



EQUISETUM
CARINAL CANALS

XYLEM CAVITIES

EQUISETUM
CARINAL CANALS



STEM STELE

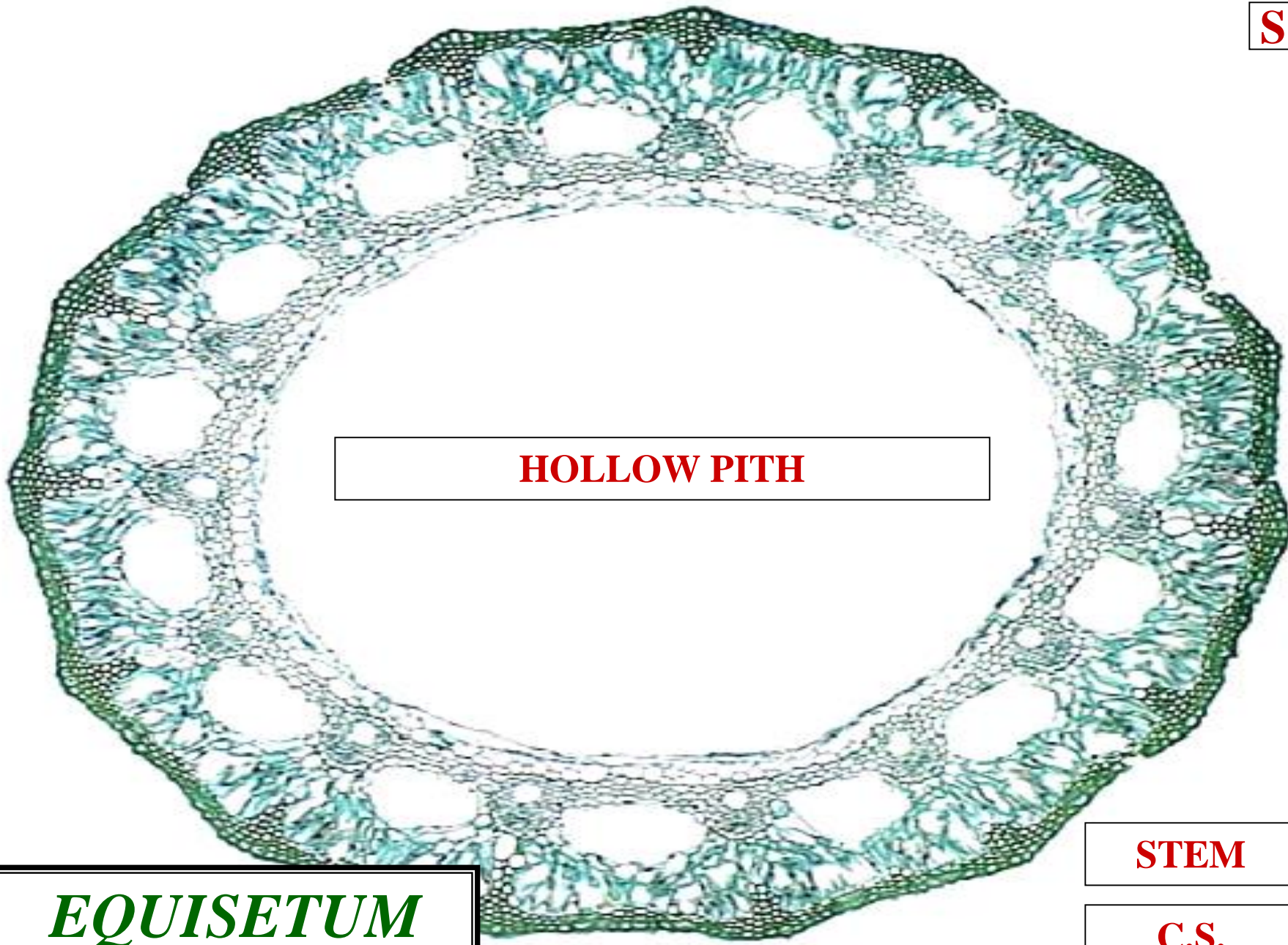
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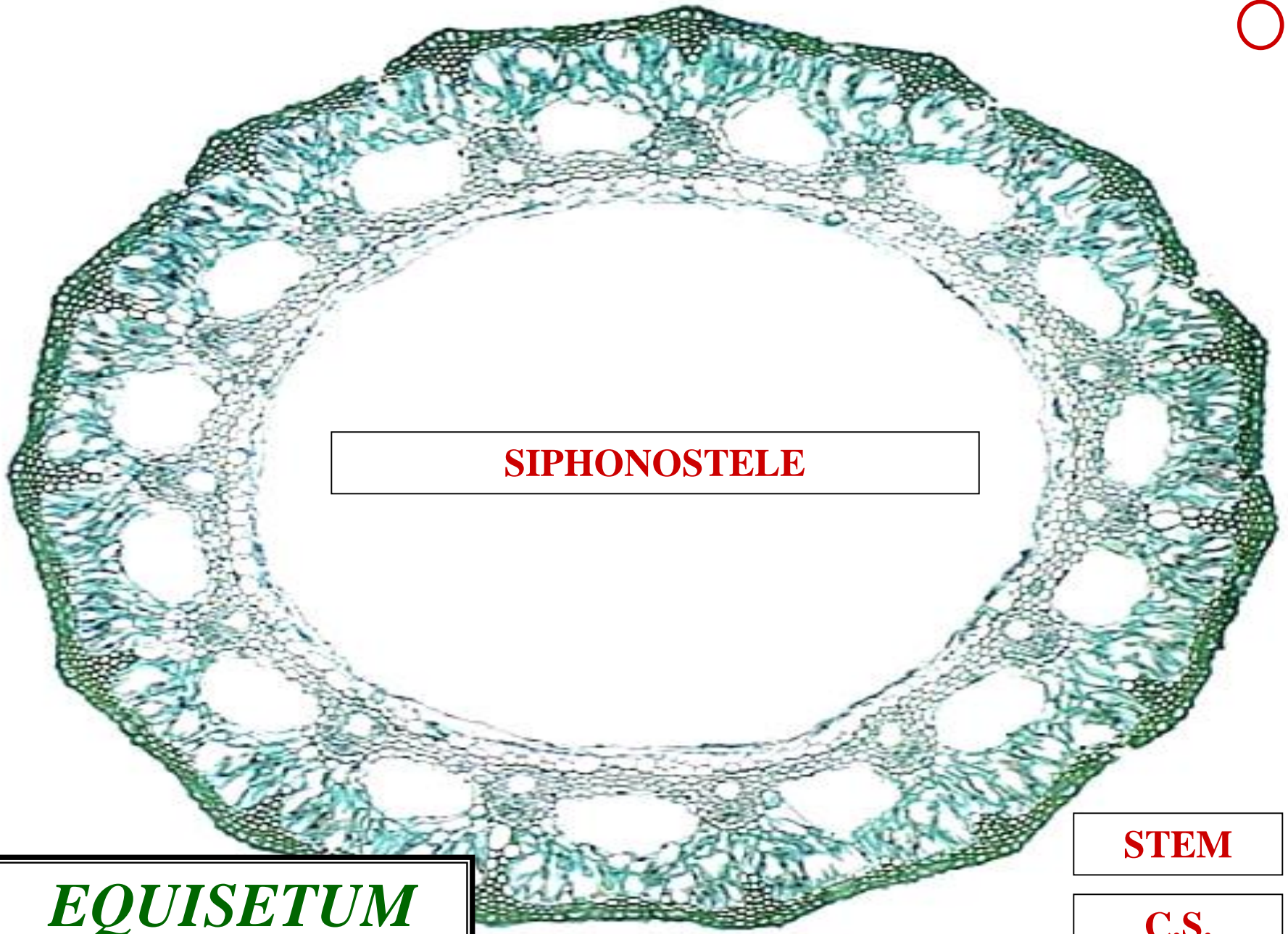
HOLLOW PITH

EQUISETUM

STEM

C.S.





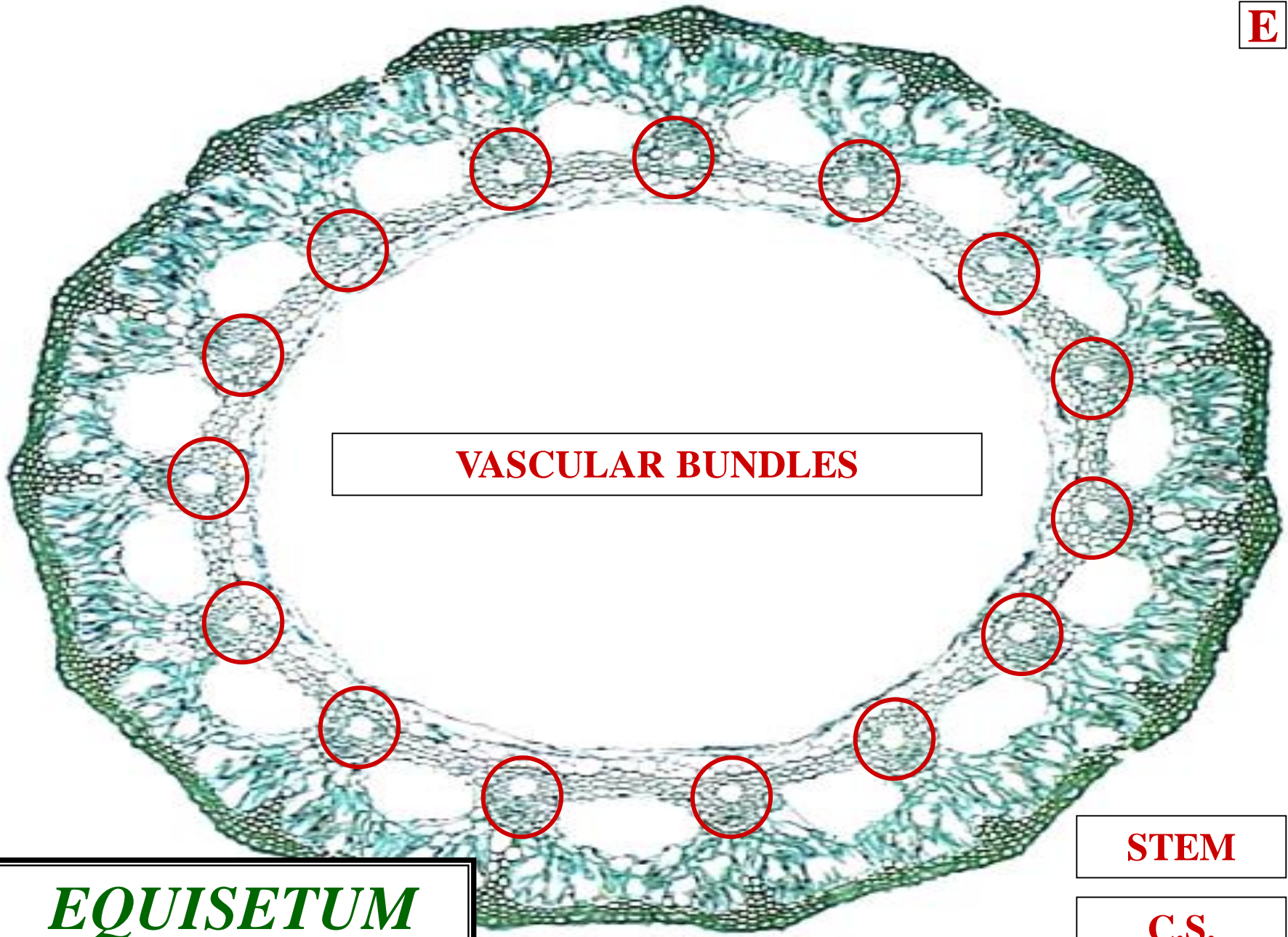
SIPHONOSTELE

EQUISETUM

STEM

C.S.

E

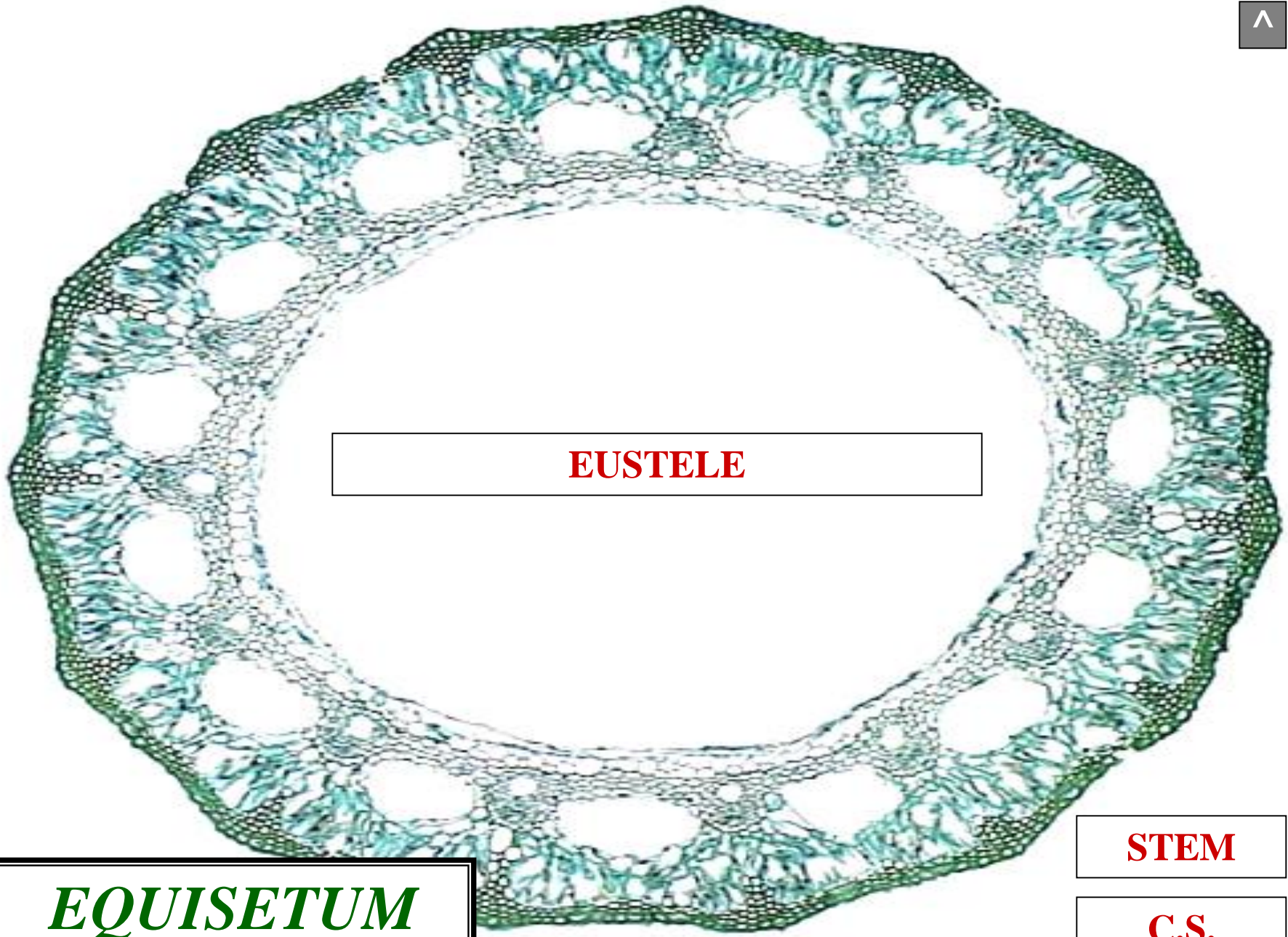


VASCULAR BUNDLES

EQUISETUM

STEM

C.S.



EUSTELE

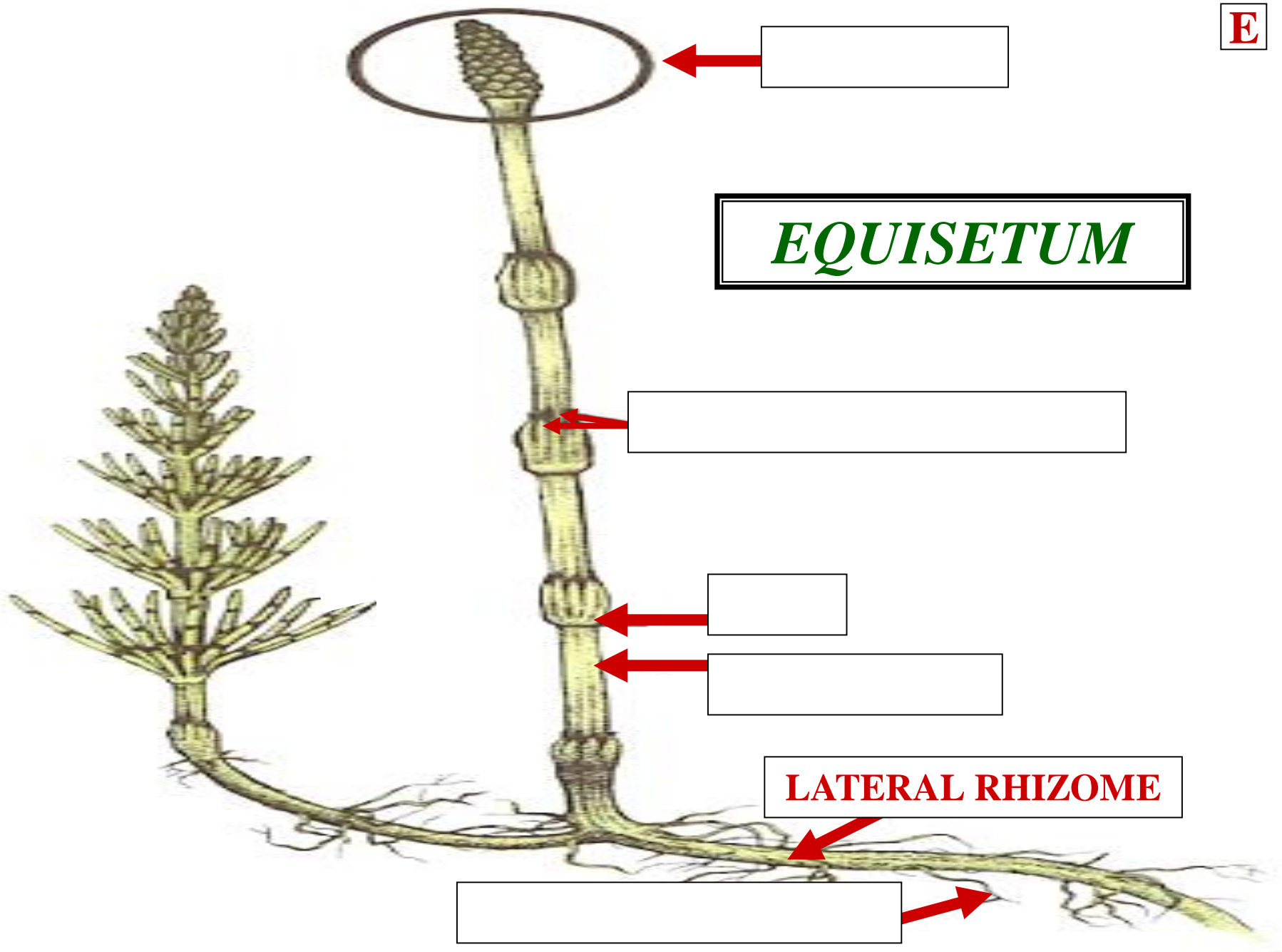
EQUISETUM

STEM

C.S.



RHIZOME



EQUISETUM

LATERAL RHIZOME



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EQUISETUM



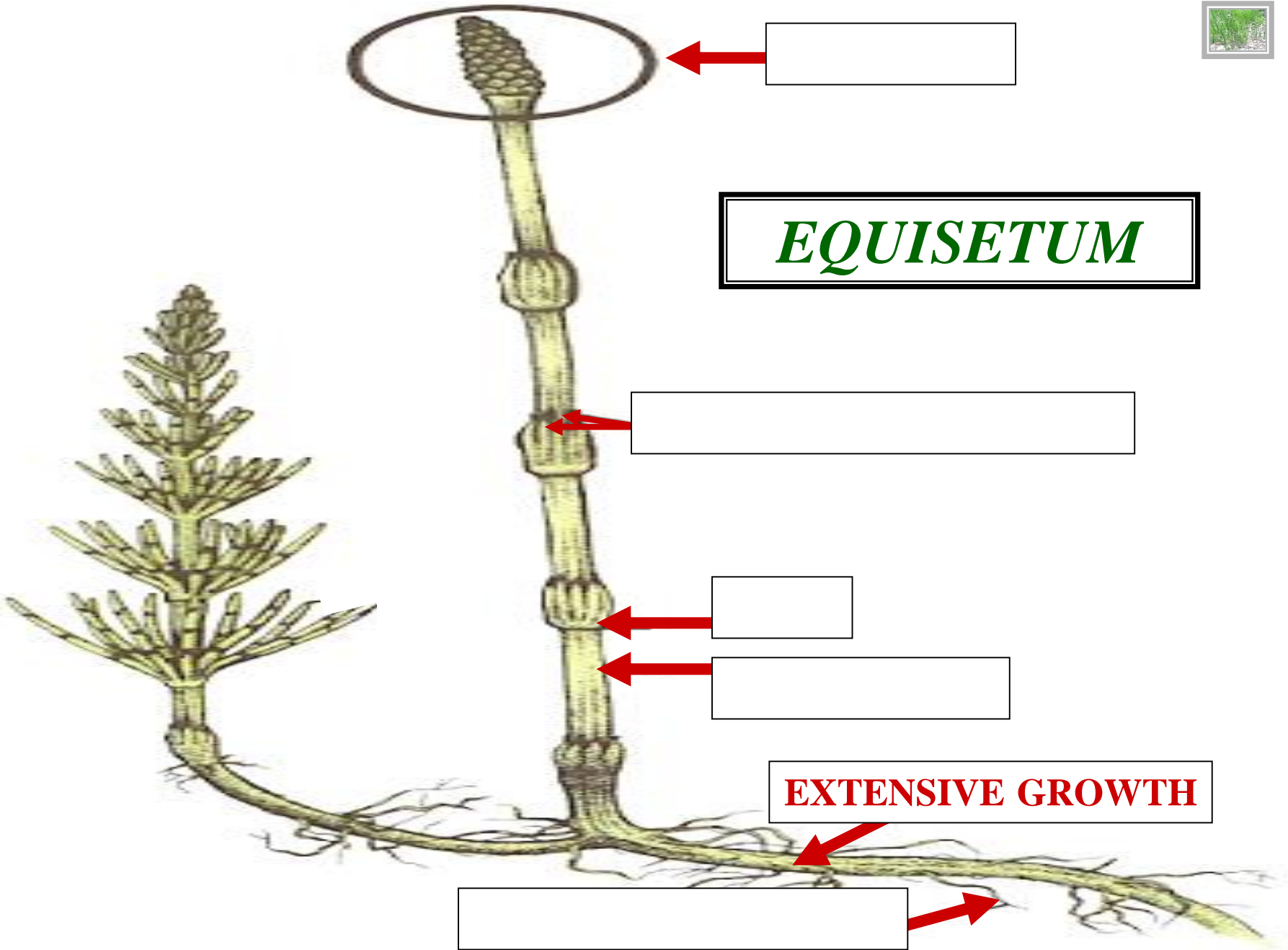
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EXTENSIVE GROWTH

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**RHIZOME
EXTENSIVE LATERAL GROWTH**



