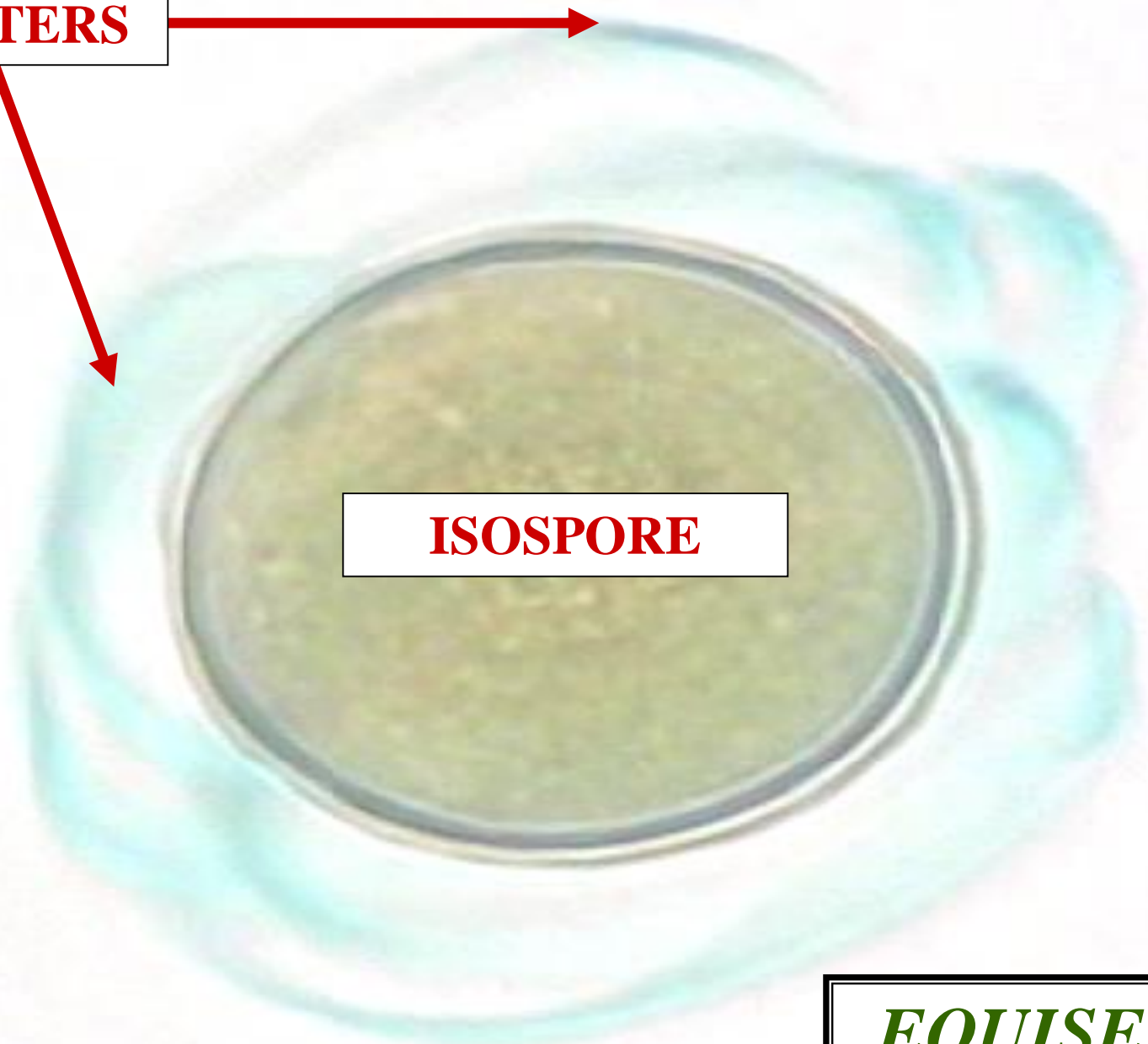


ELATERS



ISOSPORE

EQUISETUM



ELATERS

EQUISETUM
ELATERS



WING-LIKE STRUCTURES

EQUISETUM
ELATERS

EQUISETUM
ELATERS



WING-LIKE STRUCTURES
AIDE
WIND DISPERSAL

EQUISETUM
ELATERS

EQUISETUM

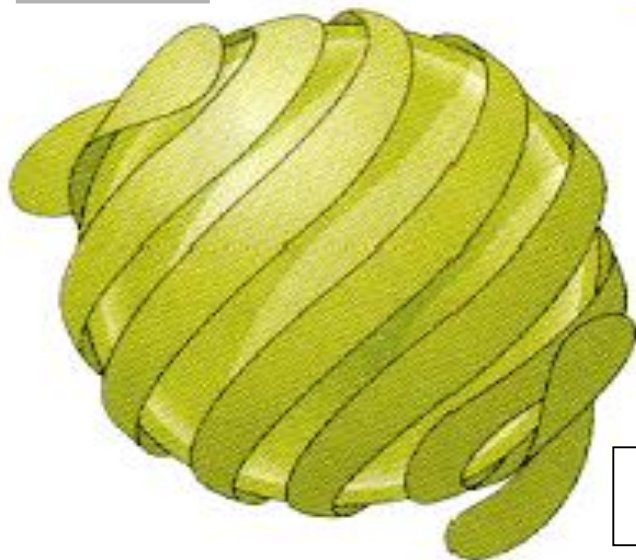
M



ISOSPORE & ELATERS

EQUISETUM

D



MOIST CONDITIONS