EQUISETUM



AERIAL STEM



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EQUISETUM

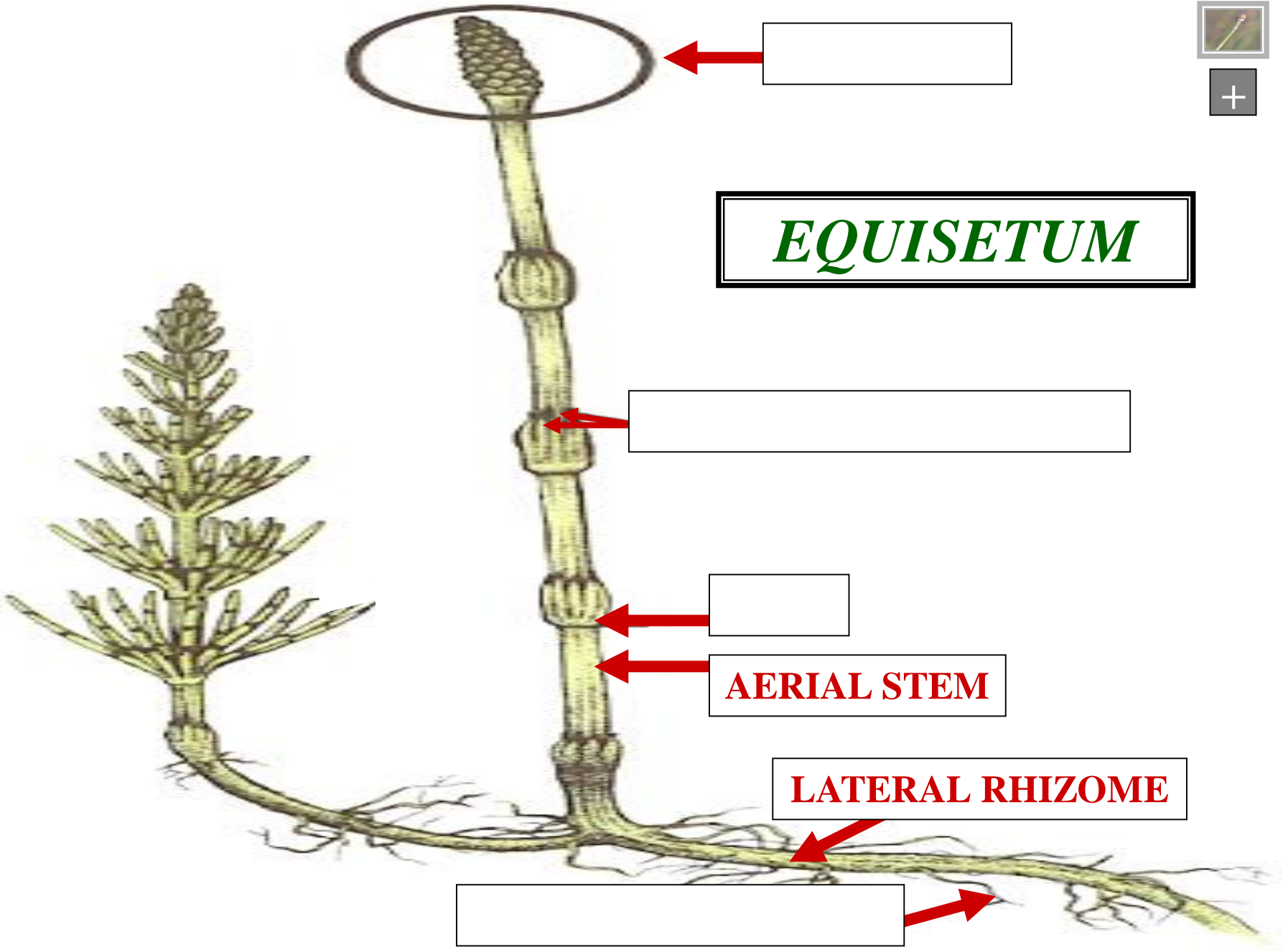


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AERIAL STEM

LATERAL RHIZOME

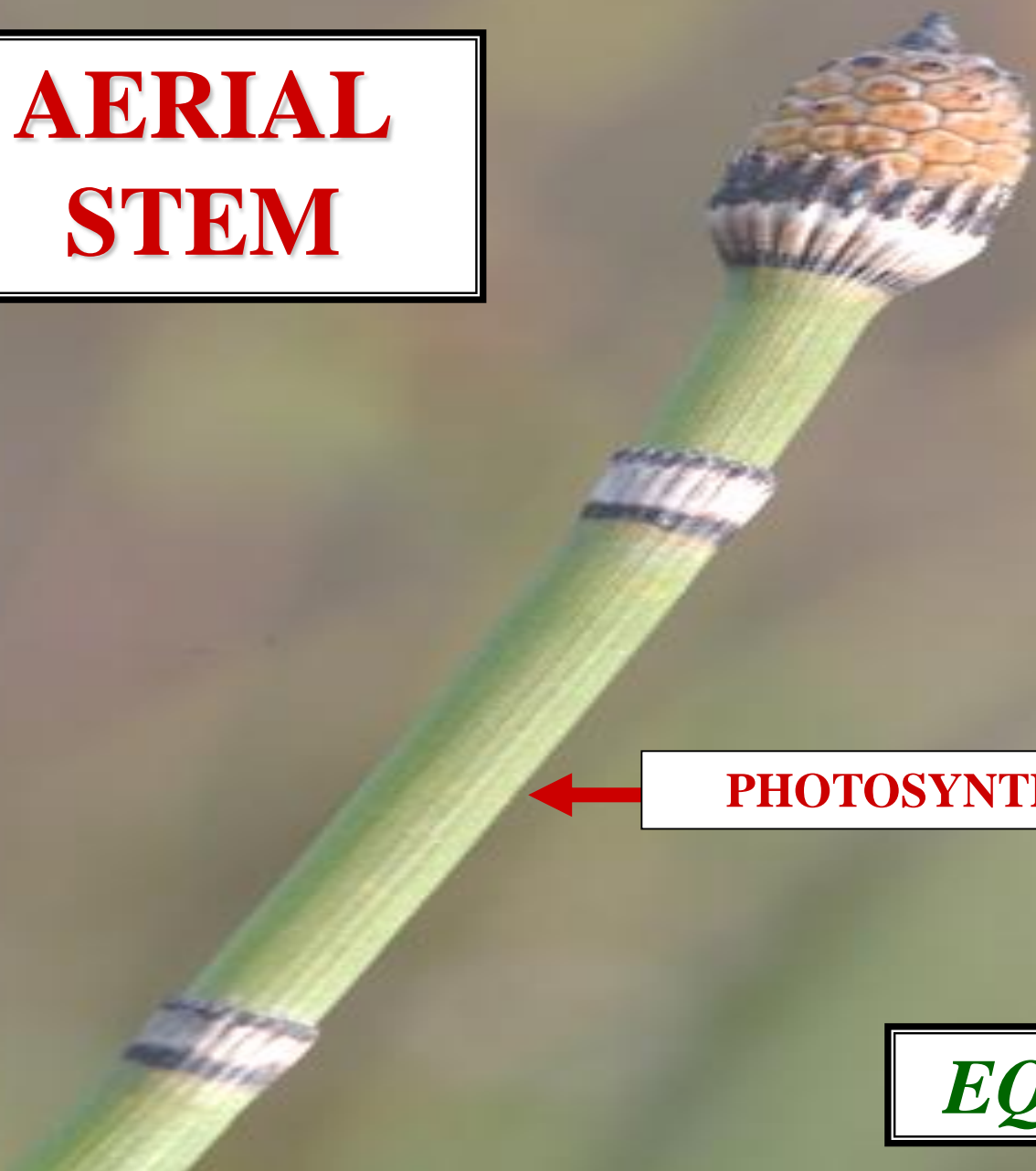


**AERIAL
STEM**



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 POINT
UPON STEM**

EQUISETUM
STEM NODE

**AERIAL
STEM**

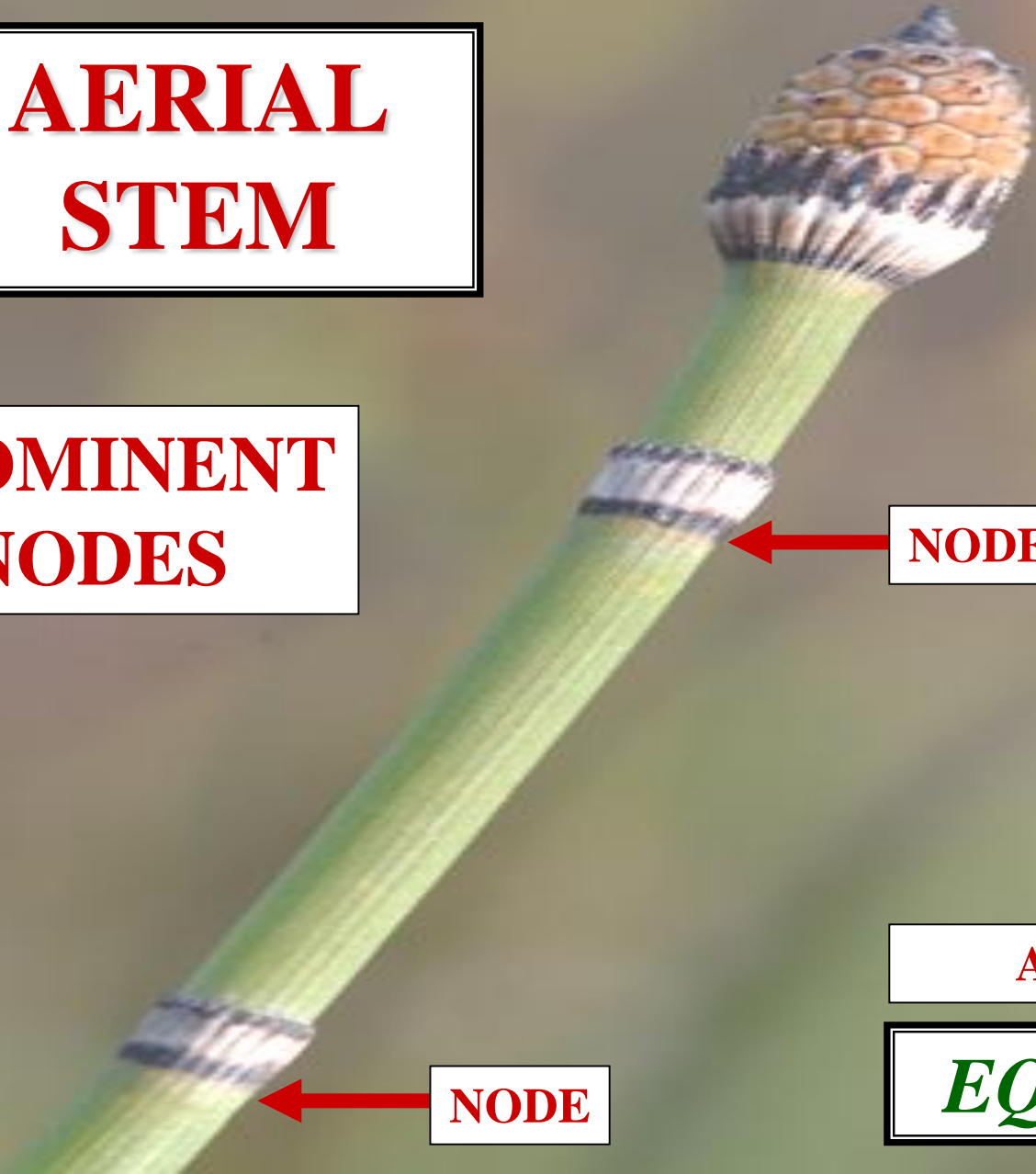
**PROMINENT
NODES**

NODE

ARTICULATE

NODE

EQUISETUM



INTERNODE

EQUISETUM
STEM INTERNODE



I

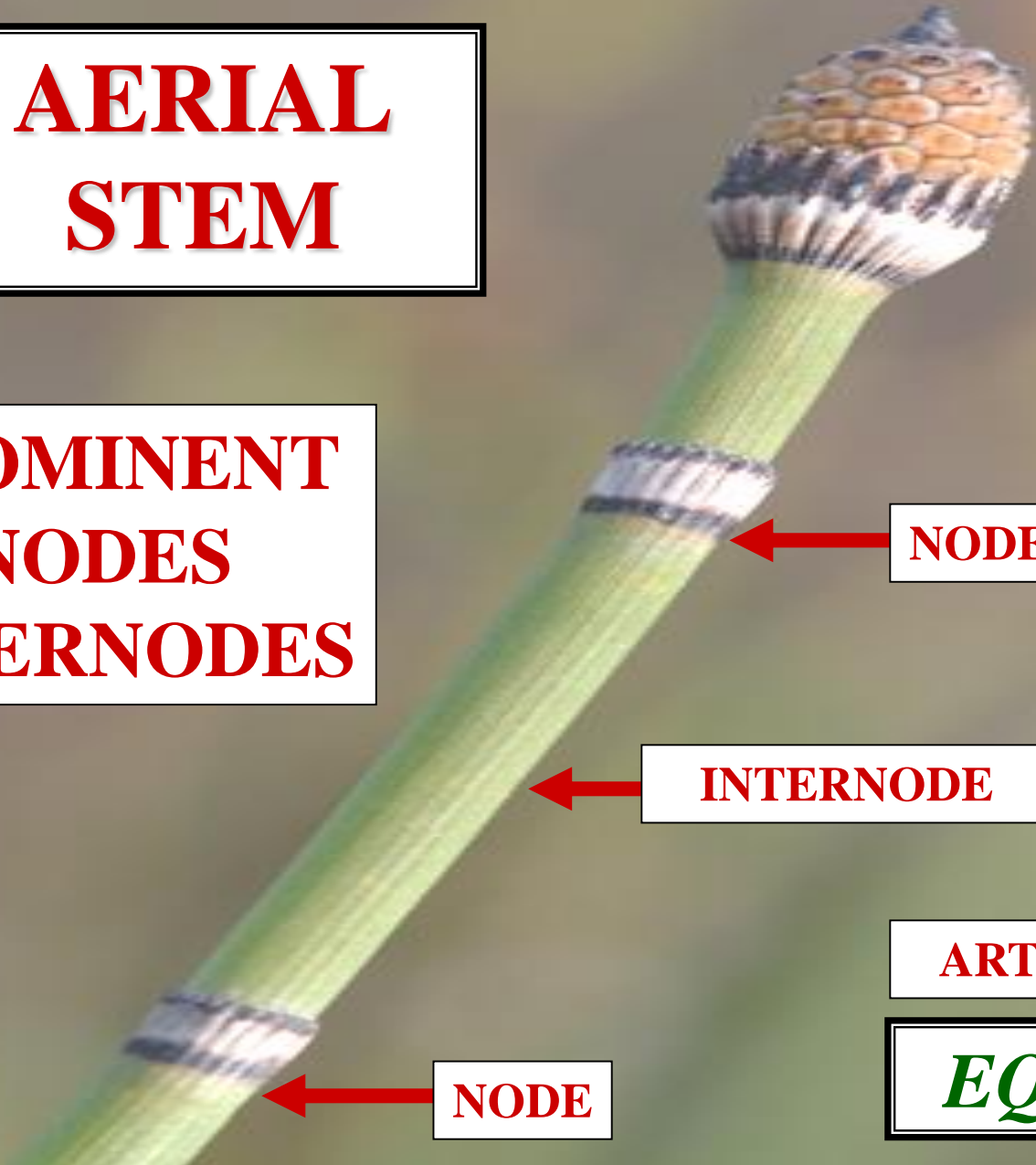
**STEM AREA
BETWEEN NODES**

EQUISETUM
STEM INTERNODE



**AERIAL
STEM**

**PROMINENT
NODES
INTERNODES**



NODE

INTERNODE

NODE

ARTICULATE STEM

EQUISETUM



LATERAL BRANCHES



AB

AERIAL STEM

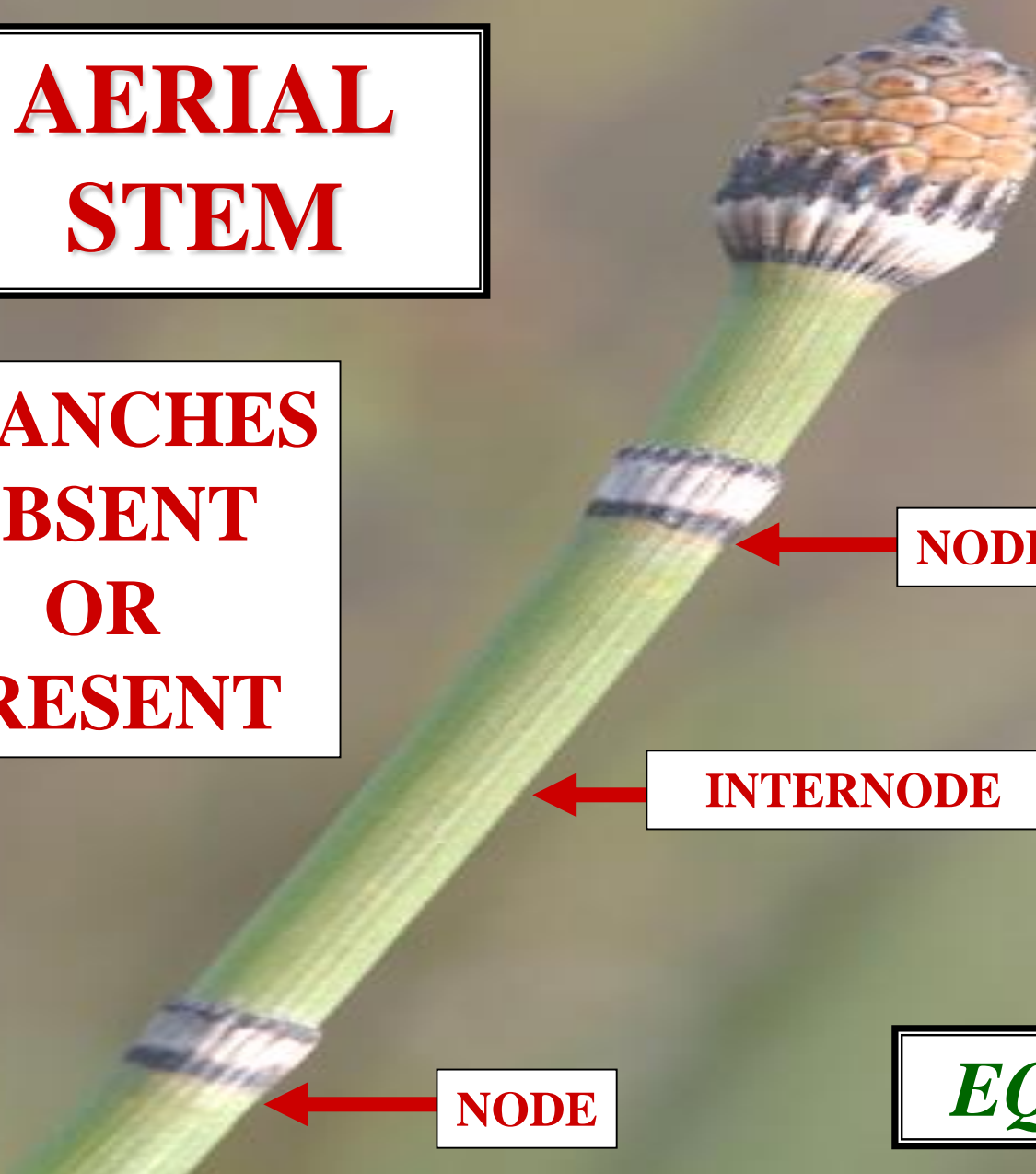
**BRANCHES
ABSENT
OR
PRESENT**

NODE

INTERNODE

NODE

EQUISETUM





PR

**AERIAL
STEM**

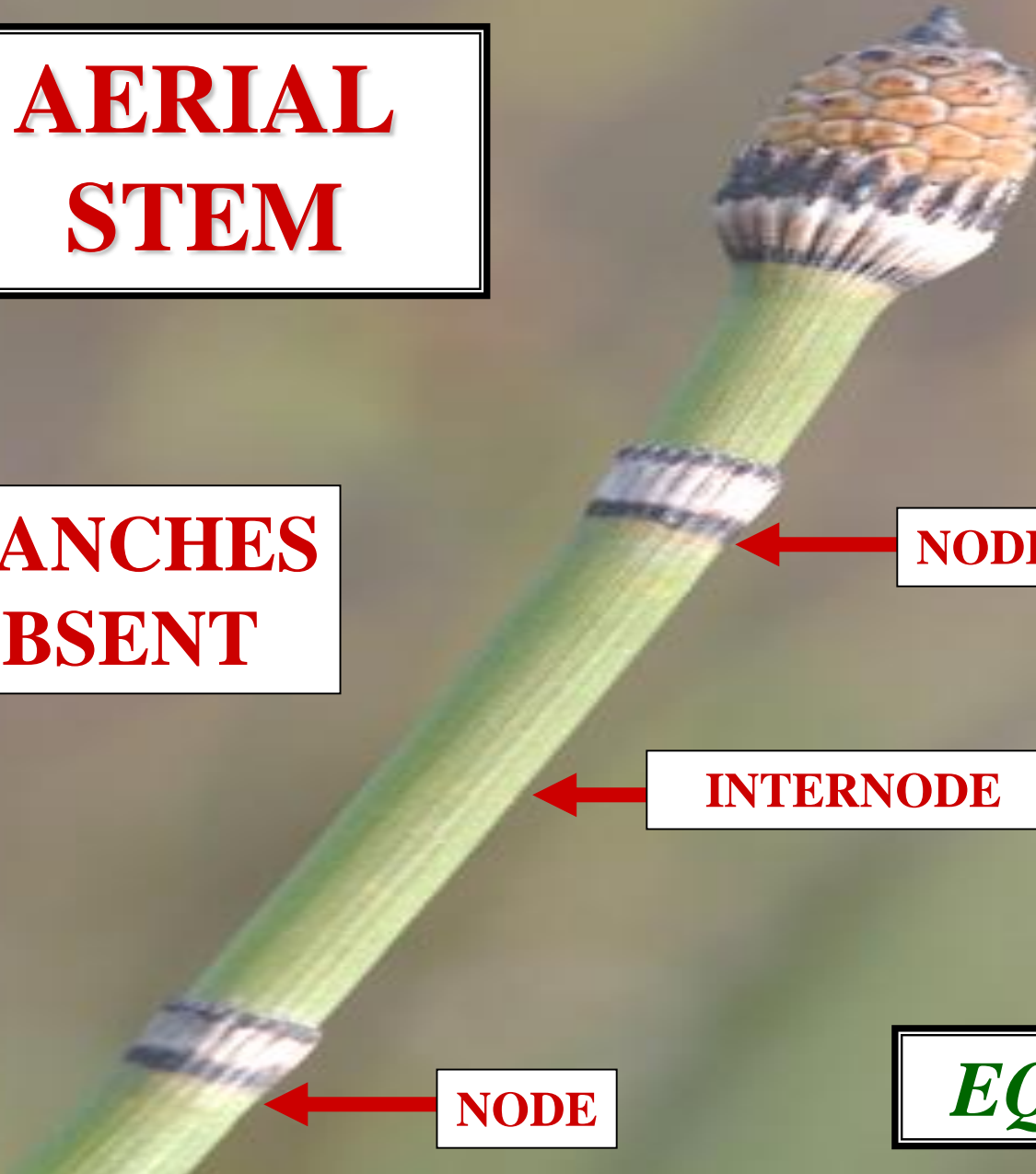
**BRANCHES
ABSENT**

NODE

INTERNODE

NODE

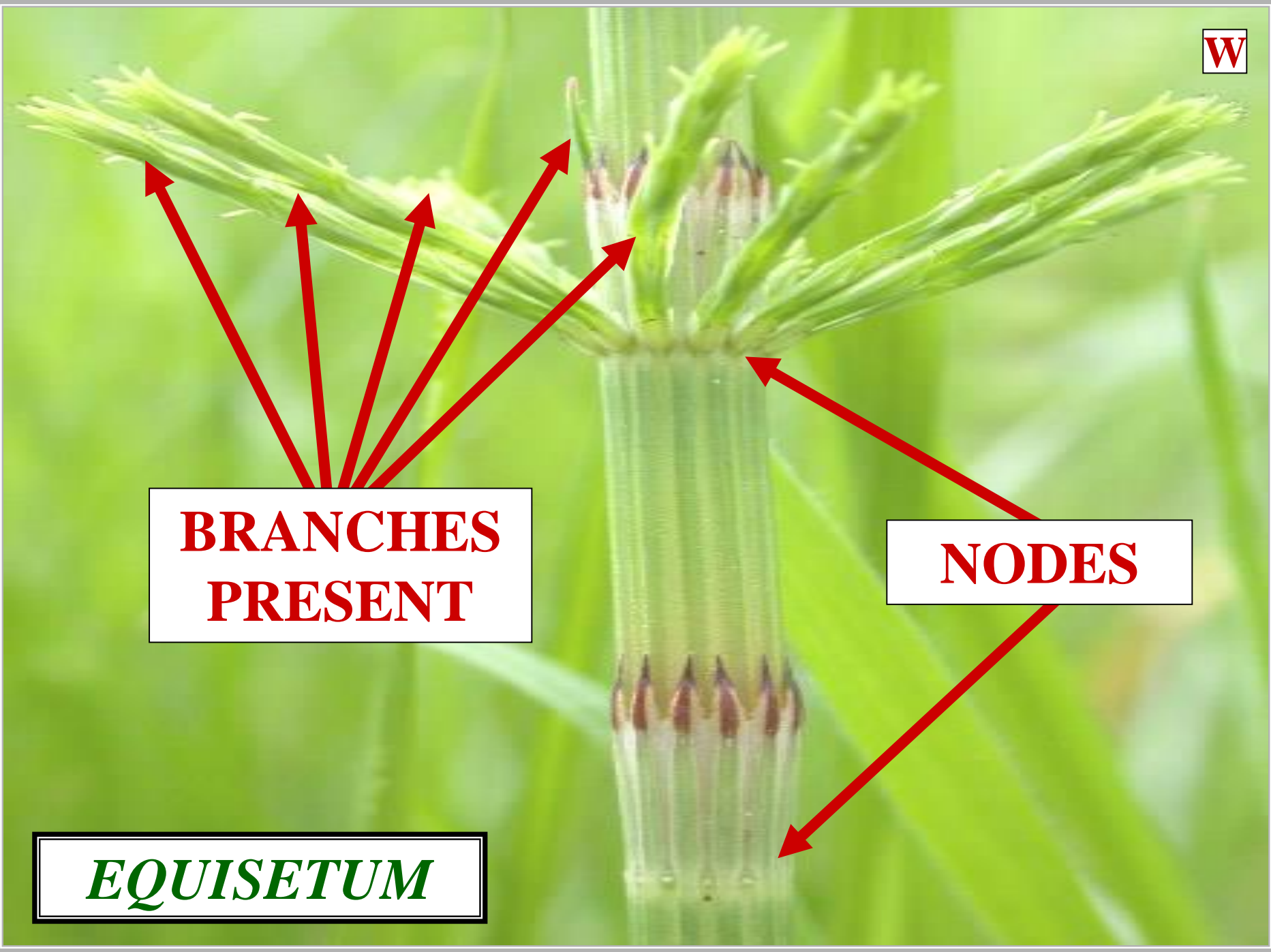
EQUISETUM



**BRANCHES
PRESENT**

NODES

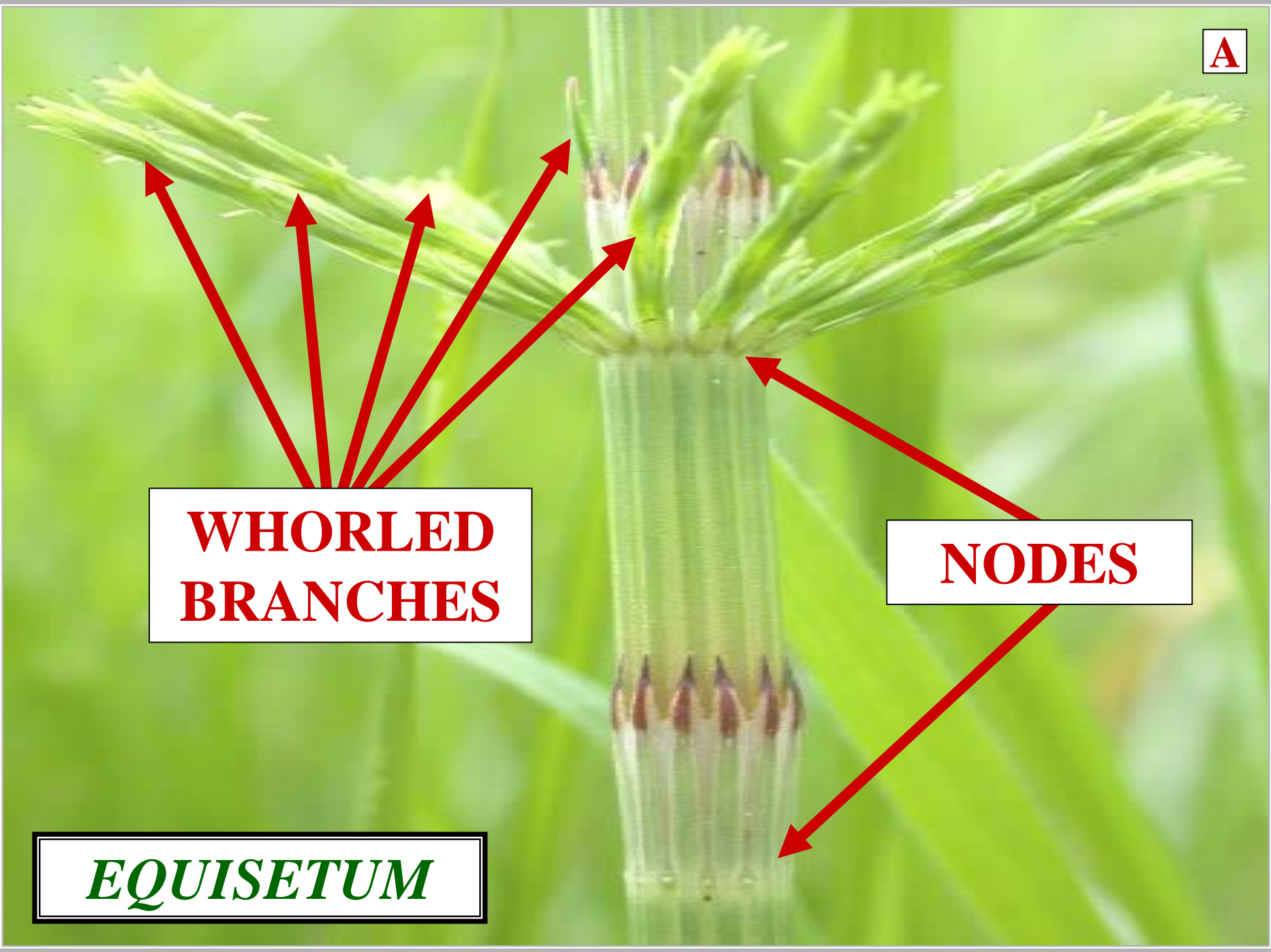
EQUISETUM



**WHORLED
BRANCHES**

NODES

EQUISETUM

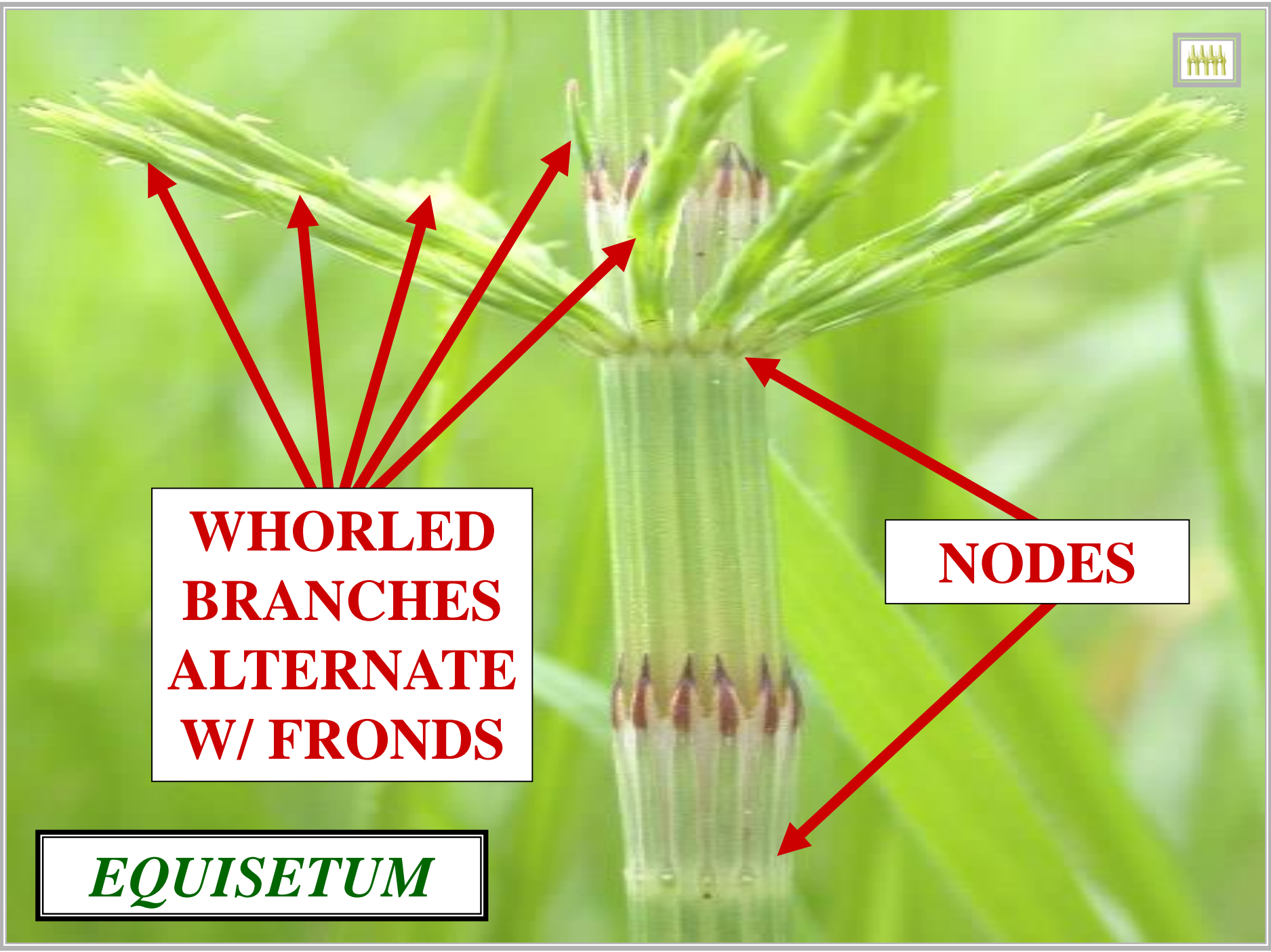




**WHORLED
BRANCHES
ALTERNATE
W/ FRONDS**

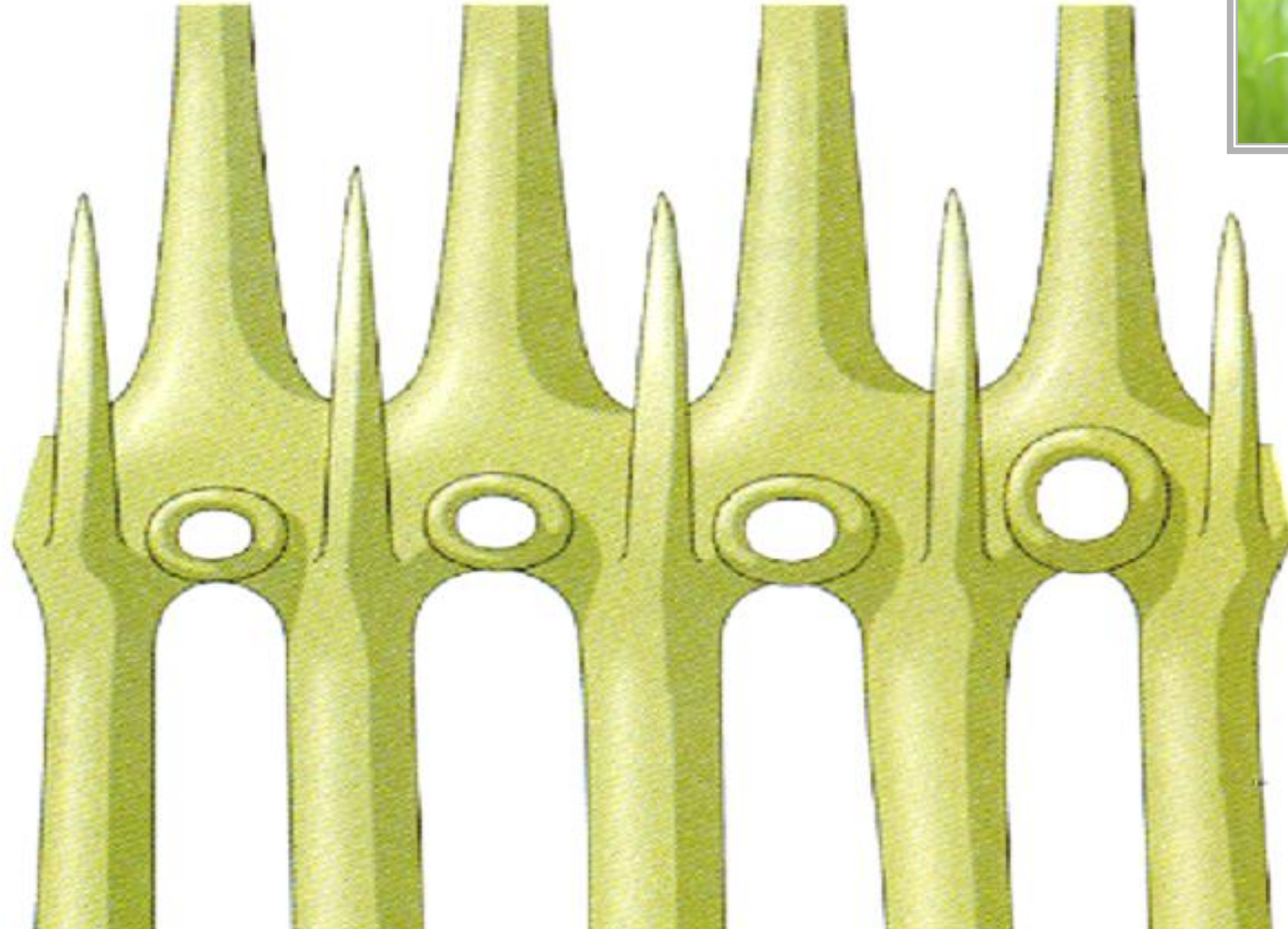
NODES

EQUISETUM





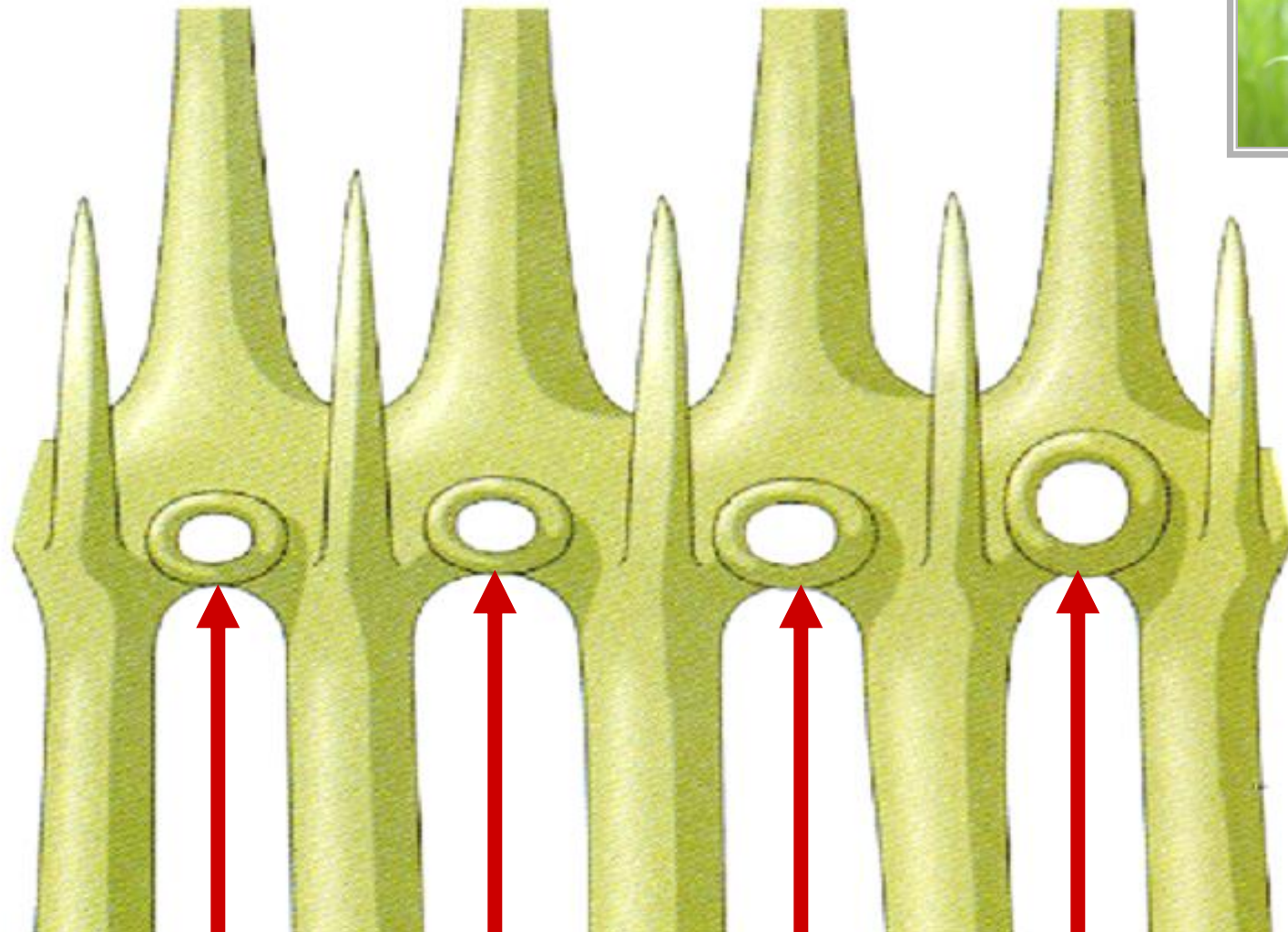
B



NODE



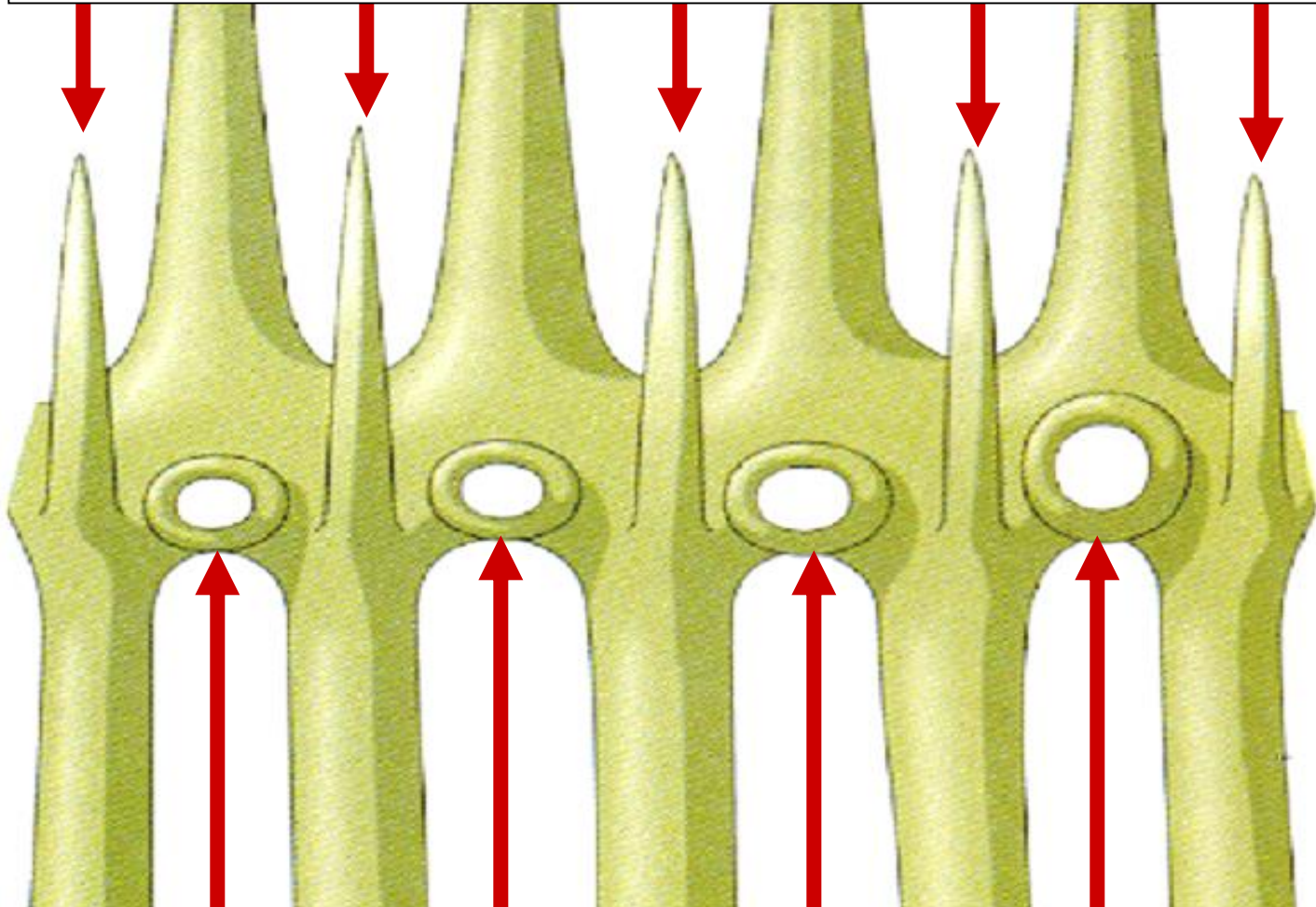
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BRANCH ORIGIN POINT



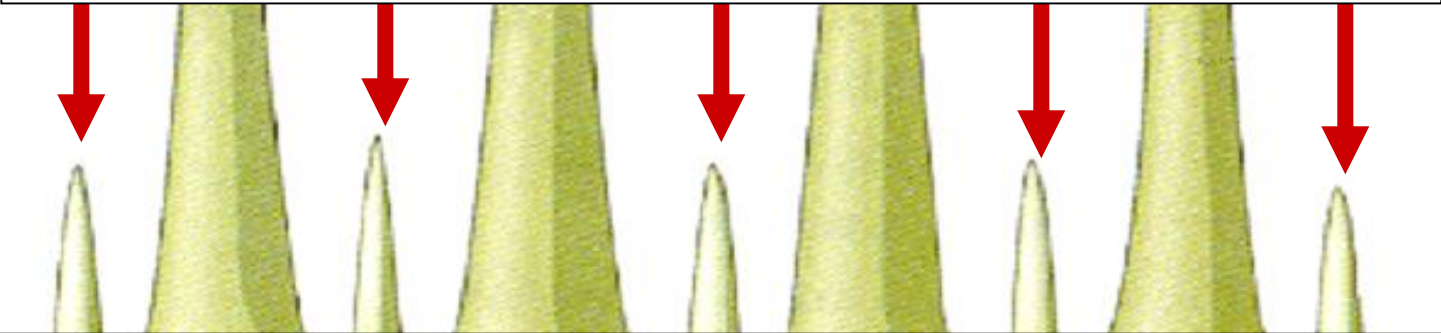
LEAF / FROND



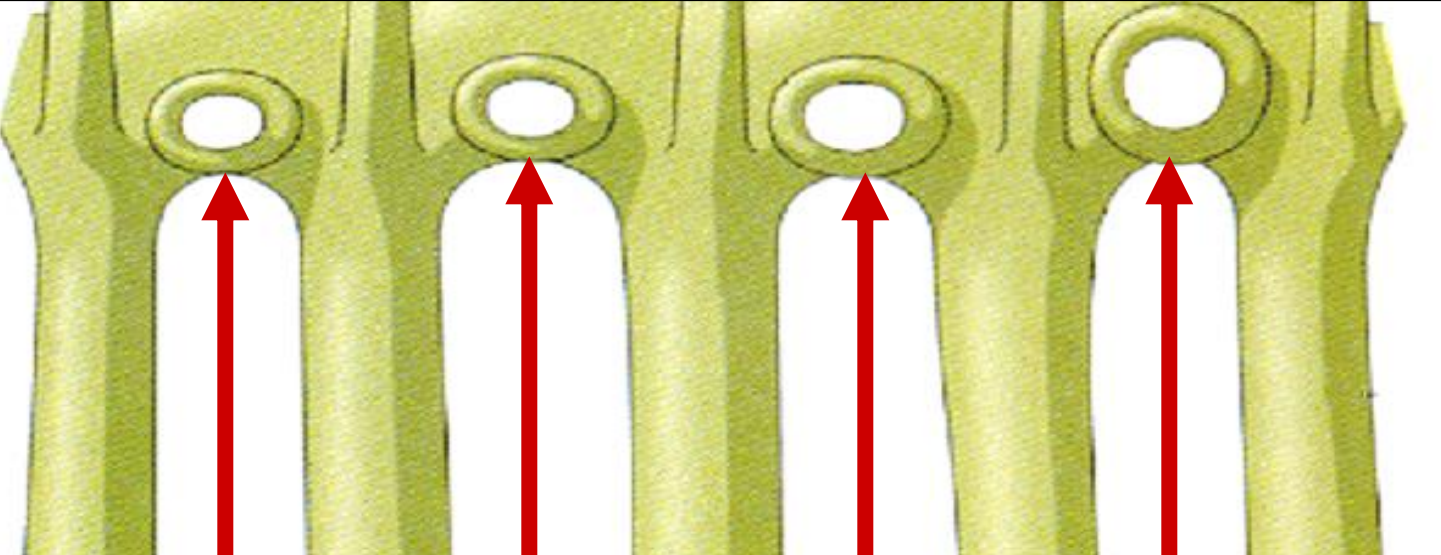
BRANCH ORIGIN POINT



LEAF / FROND



BRANCHES ALTERNATE W/ FRONDS



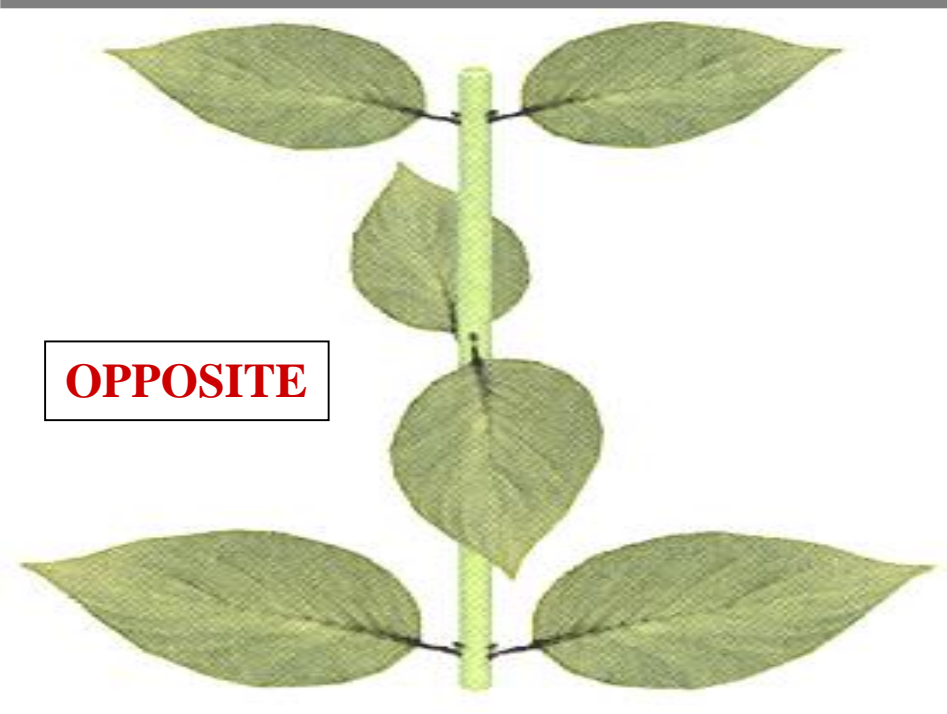
BRANCH ORIGIN POINT



FROND



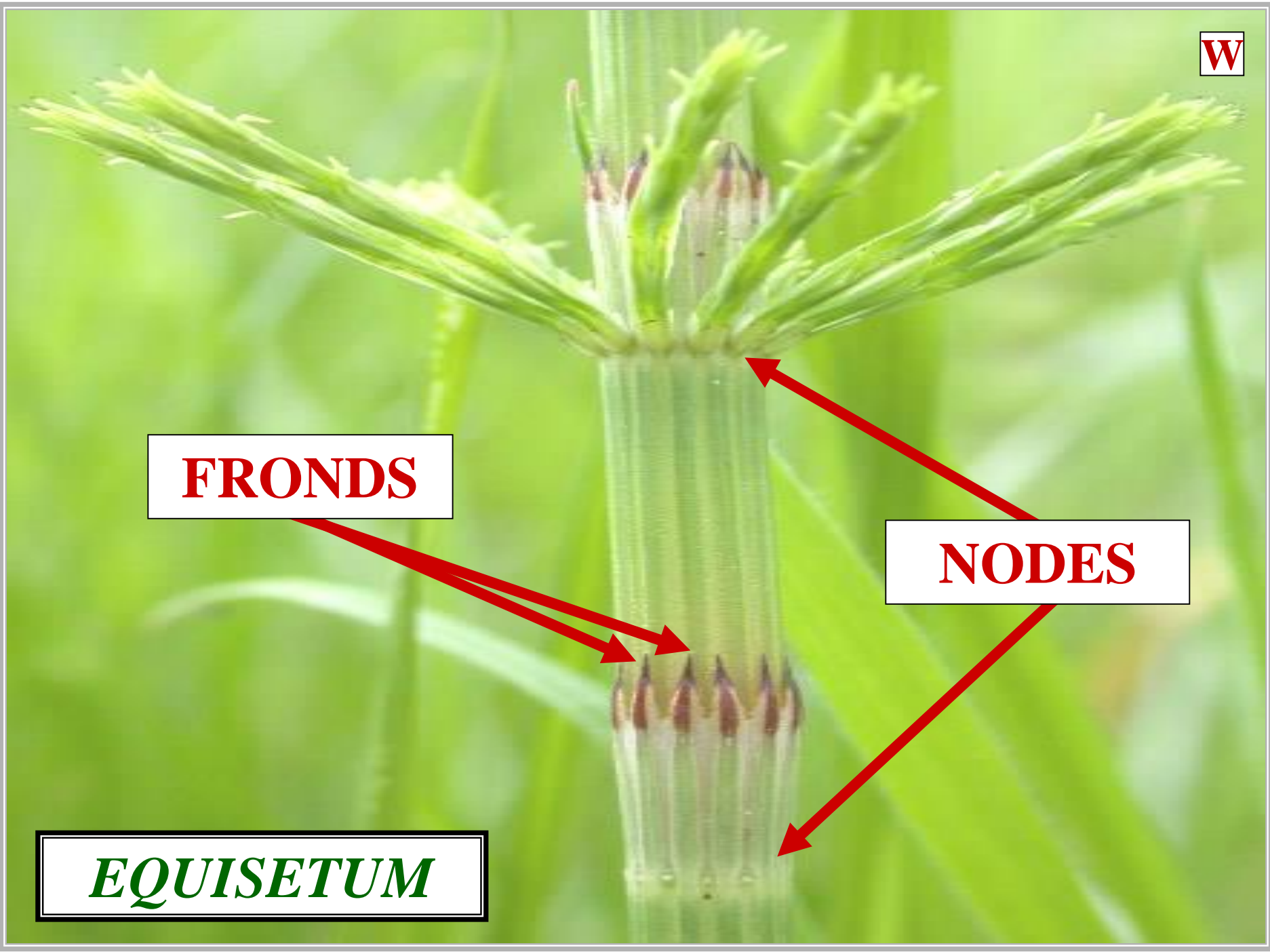
PHYLLOTAXY



FRONDS

NODES

EQUISETUM

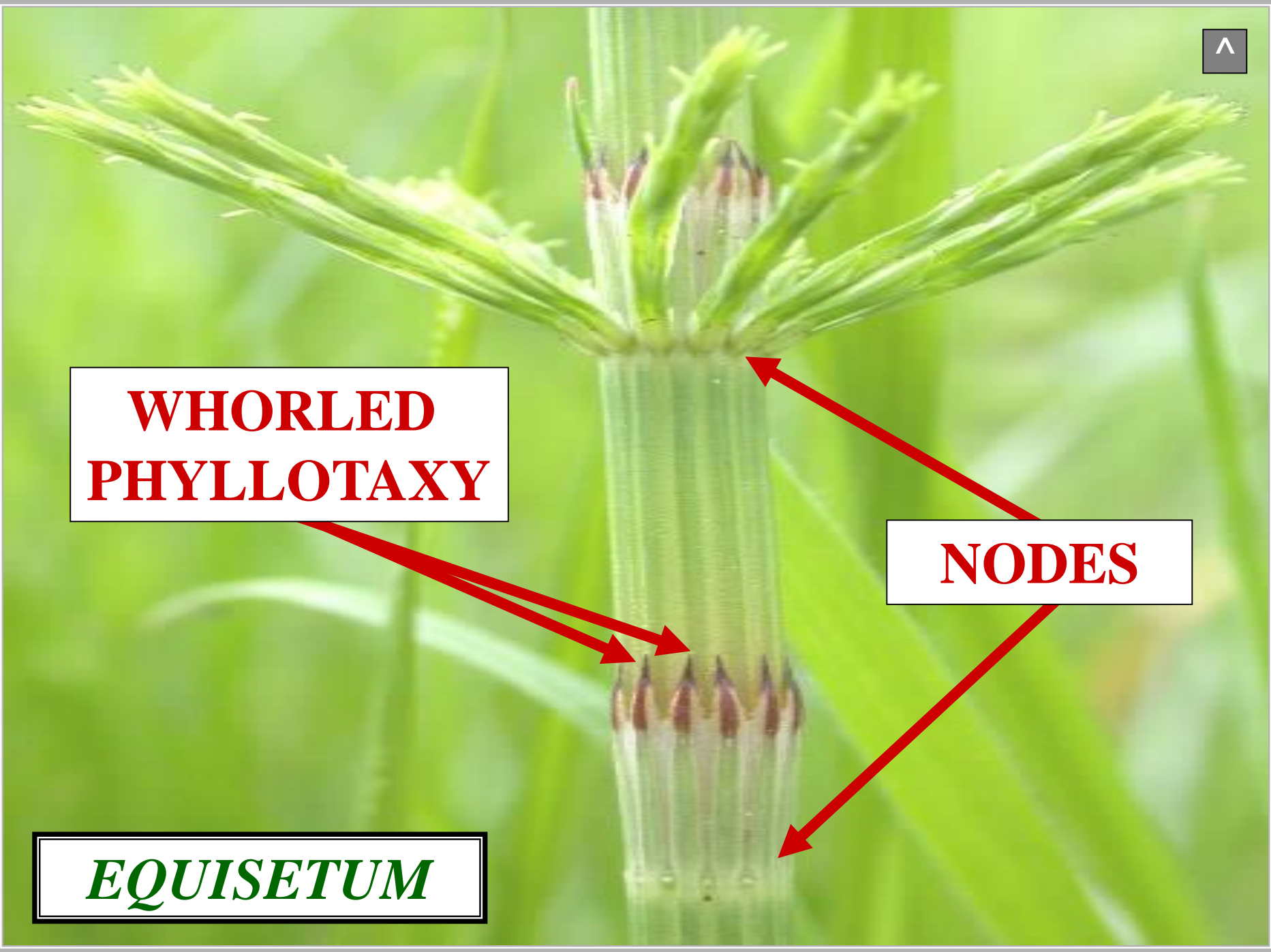




**WHORLED
PHYLLOTAXY**

NODES

EQUISETUM



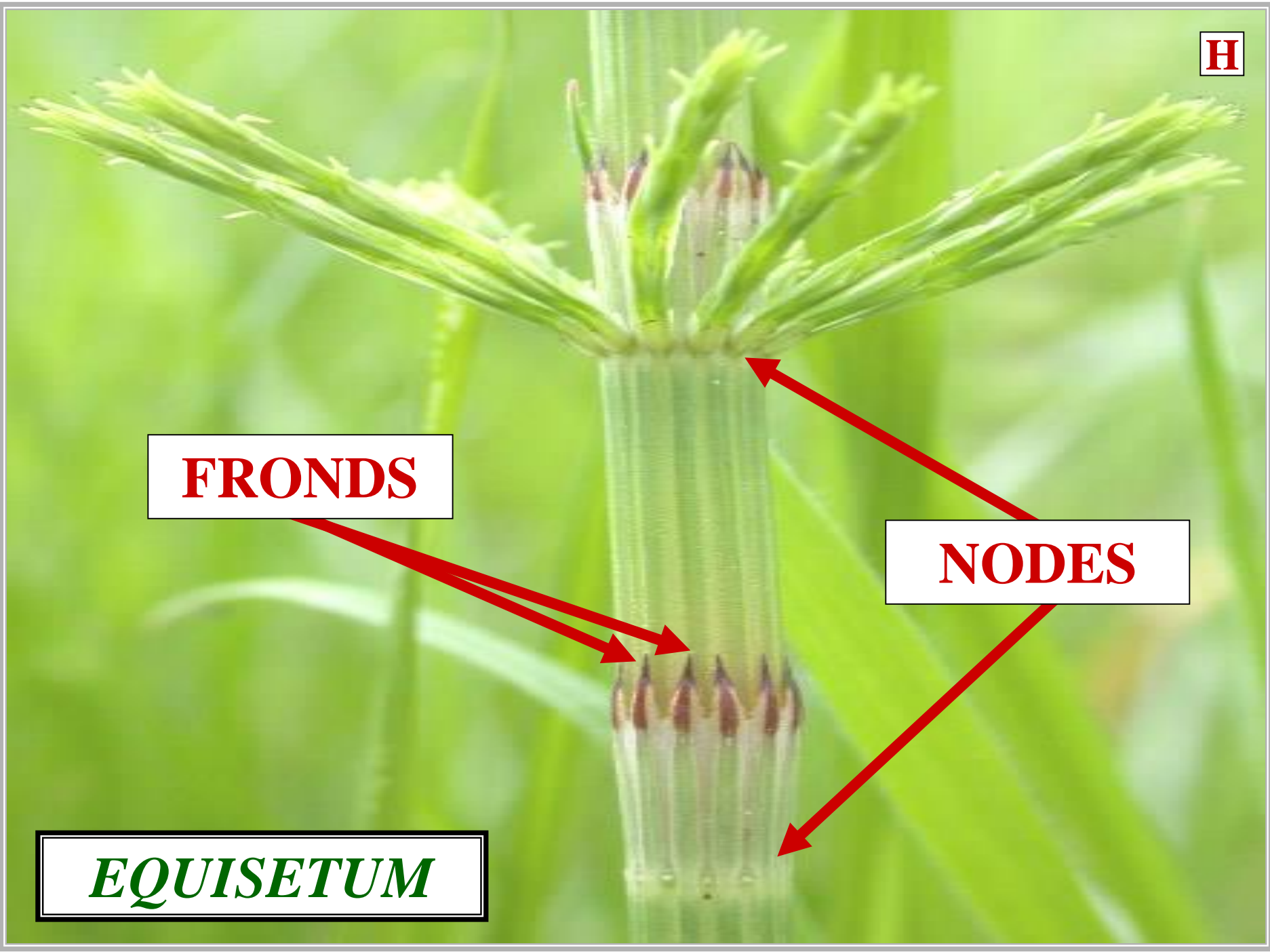


MORPHOLOGY

FRONDS

NODES

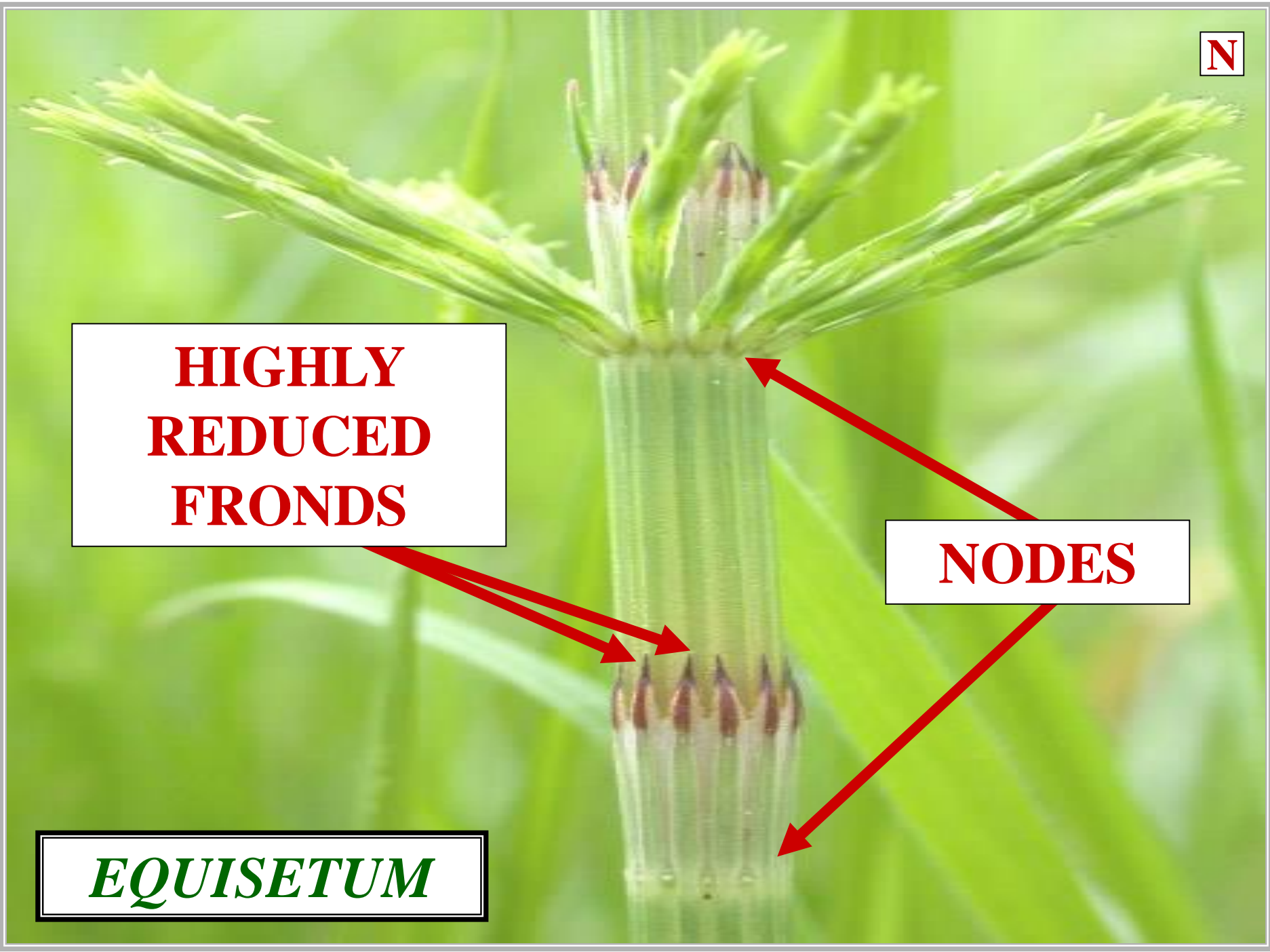
EQUISETUM



**HIGHLY
REDUCED
FRONDS**

NODES

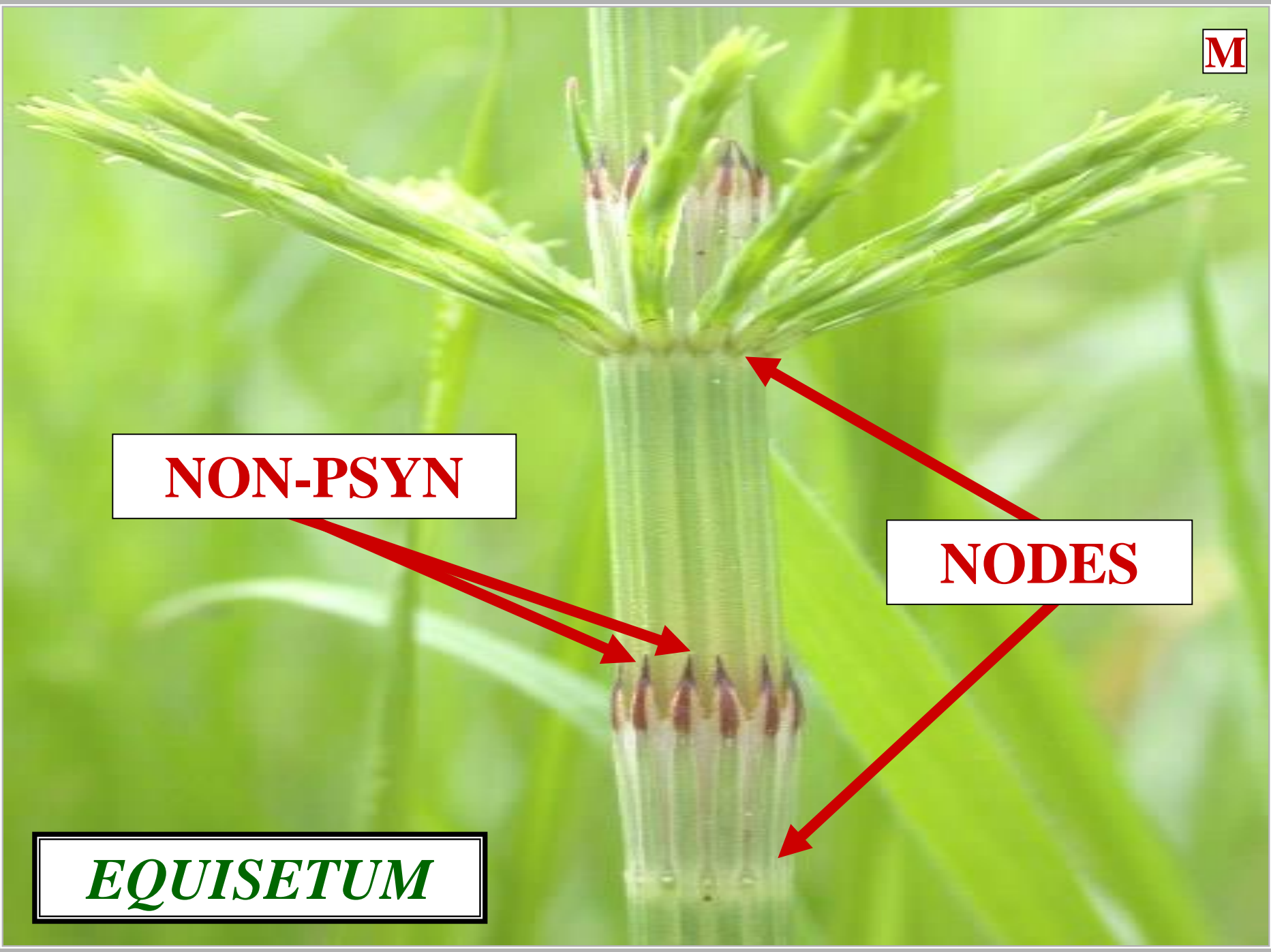
EQUISETUM



NON-PSYN

NODES

EQUISETUM

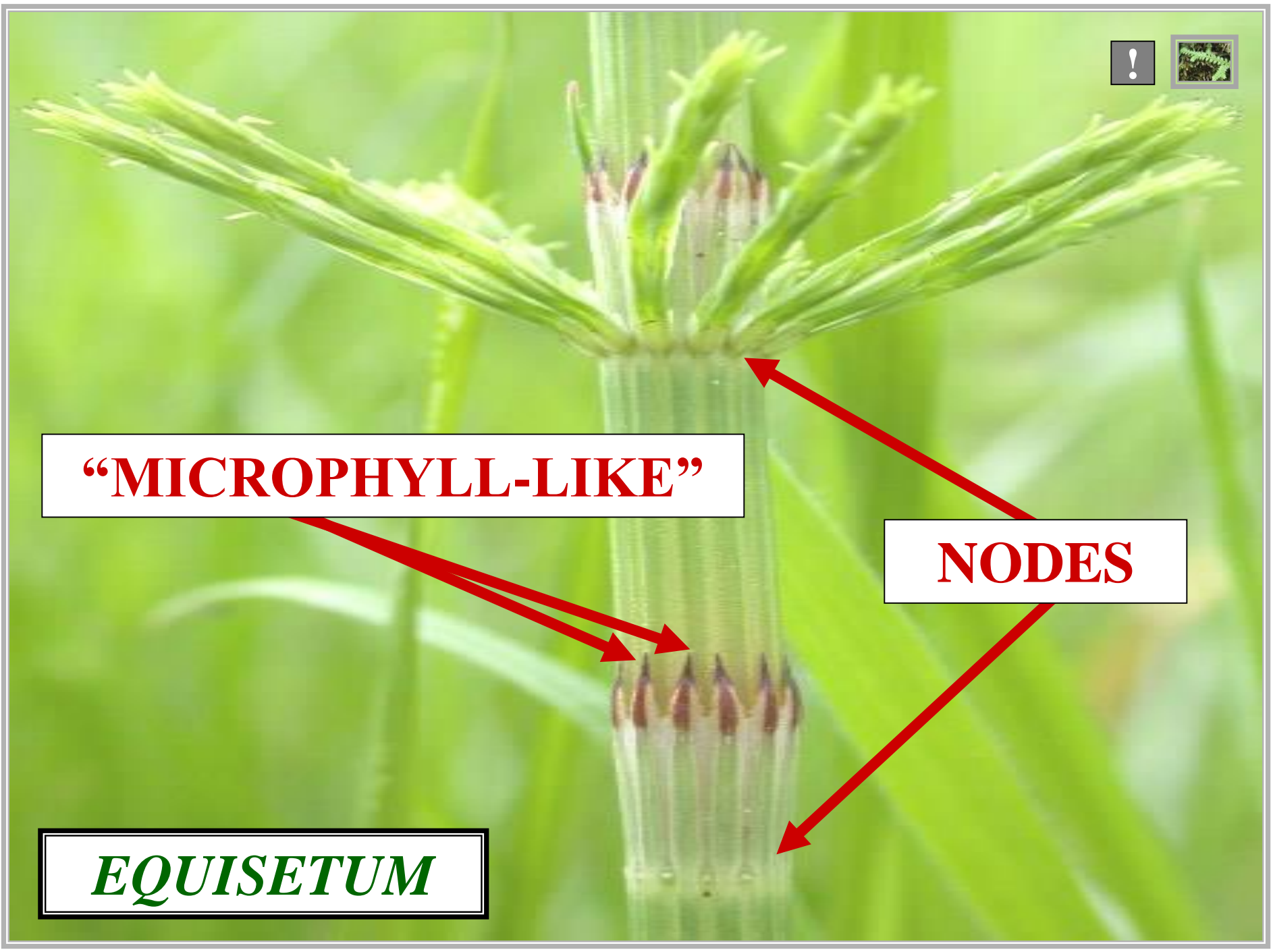




“MICROPHYLL-LIKE”

NODES

EQUISETUM

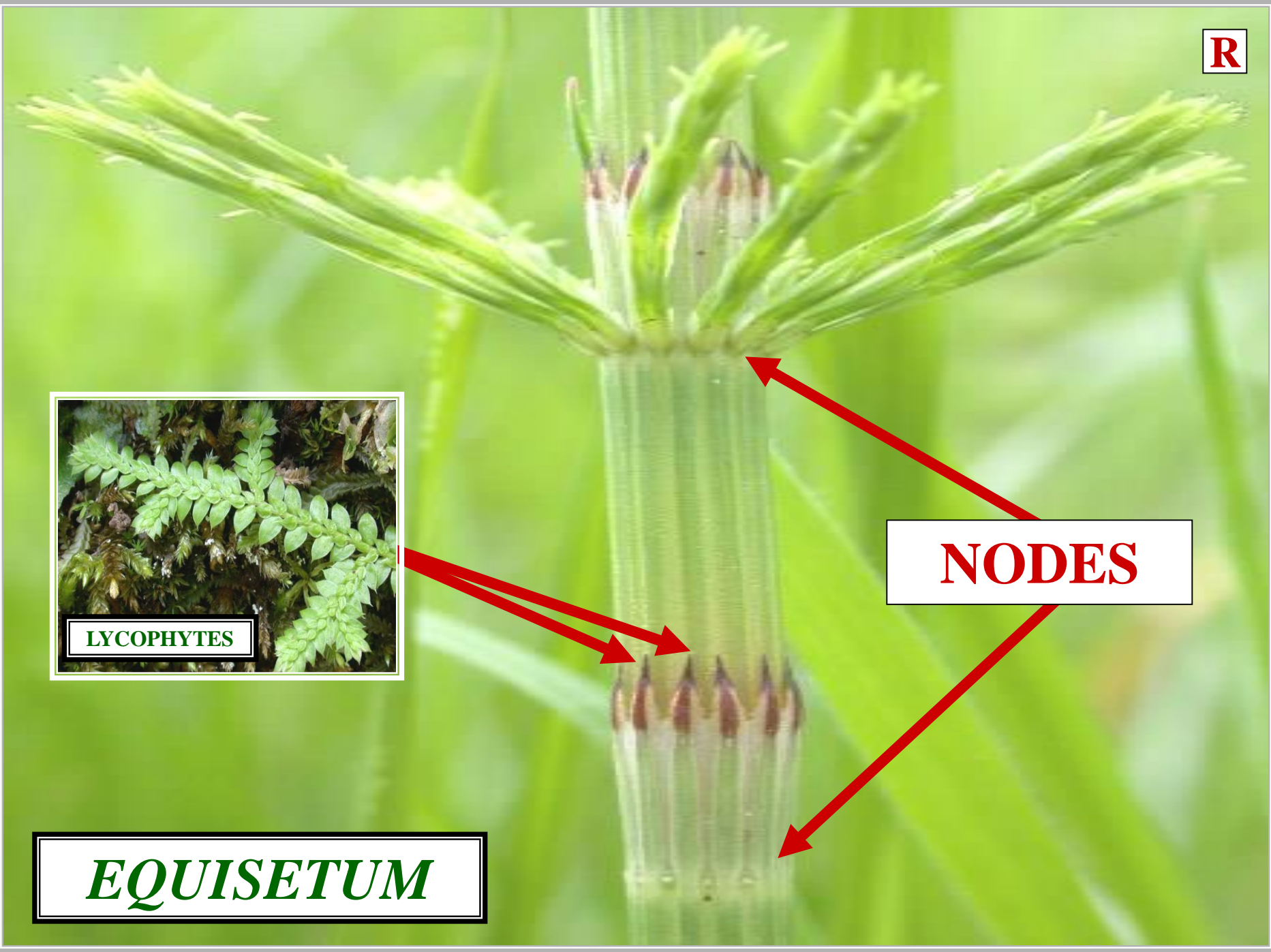




LYCOPHYTES

EQUISETUM

NODES

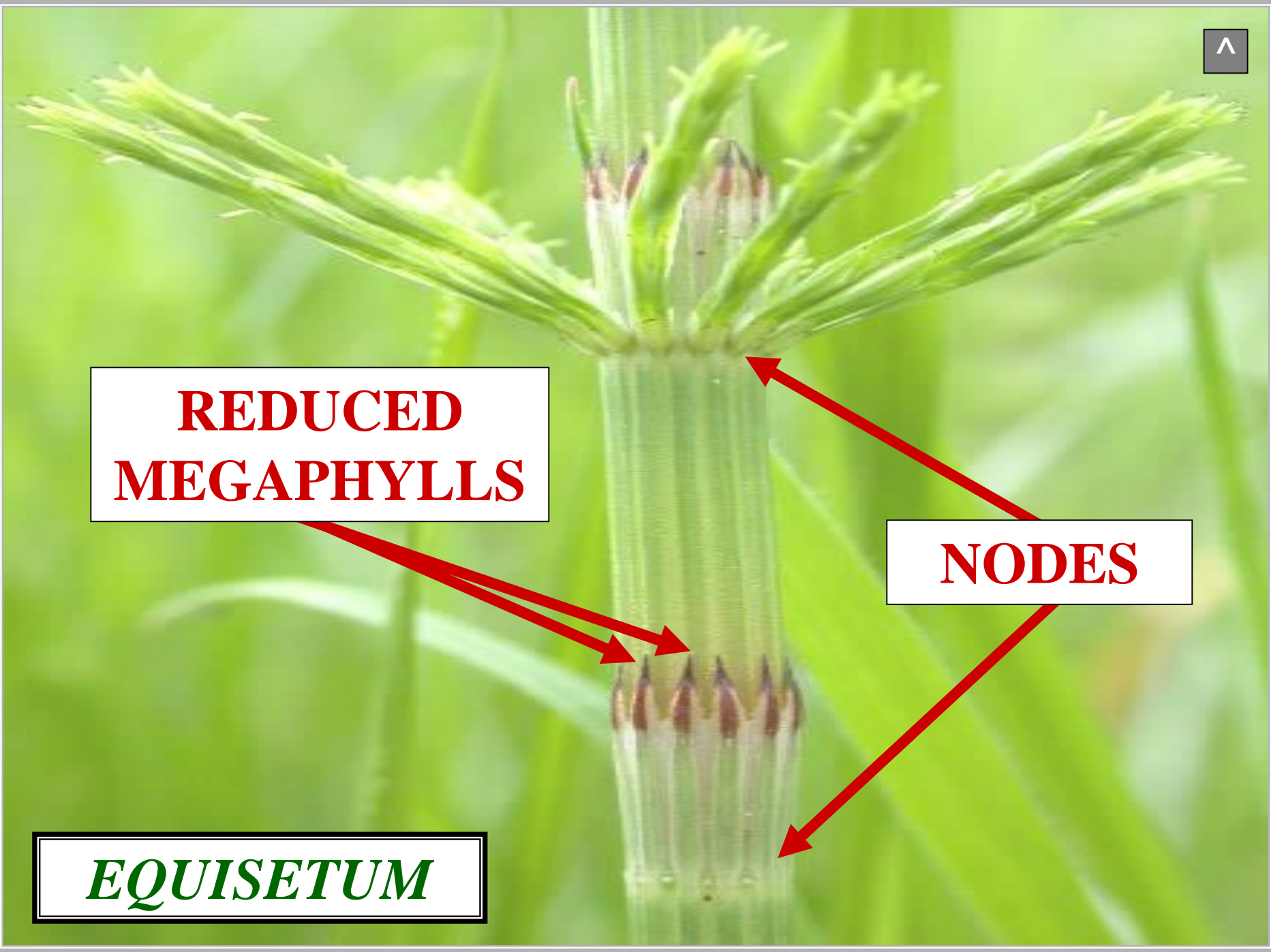




**REDUCED
MEGAPHYLLS**

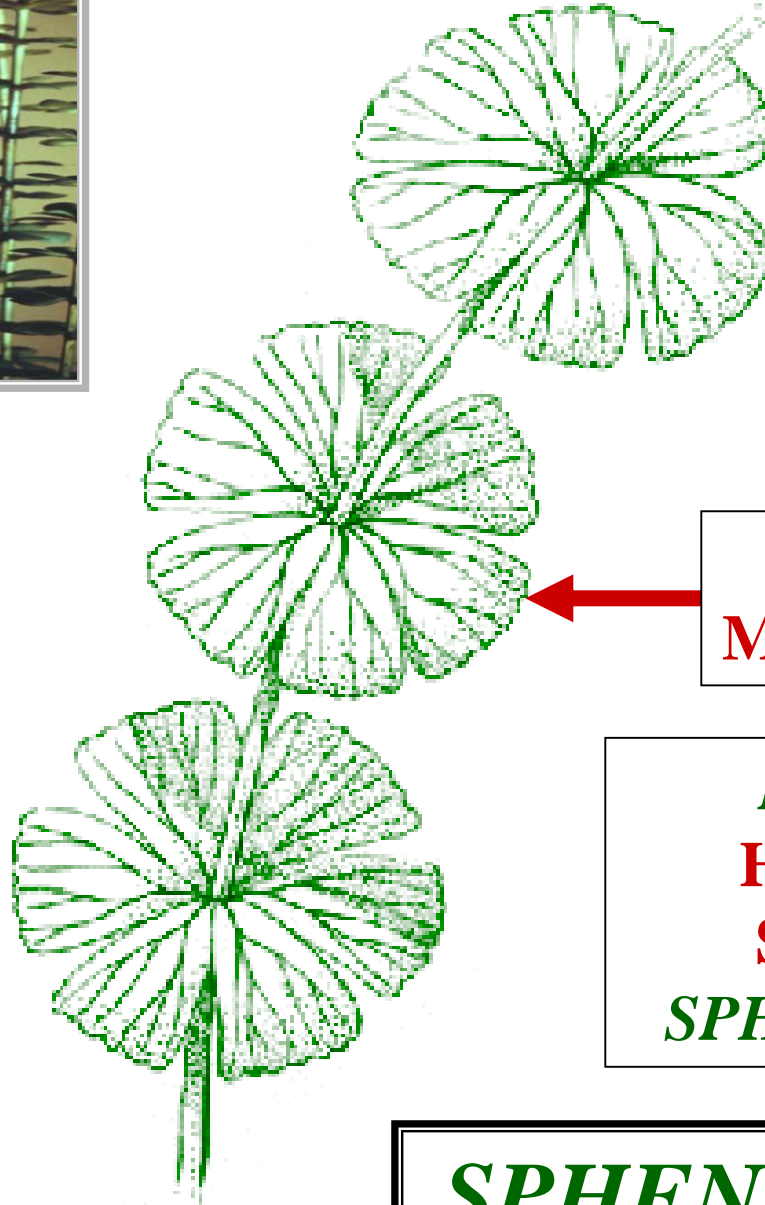
NODES

EQUISETUM





FROND EVOLUTION

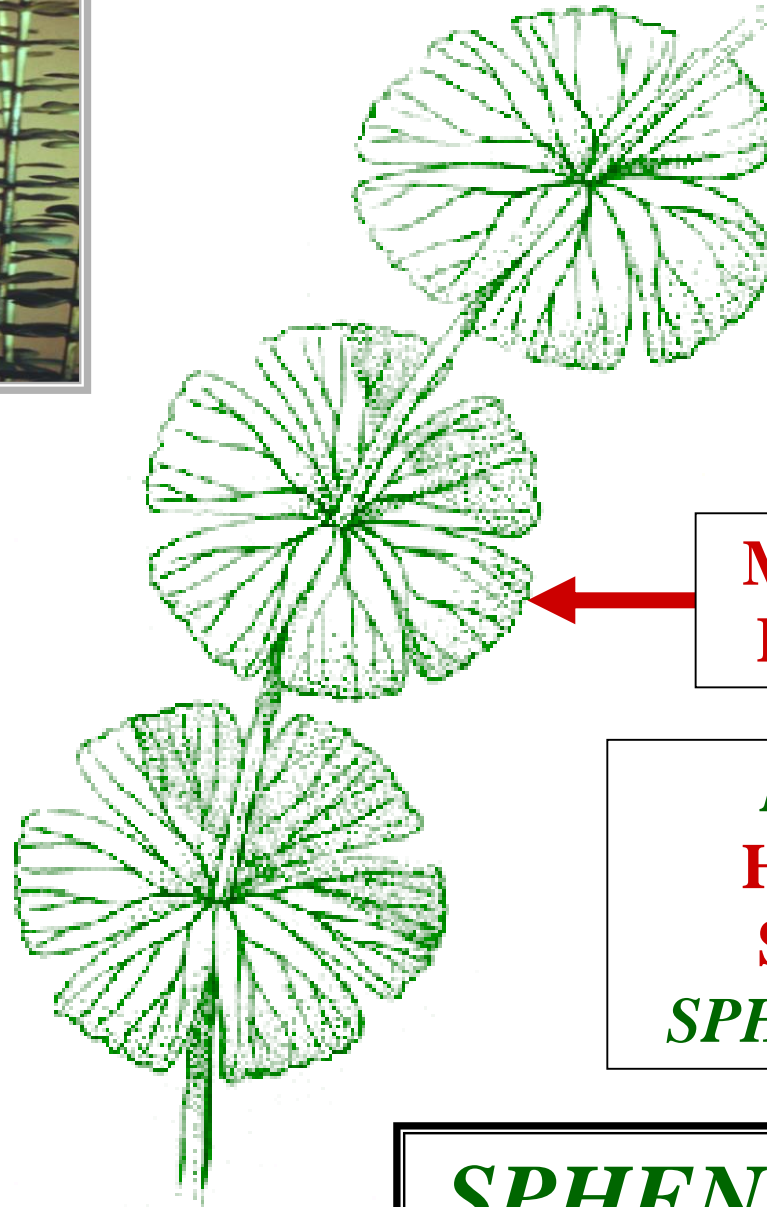


**WHORLED
MEGAPHYLLS**

*EQUISETUM
HAD FRONDS
SIMILAR TO
SPHENOPHYLLUM*

SPHENOPHYLLUM





**MEGAPHYLL
REDUCTION**

EQUISETUM
**HAD FRONDS
SIMILAR TO**
SPHENOPHYLLUM



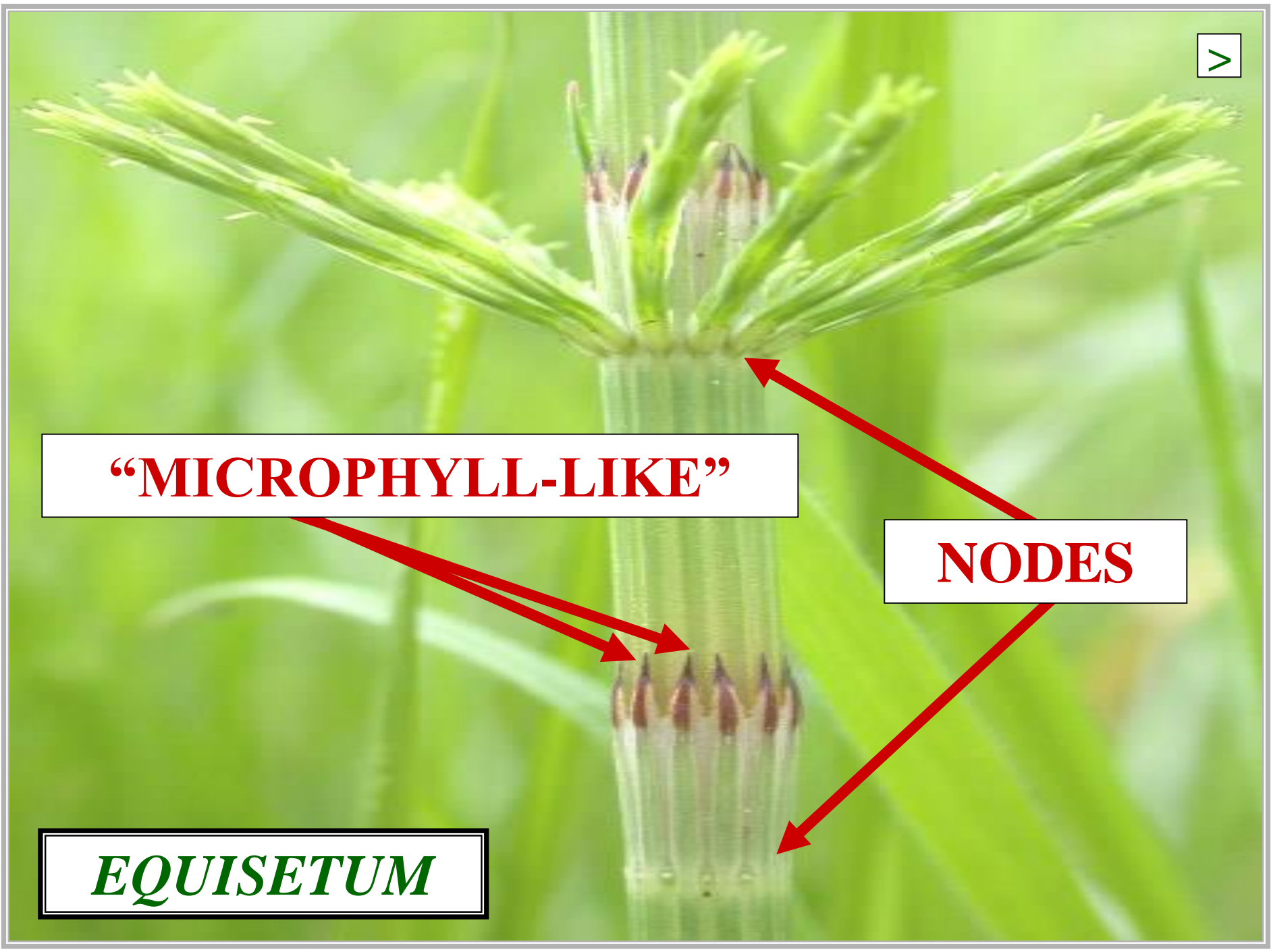
SPHENOPHYLLUM



“MICROPHYLL-LIKE”

NODES

EQUISETUM

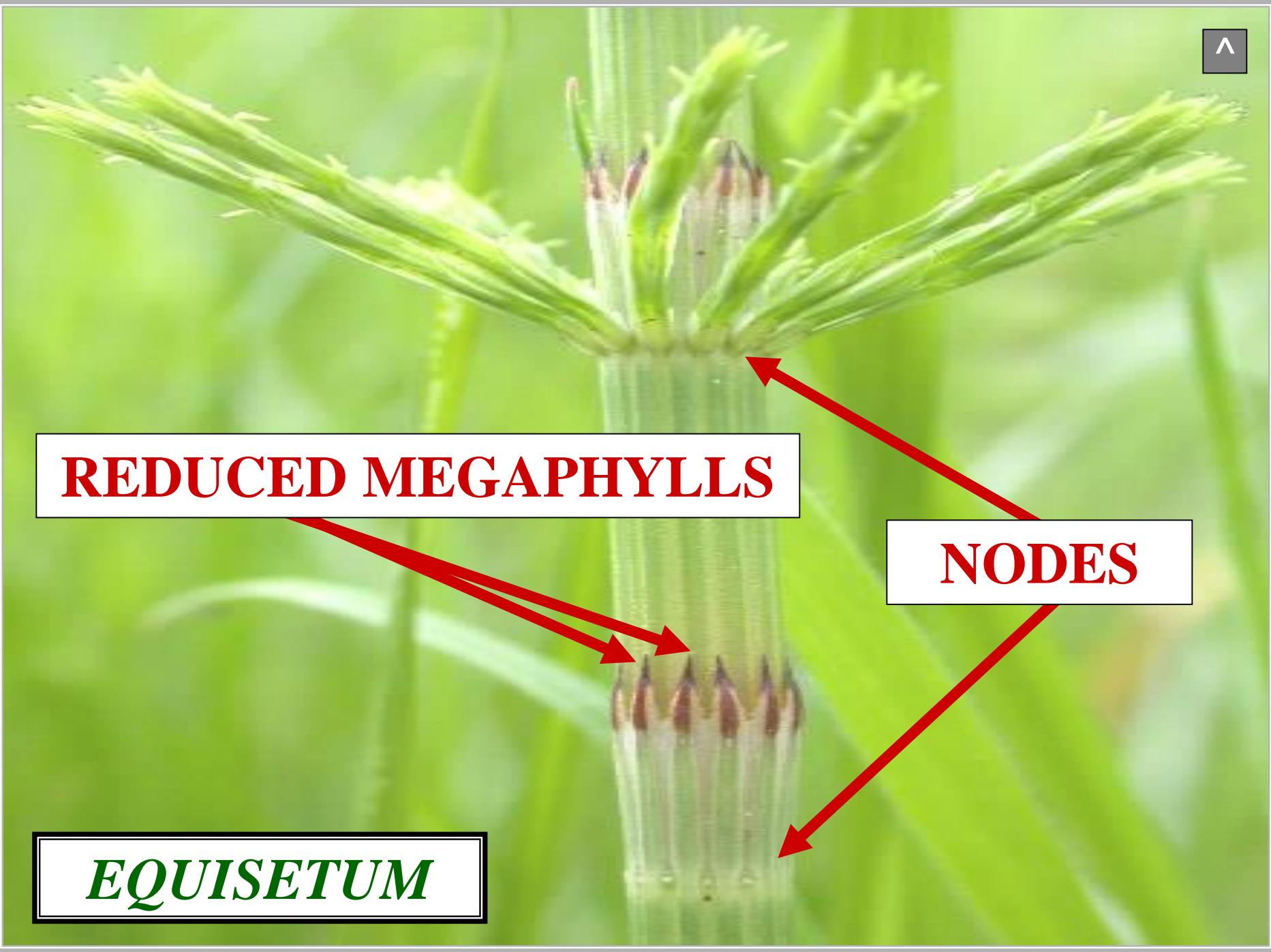




REDUCED MEGAPHYLLS

NODES

EQUISETUM





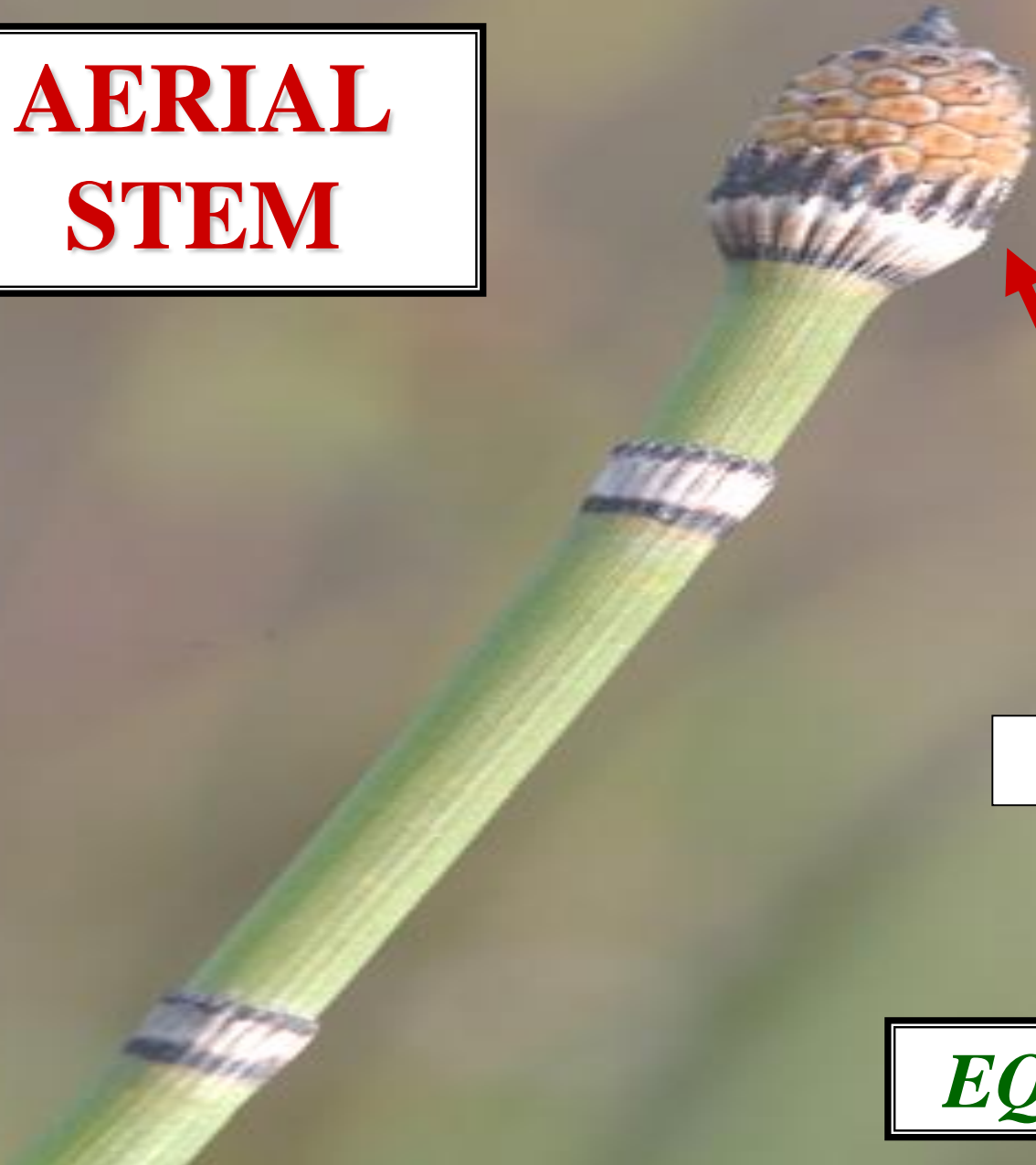
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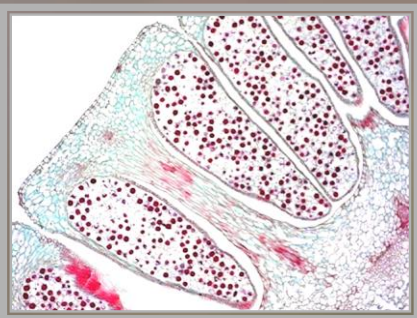
STROBILUS

**AERIAL
STEM**

STROBILUS

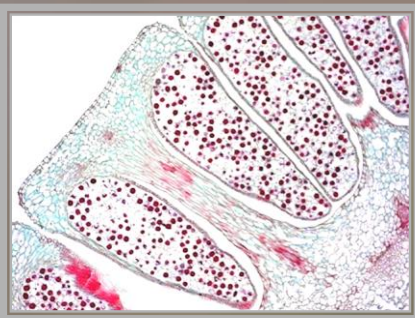
EQUISETUM





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EQUISETUM



SPORANGIOPHORE

EQUISETUM

SPORANGIOPHORE

SPORANGIOPHORE



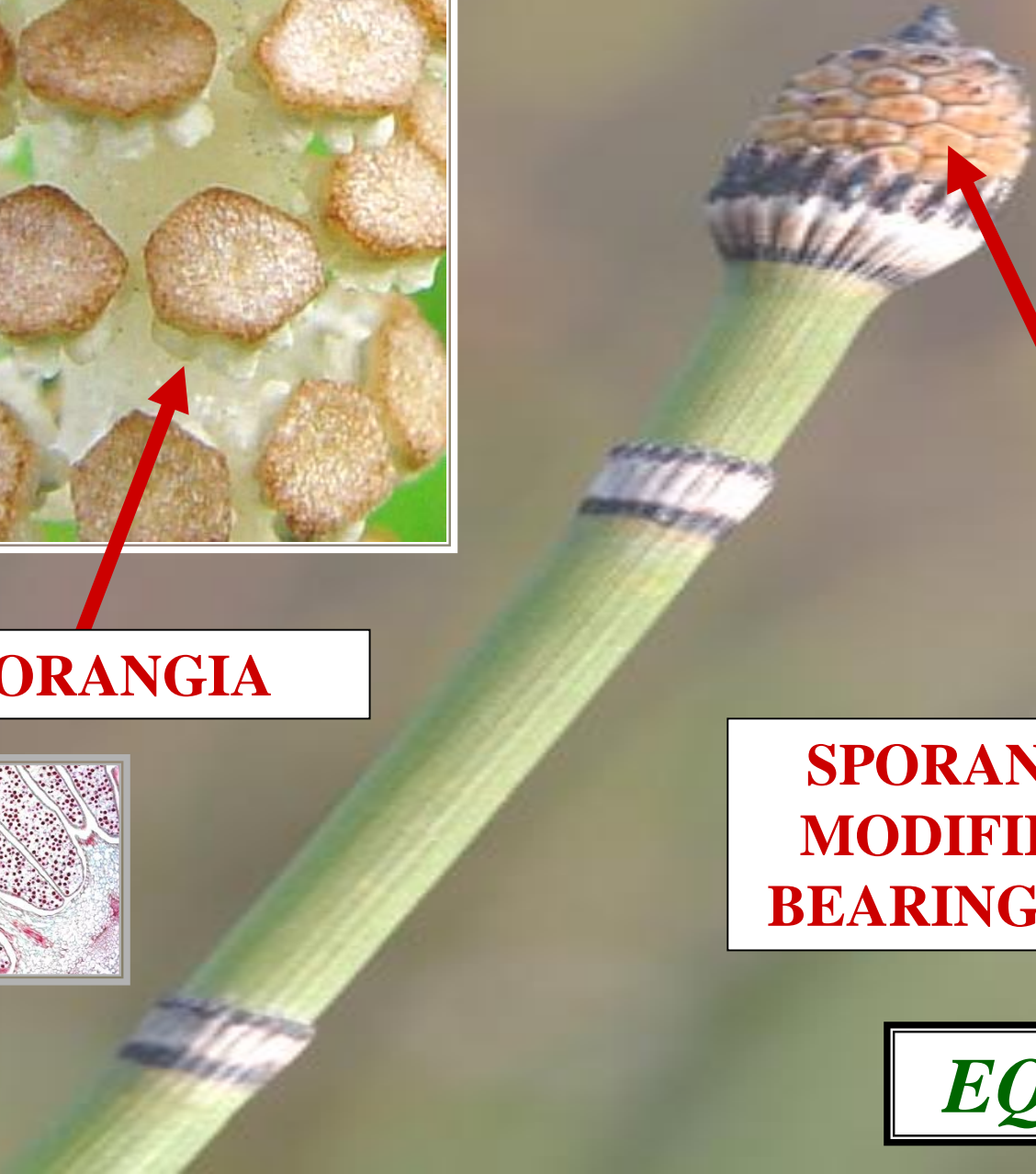
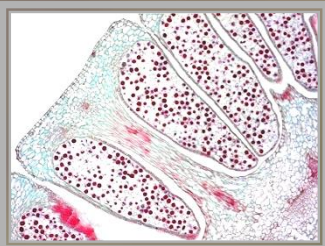
EQISETUM
SPORANGIOPHORE

MODIFIED
BRANCH/STEM
BEARING
SPORANGIA

EQISETUM
SPORANGIOPHORE



SPORANGIA

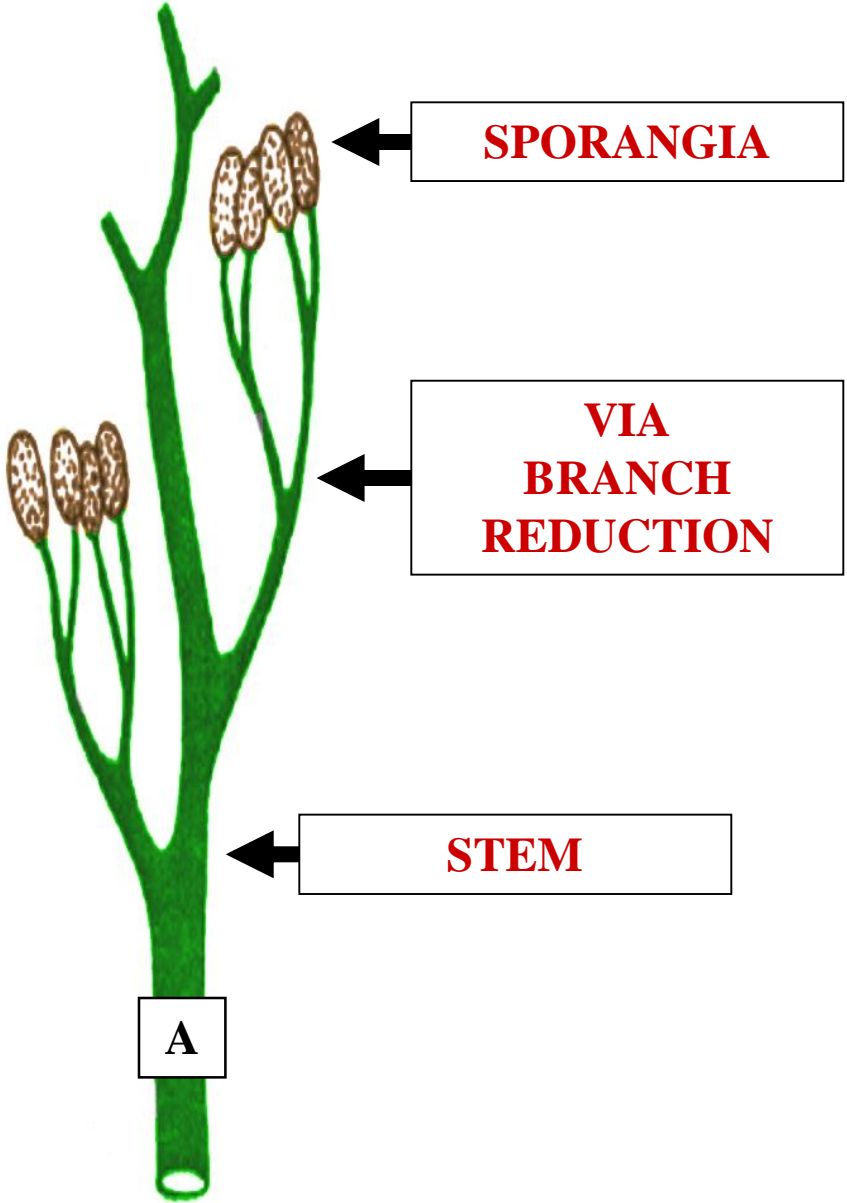


**SPORANGIOPHORE
MODIFIED BRANCH
BEARING SPORANGIA**

EQUISETUM



SPORANGIOPHORE EVOLUTION



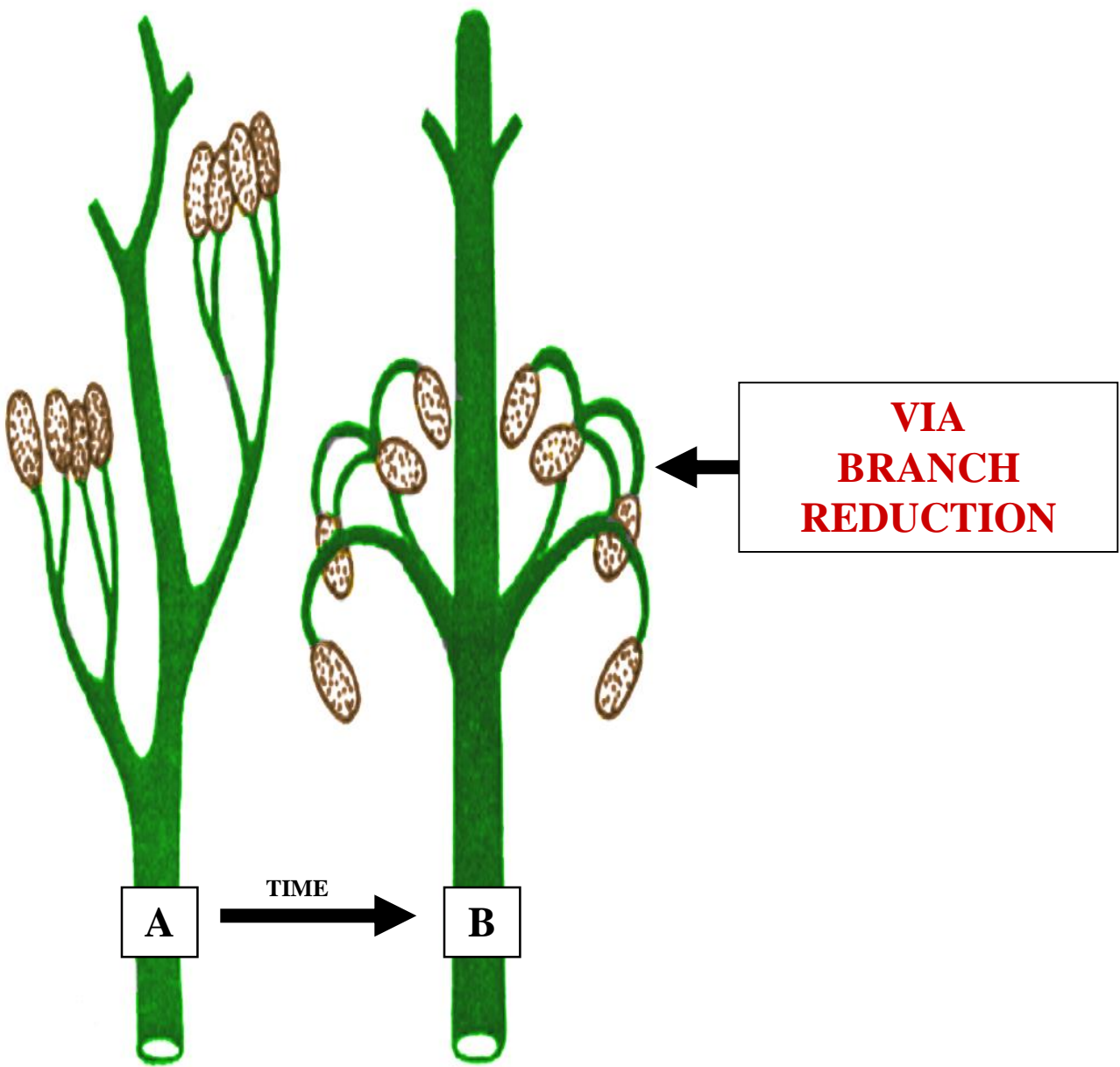
SPORANGIA

**VIA
BRANCH
REDUCTION**

STEM

A

EVOLVED VIA BRANCH REDUCTION



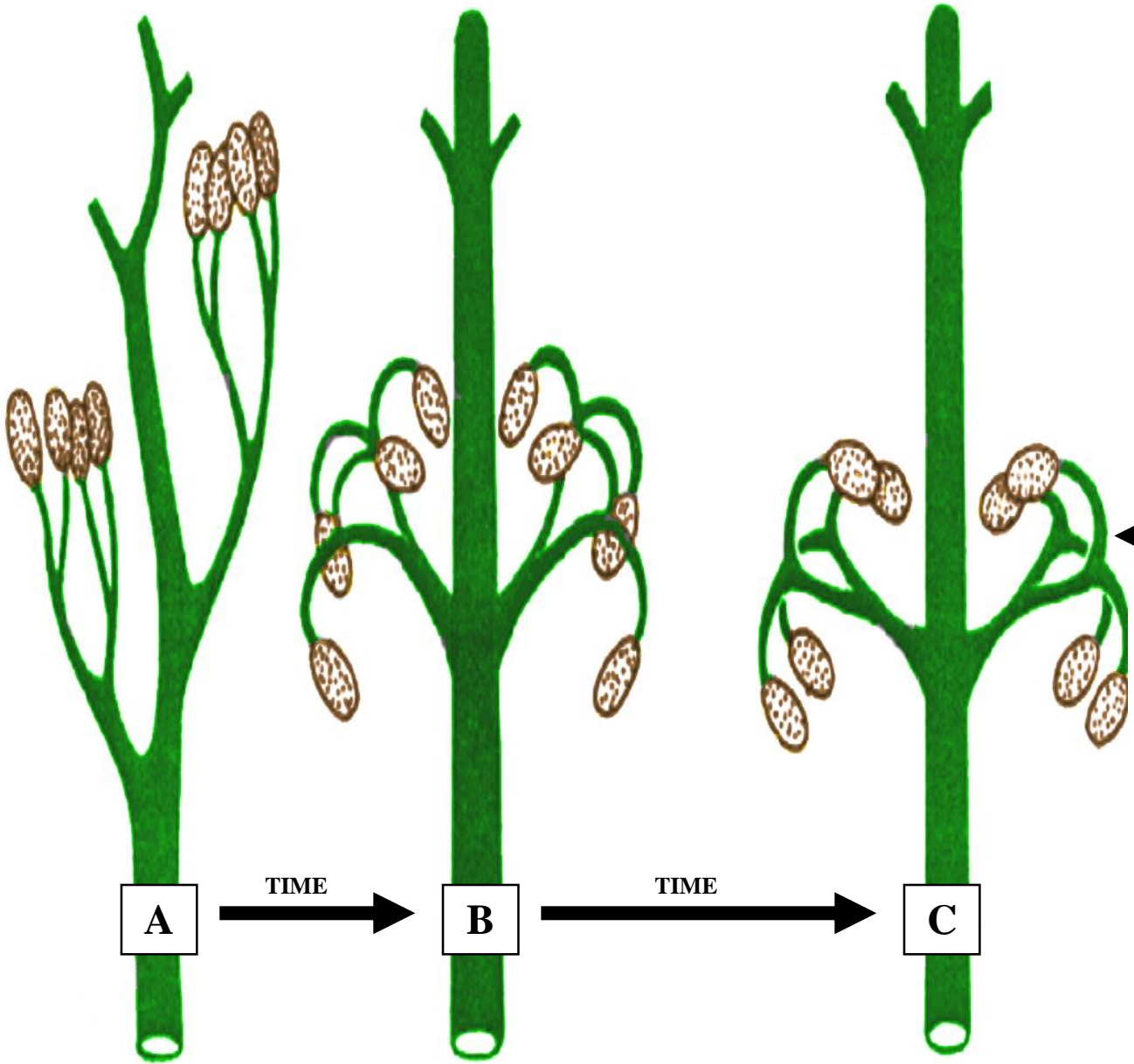
**VIA
BRANCH
REDUCTION**

A

TIME

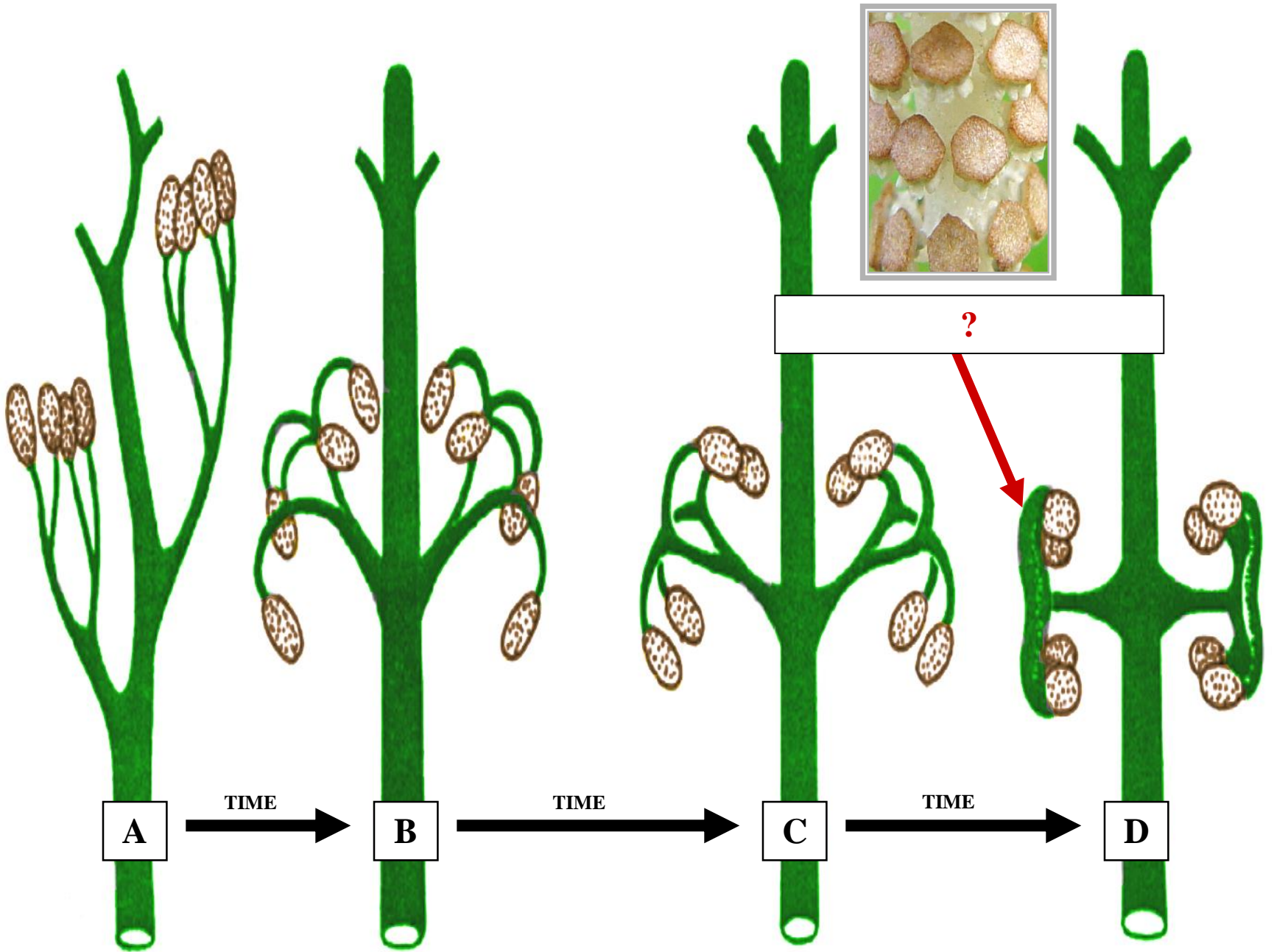
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EVOLVED VIA BRANCH REDUCTION

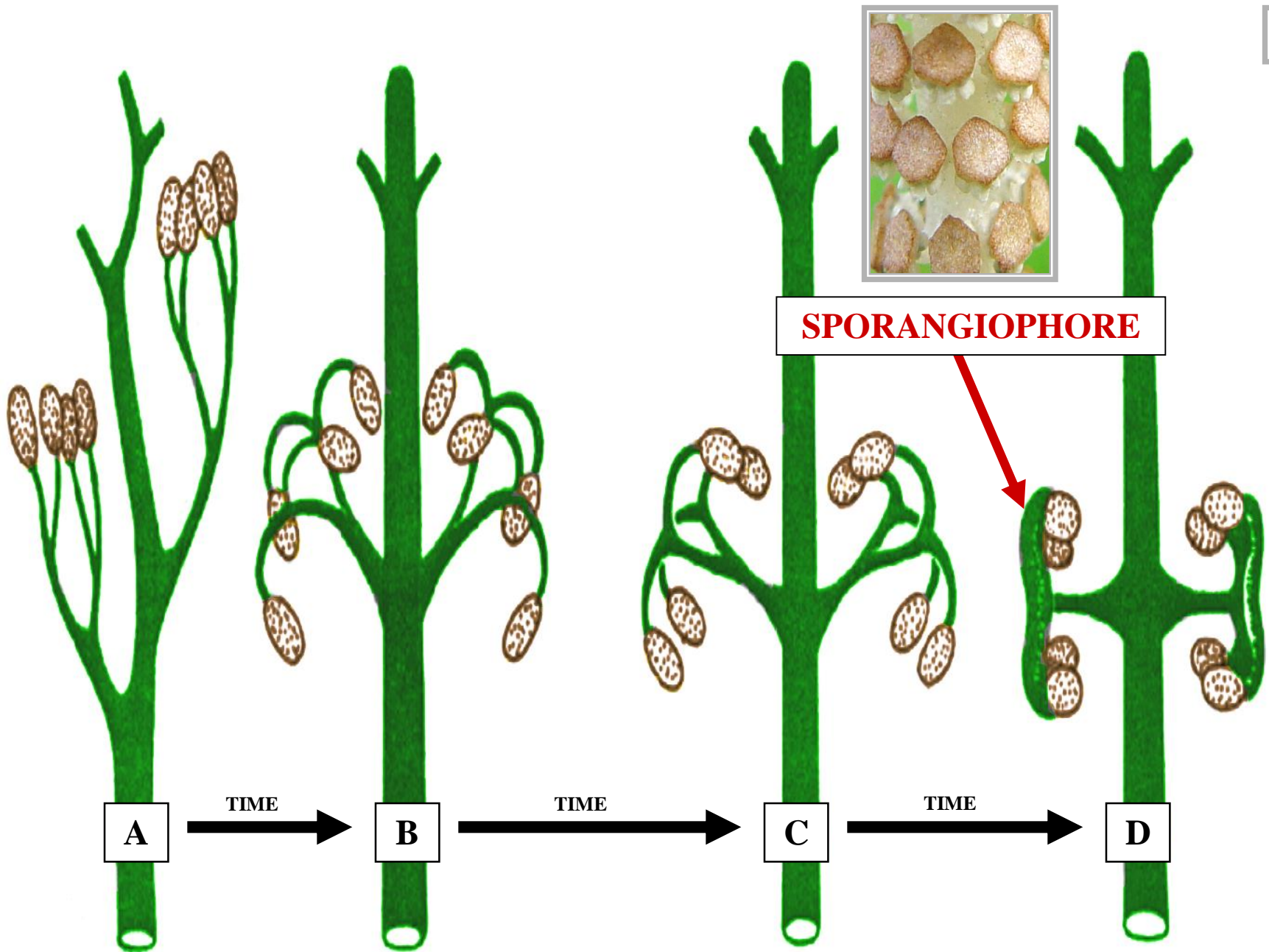


**VIA
BRANCH
REDUCTION**

EVOLVED VIA BRANCH REDUCTION



EVOLVED VIA BRANCH REDUCTION



SPORANGIOPHORE

TIME

TIME

TIME

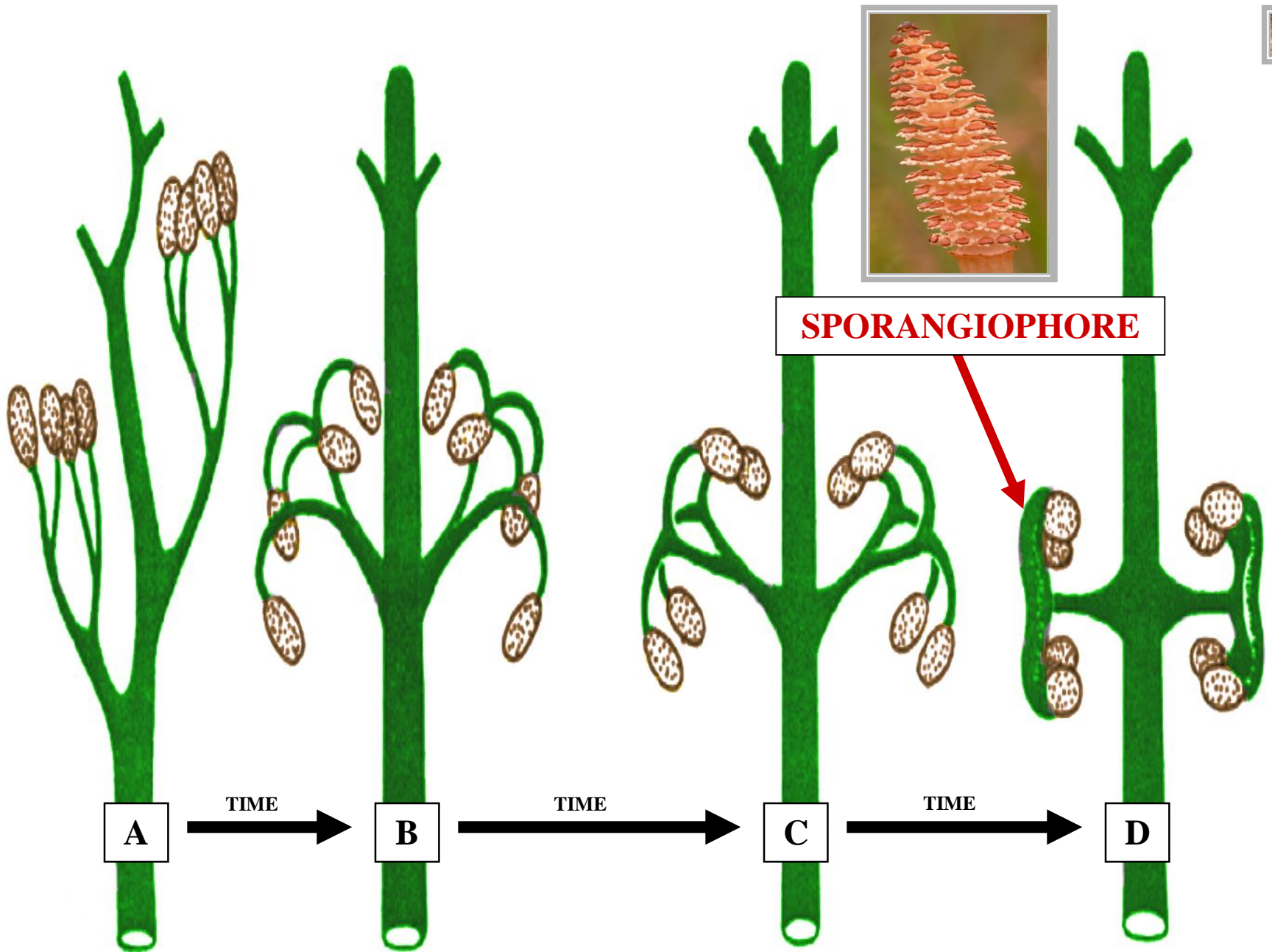
A

B

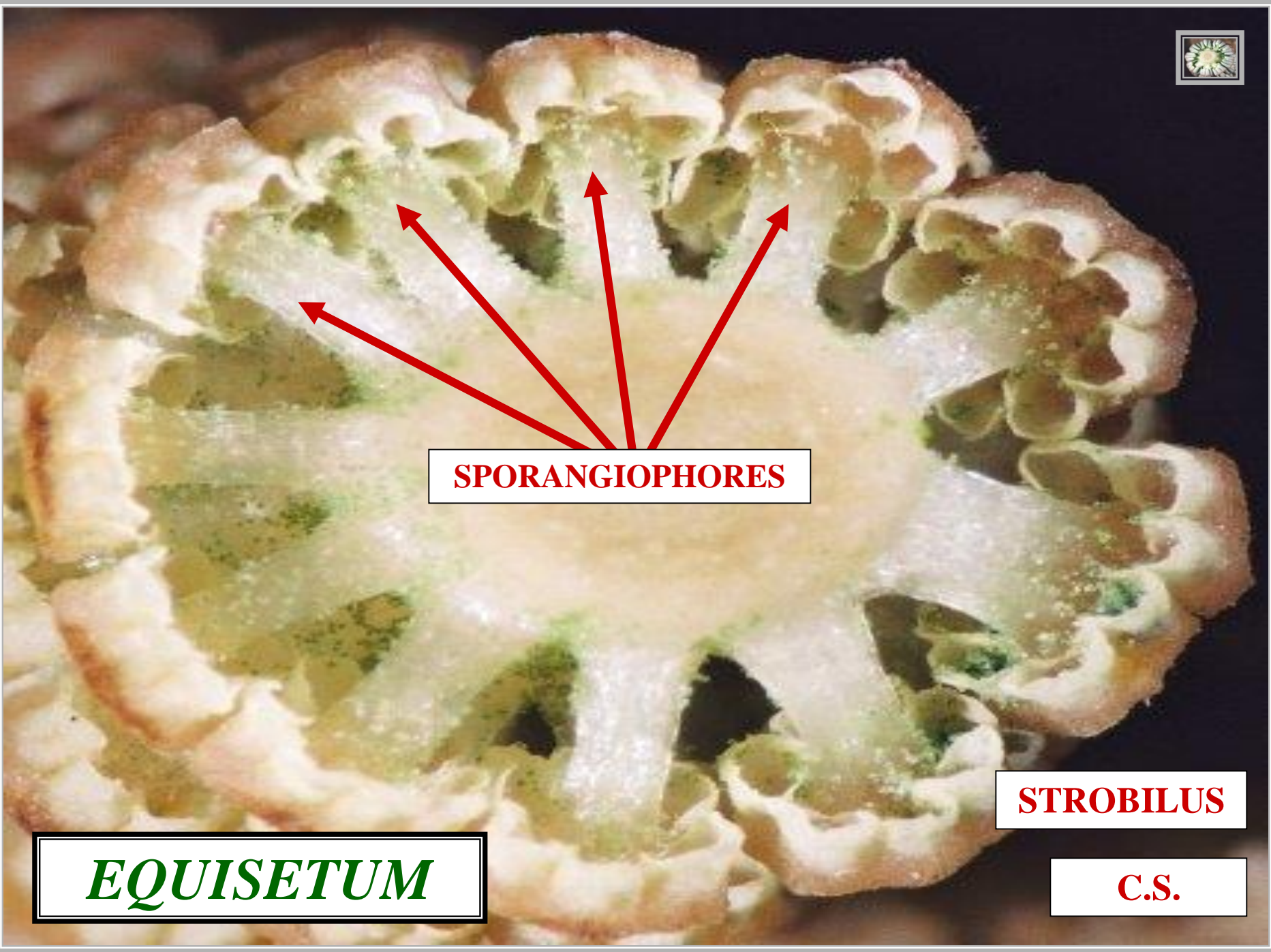
C

D

EVOLVED VIA BRANCH REDUCTION



EVOLVED VIA BRANCH REDUCTION

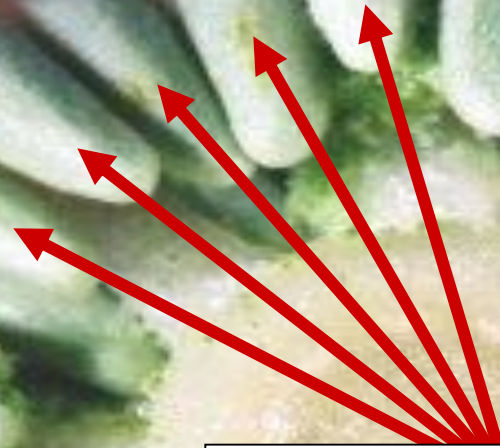


SPORANGIOPHORES

STROBILUS

EQUISETUM

C.S.

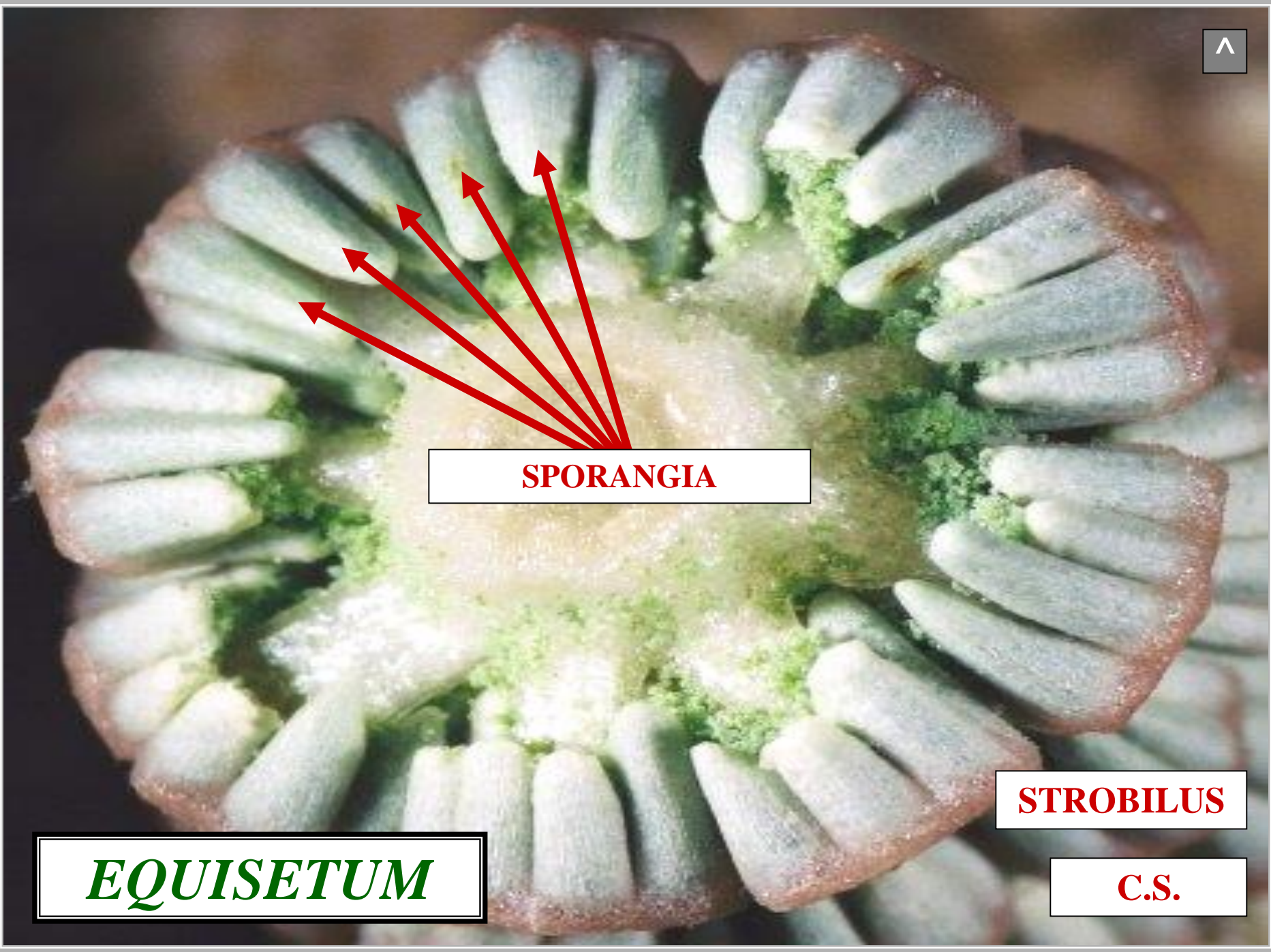


SPORANGIA

STROBILUS

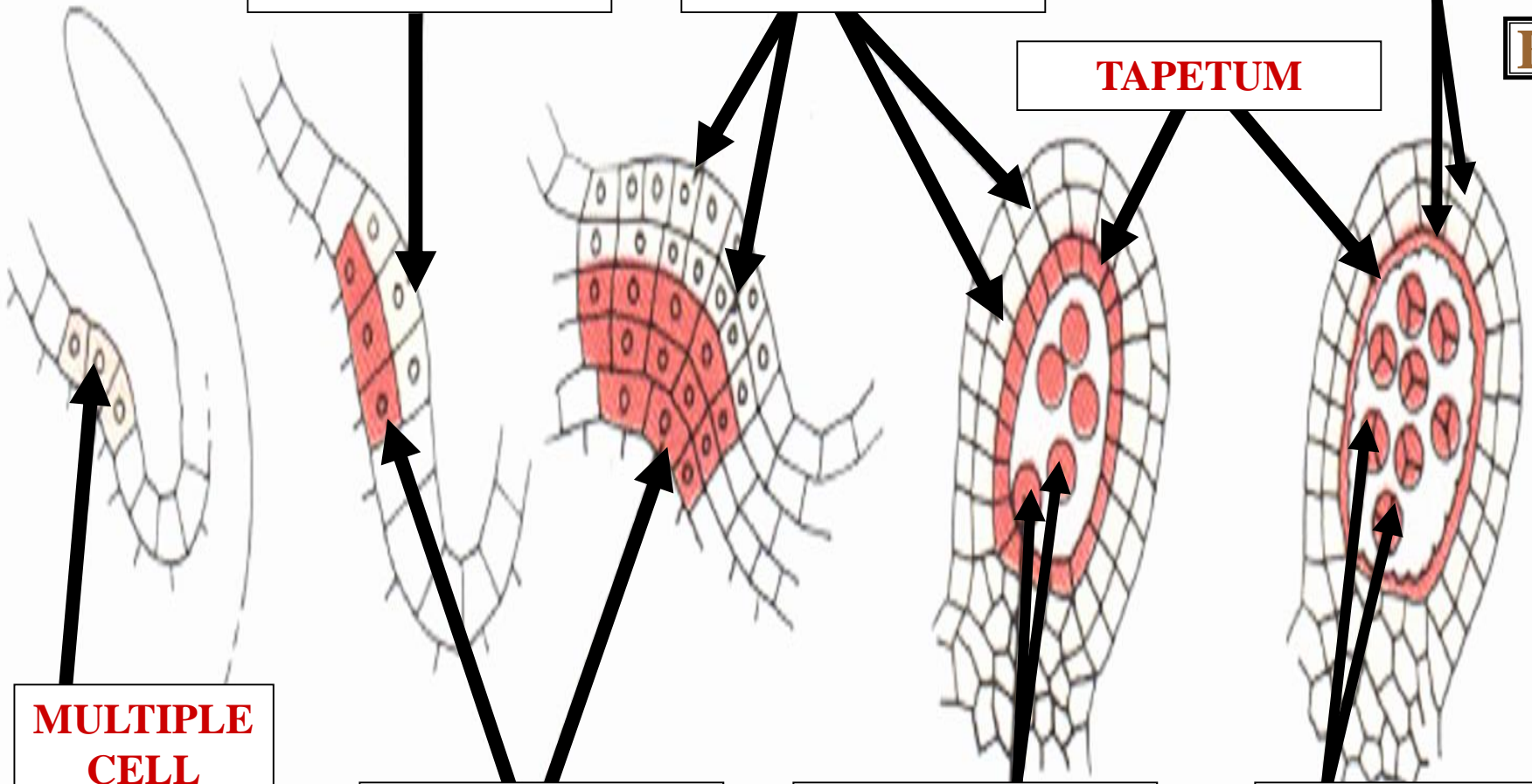
EQUISETUM

C.S.





SPORANGIUM



WALL CELLS

WALL CELLS

LARGE SIZE

THICK WALL

E

TAPETUM

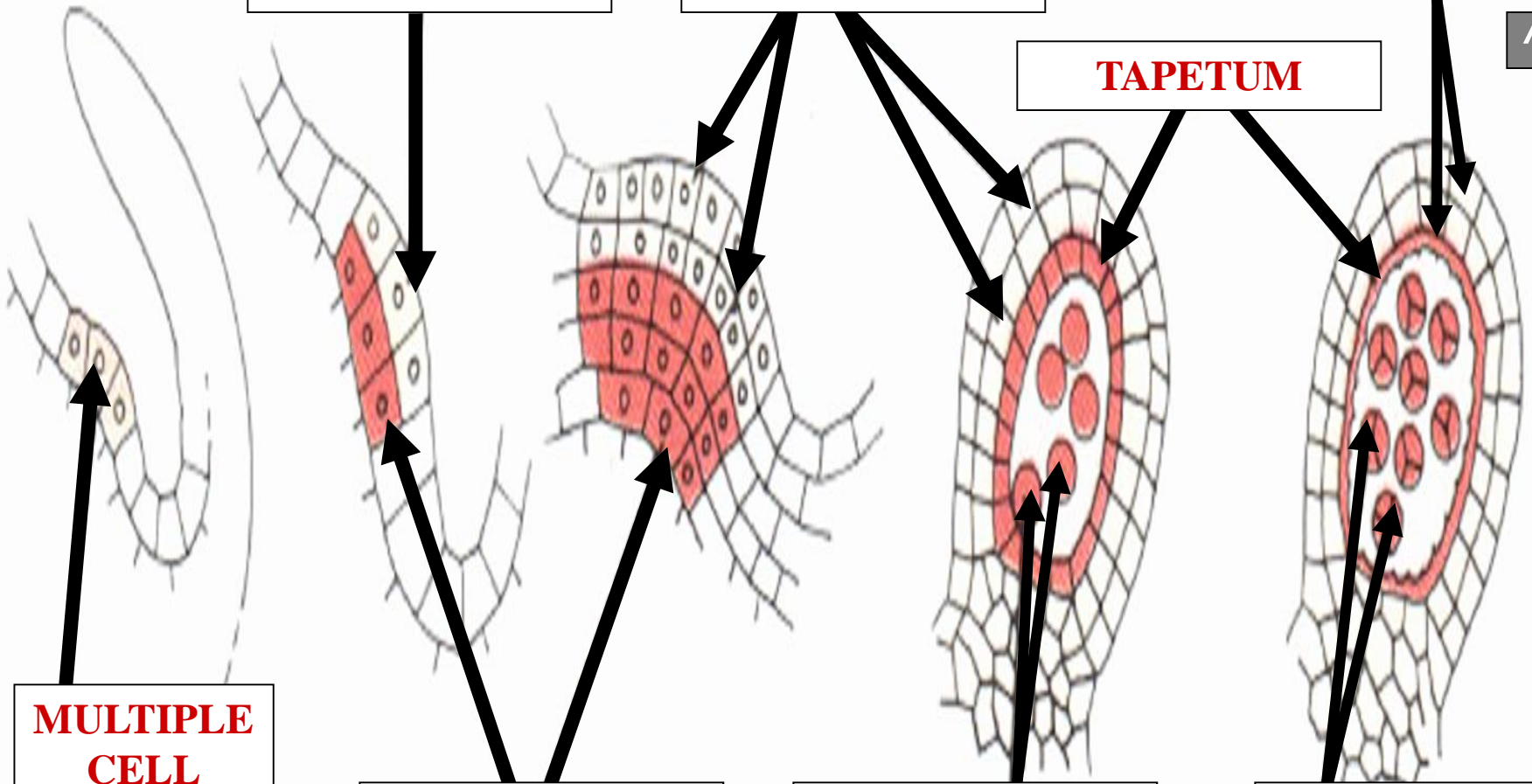
**MULTIPLE
CELL
INITIALS**

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.

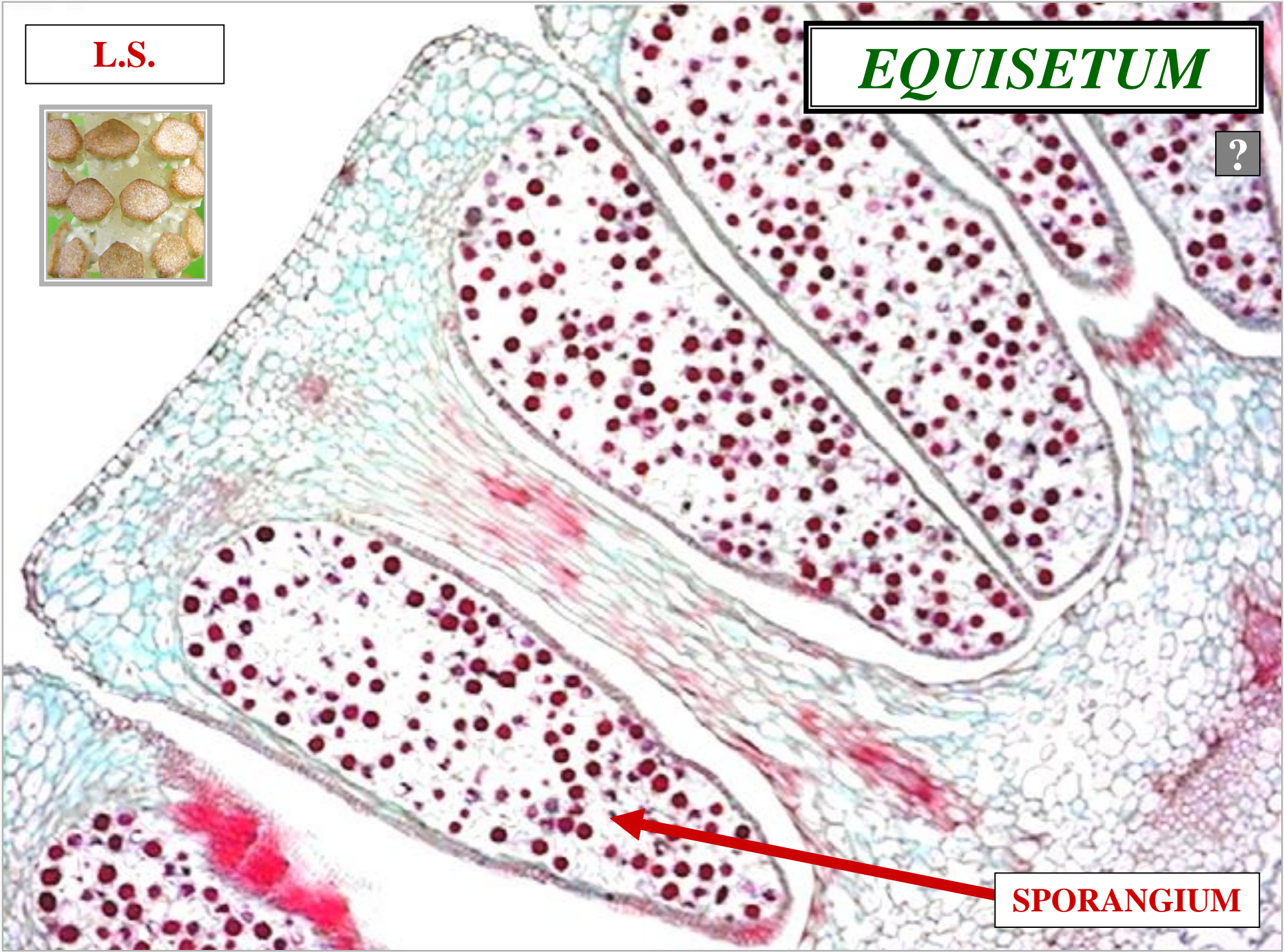
SPORANGIUM POSITION

L.S.



EQUISETUM

?



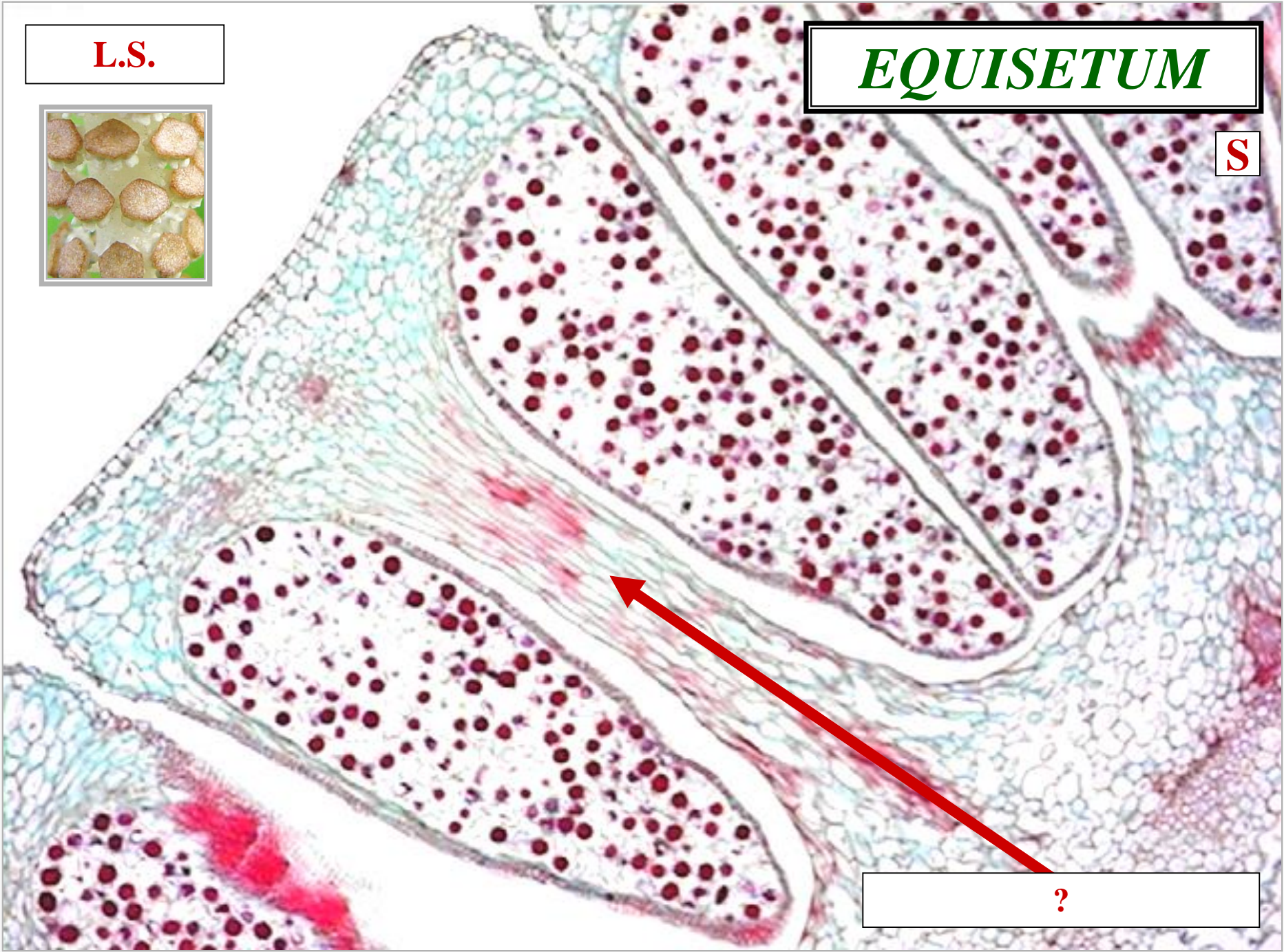
SPORANGIUM

L.S.



EQUISETUM

S



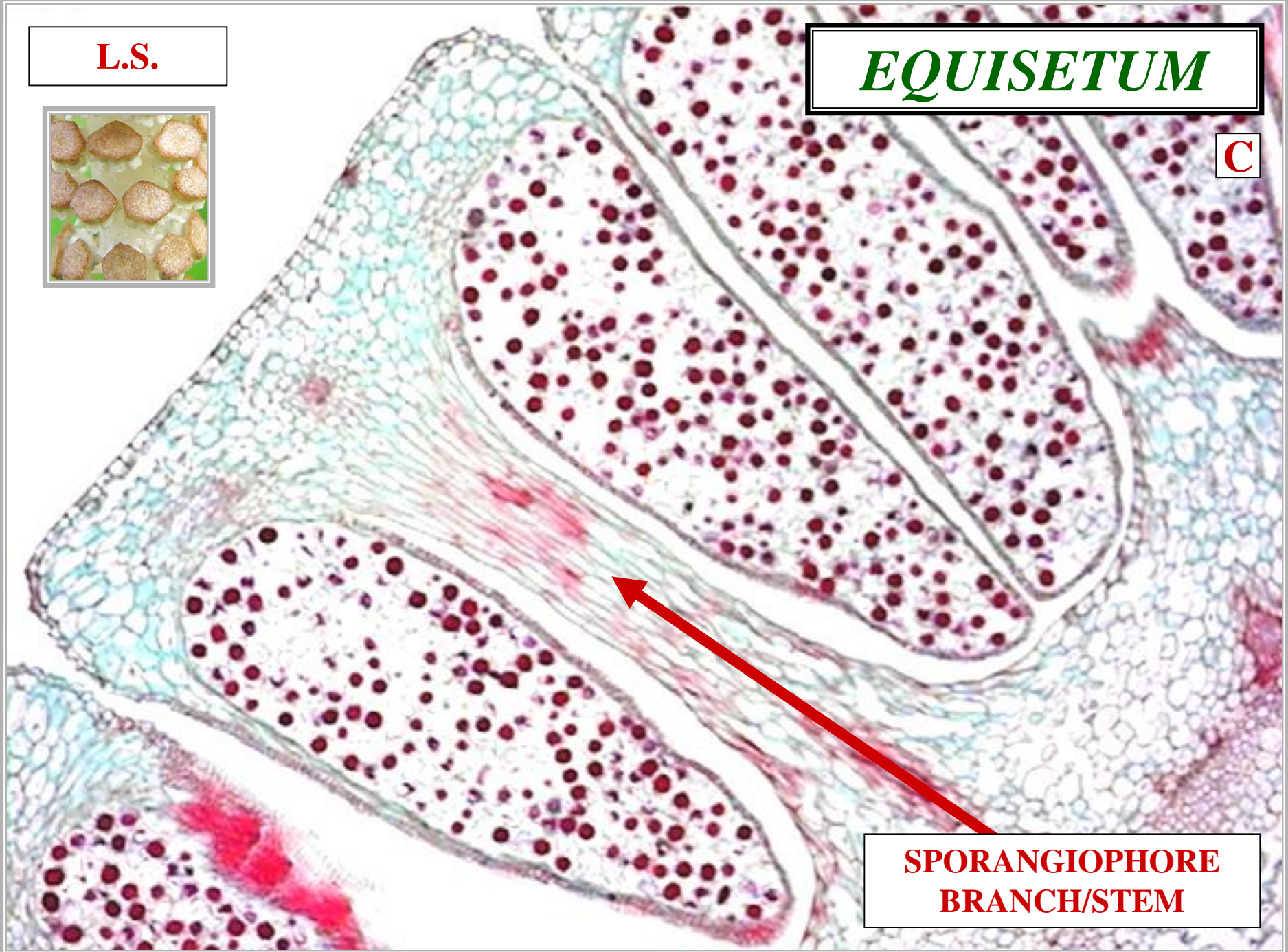
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L.S.



EQUISETUM

C



**SPORANGIOPHORE
BRANCH/STEM**

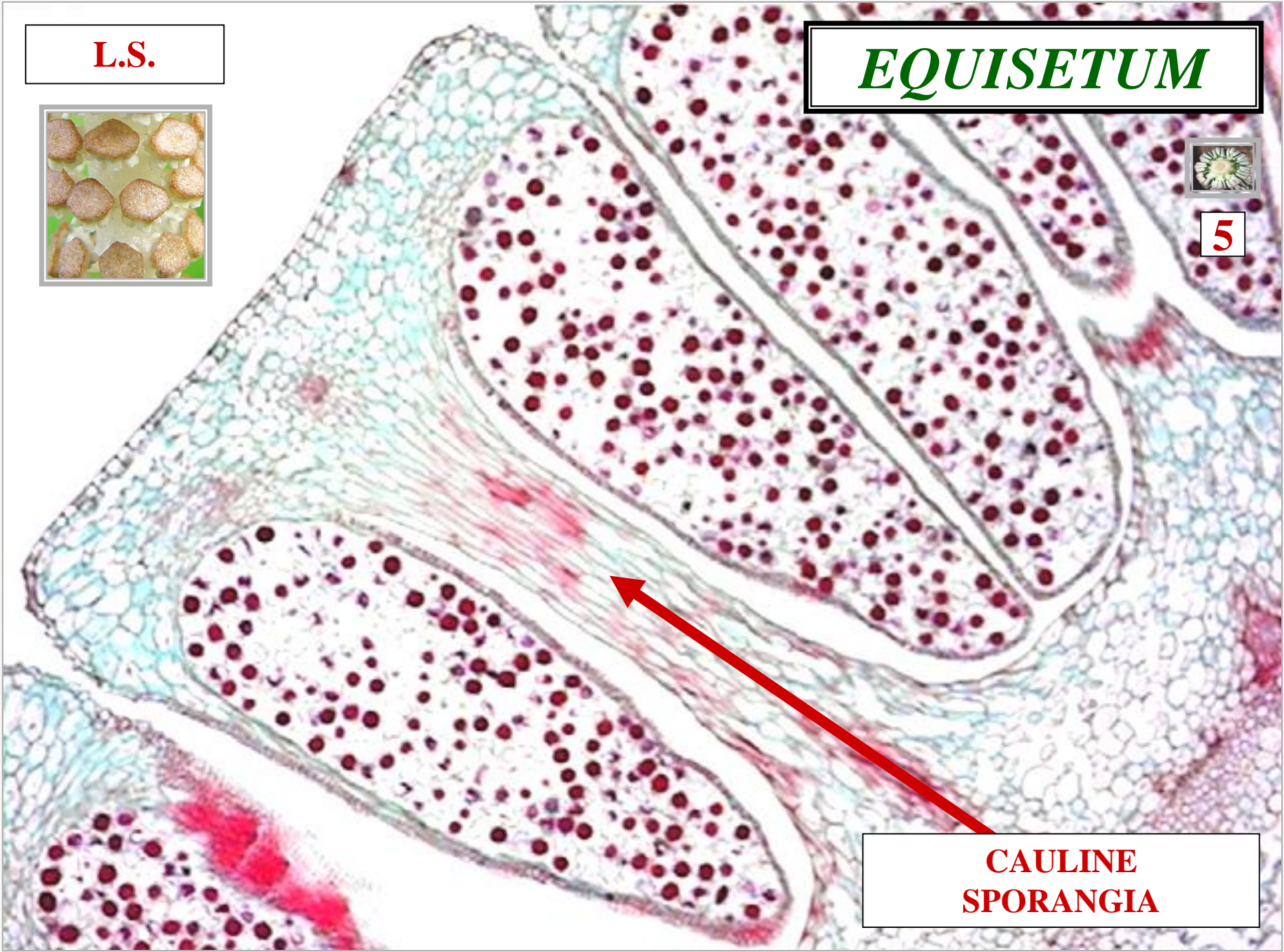
L.S.



EQUISETUM



5



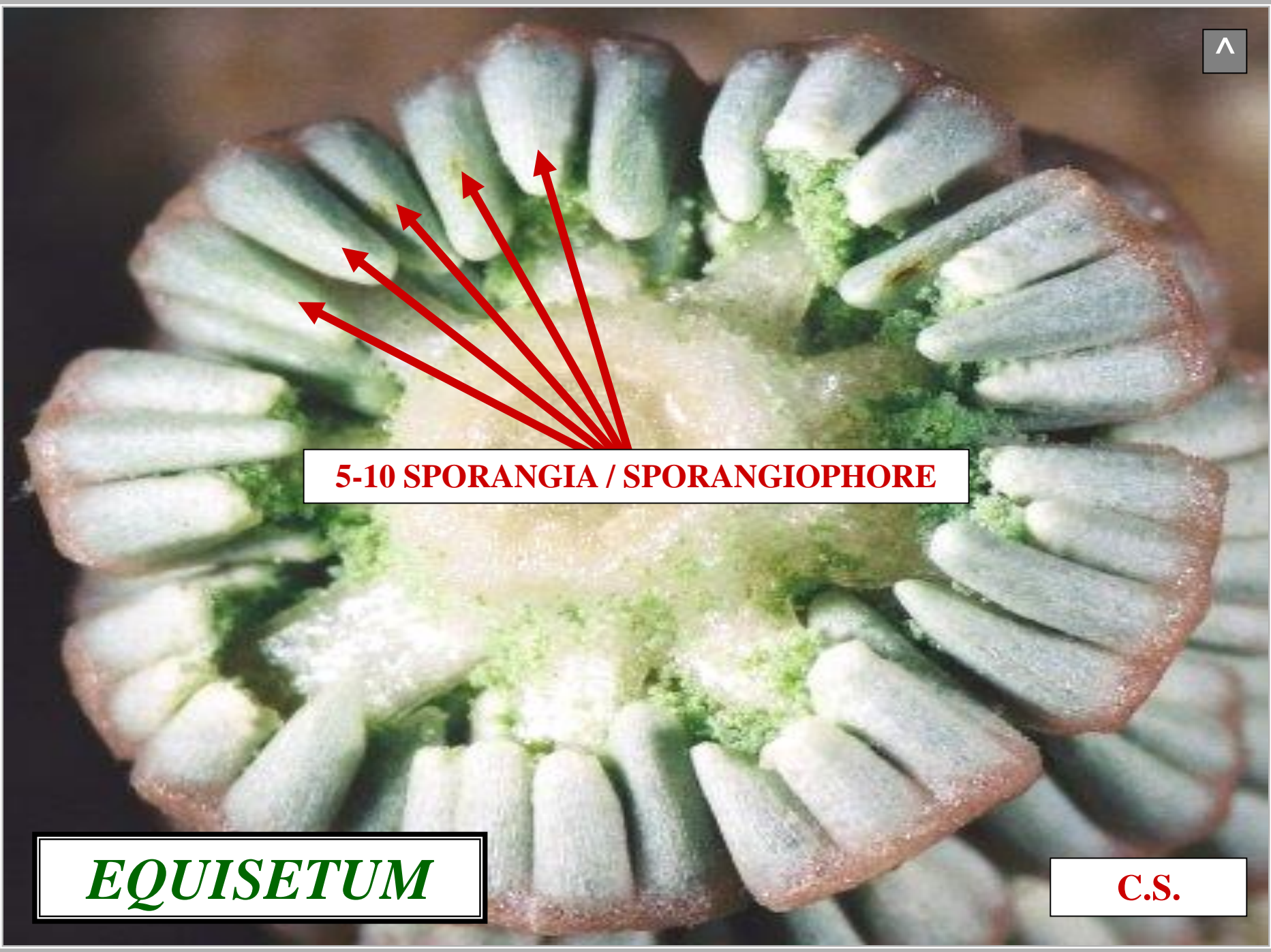
**CAULINE
SPORANGIA**



5-10 SPORANGIA / SPORANGIOPHORE

EQUISETUM

C.S.





SPORE HABIT

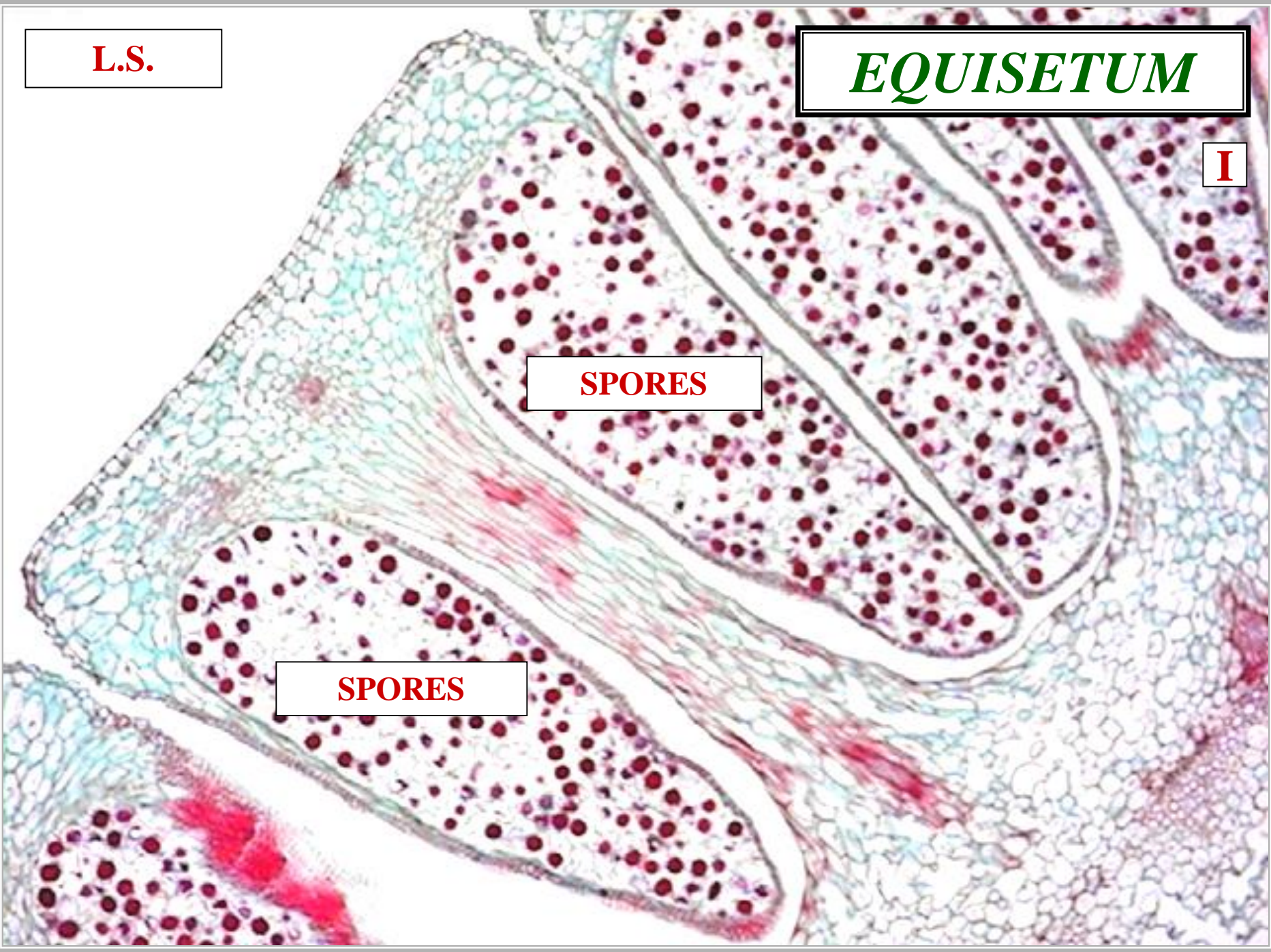
L.S.

EQUISETUM

I

SPORES

SPORES



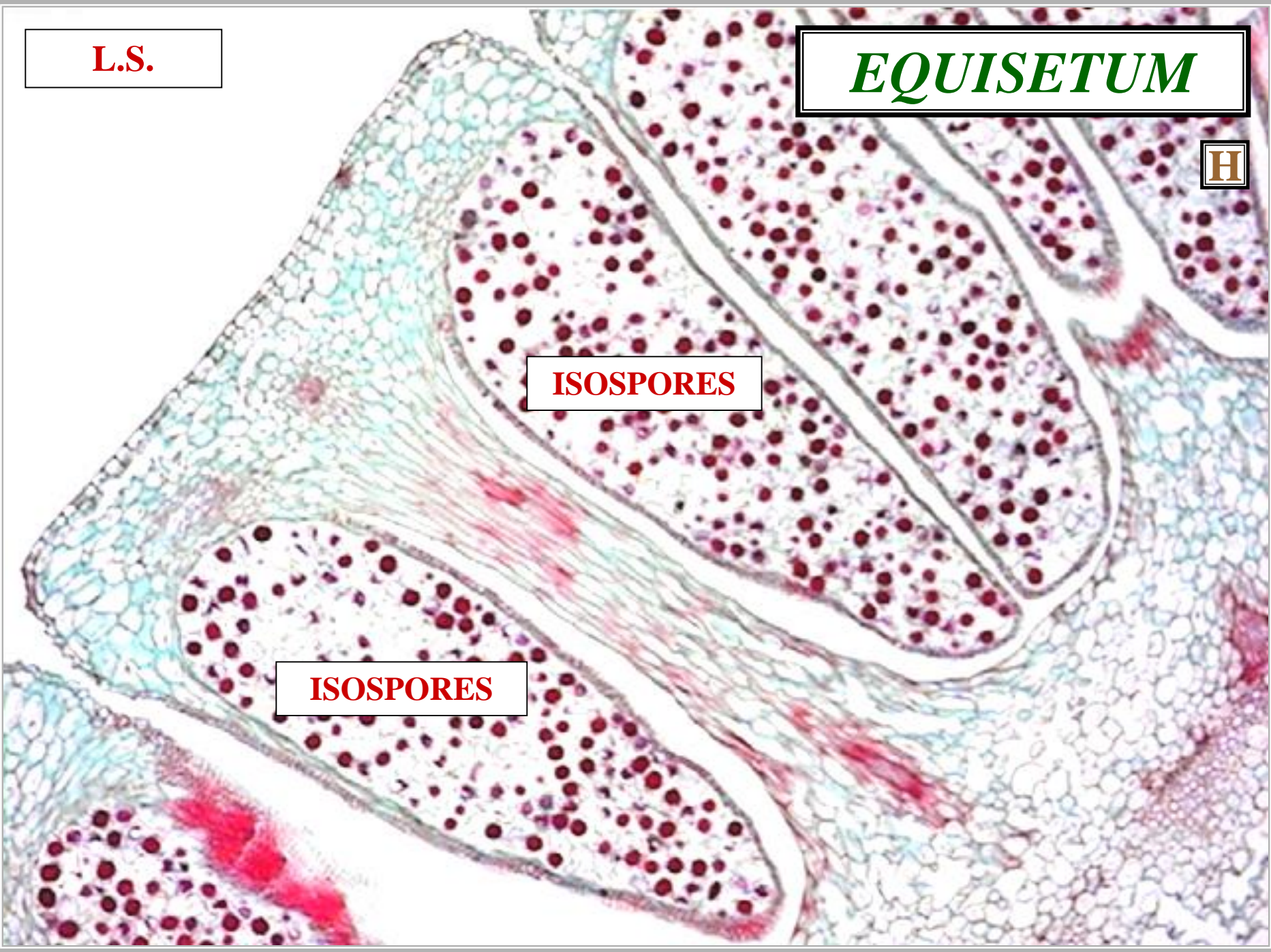
L.S.

EQUISETUM

H

ISOSPORES

ISOSPORES



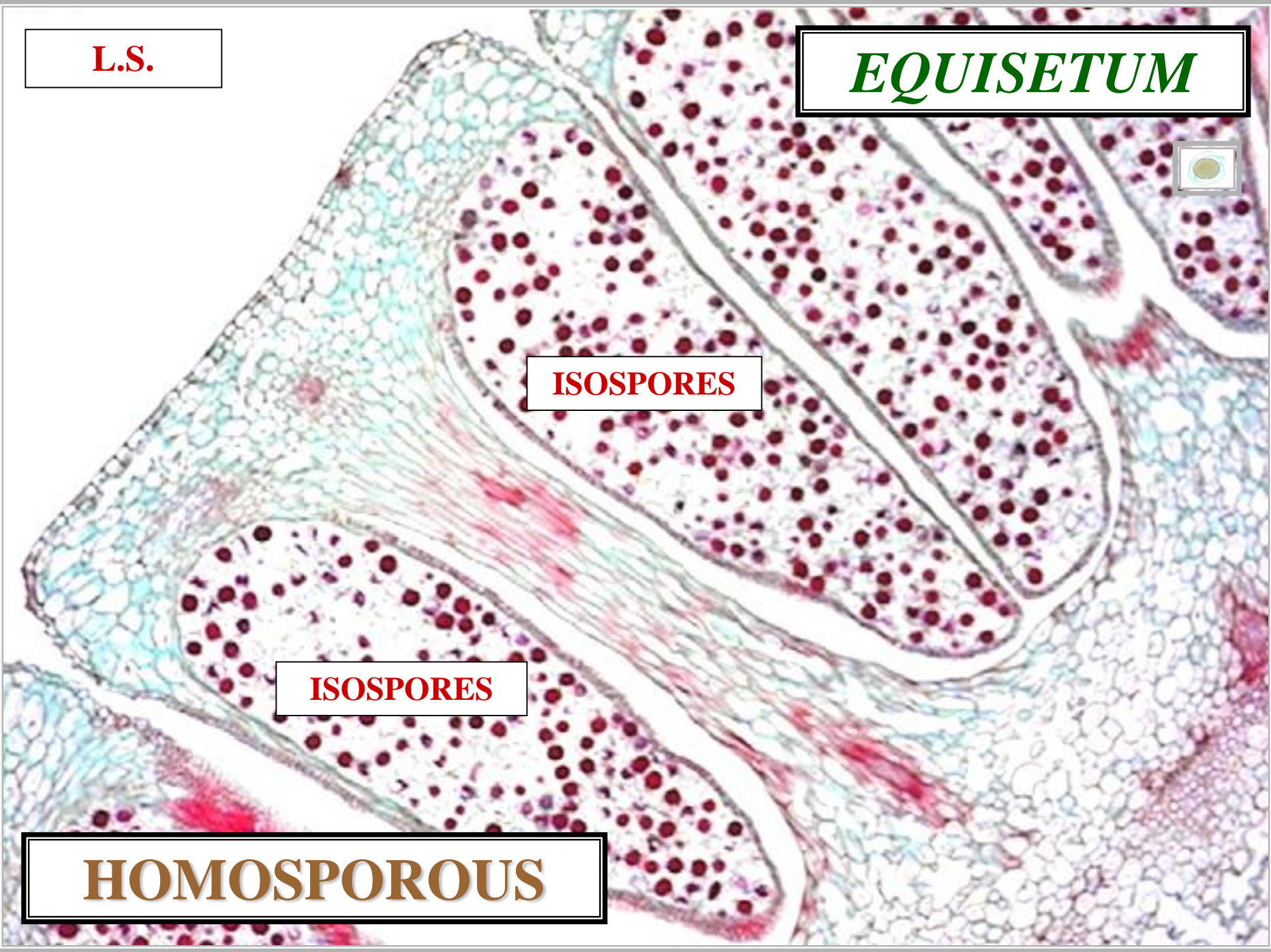
L.S.

EQUISETUM

ISOSPORES

ISOSPORES

HOMOSPOROUS





ISOSPORE

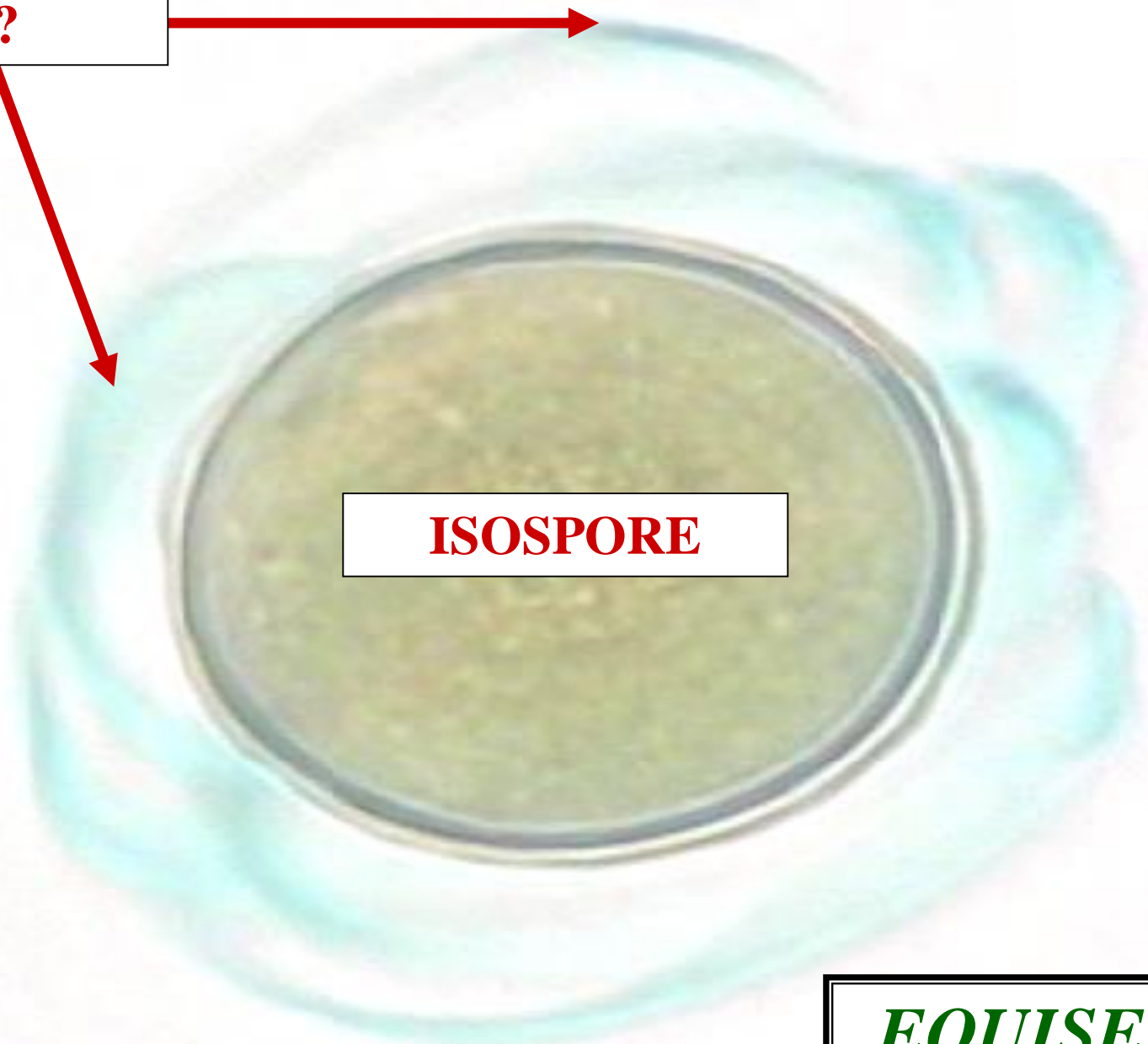
EQUISETUM

?



ISOSPORE

EQUISETUM

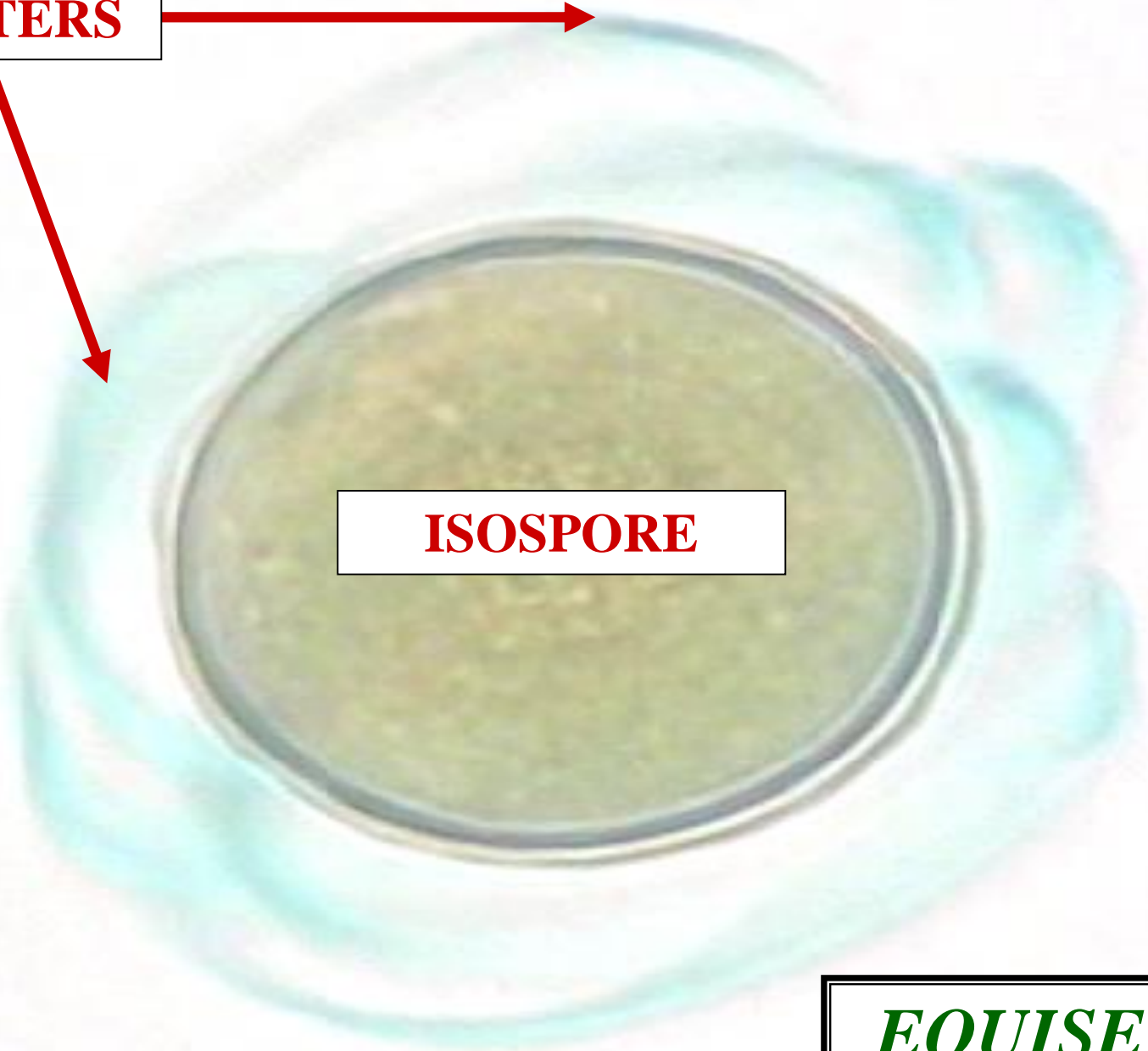


ELATERS



ISOSPORE

EQUISETUM



ELATERS

EQUISETUM
ELATERS



WING-LIKE STRUCTURES

EQUISETUM
ELATERS

EQUISETUM
ELATERS

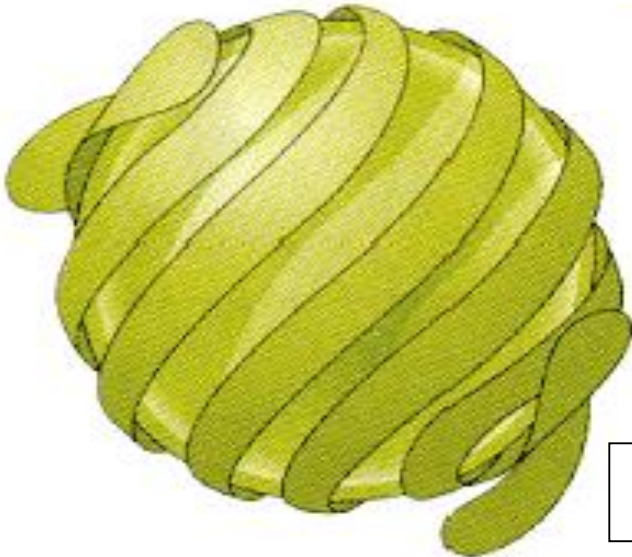


WING-LIKE STRUCTURES
AIDE
WIND DISPERSAL

EQUISETUM
ELATERS

EQUISETUM

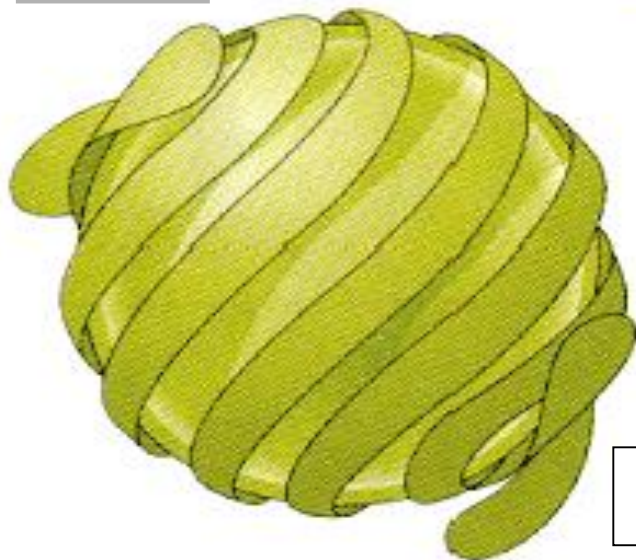
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ISOSPORE & ELATERS

EQUISETUM

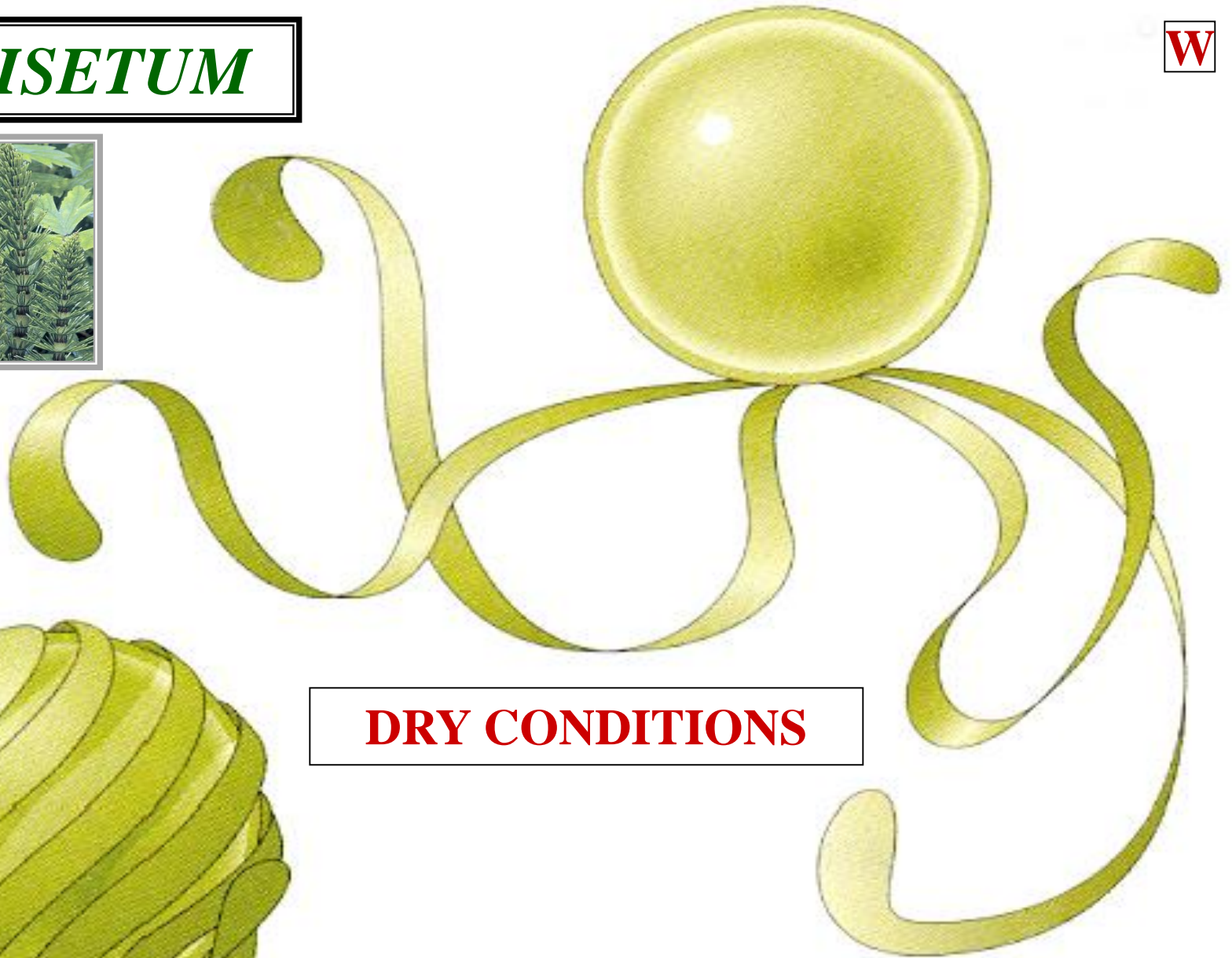
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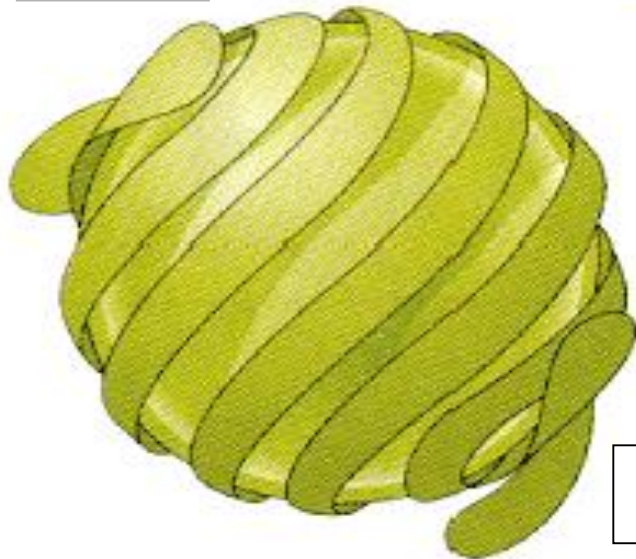
MOIST CONDITIONS

EQUISETUM

W

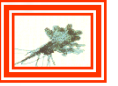


DRY CONDITIONS

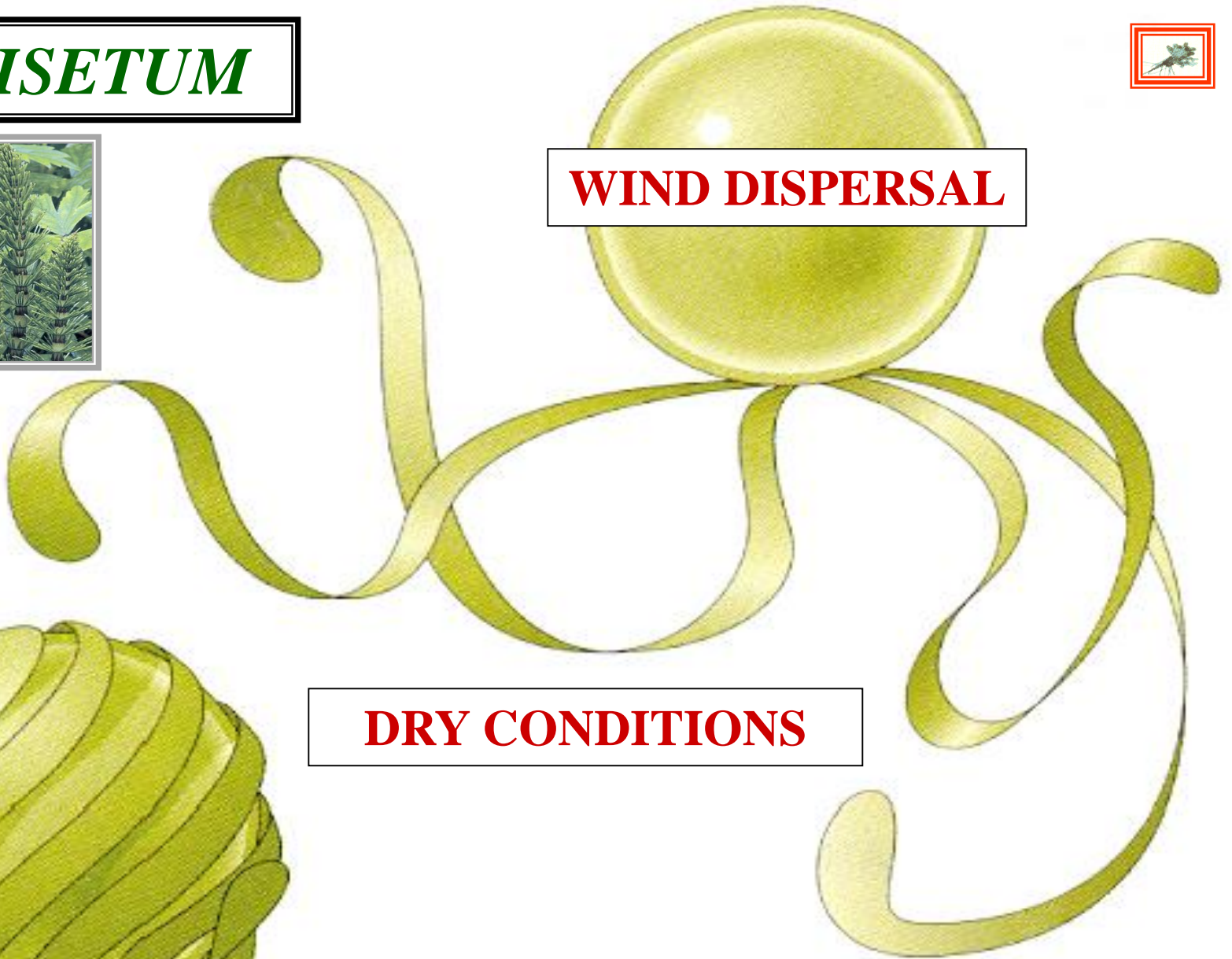


MOIST CONDITIONS

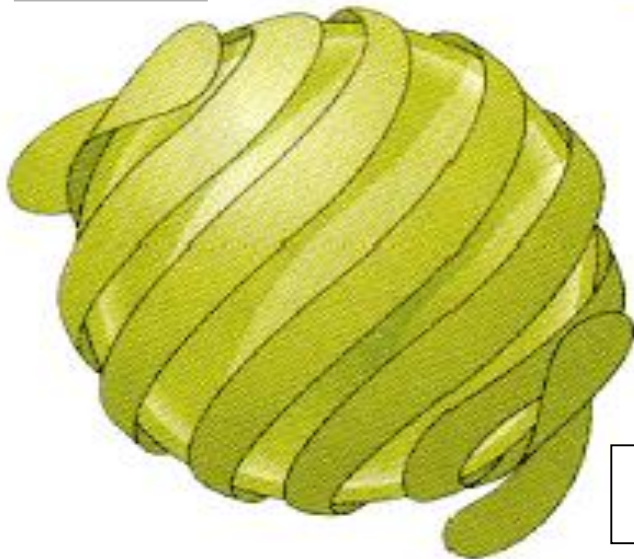
EQUISETUM



WIND DISPERSAL

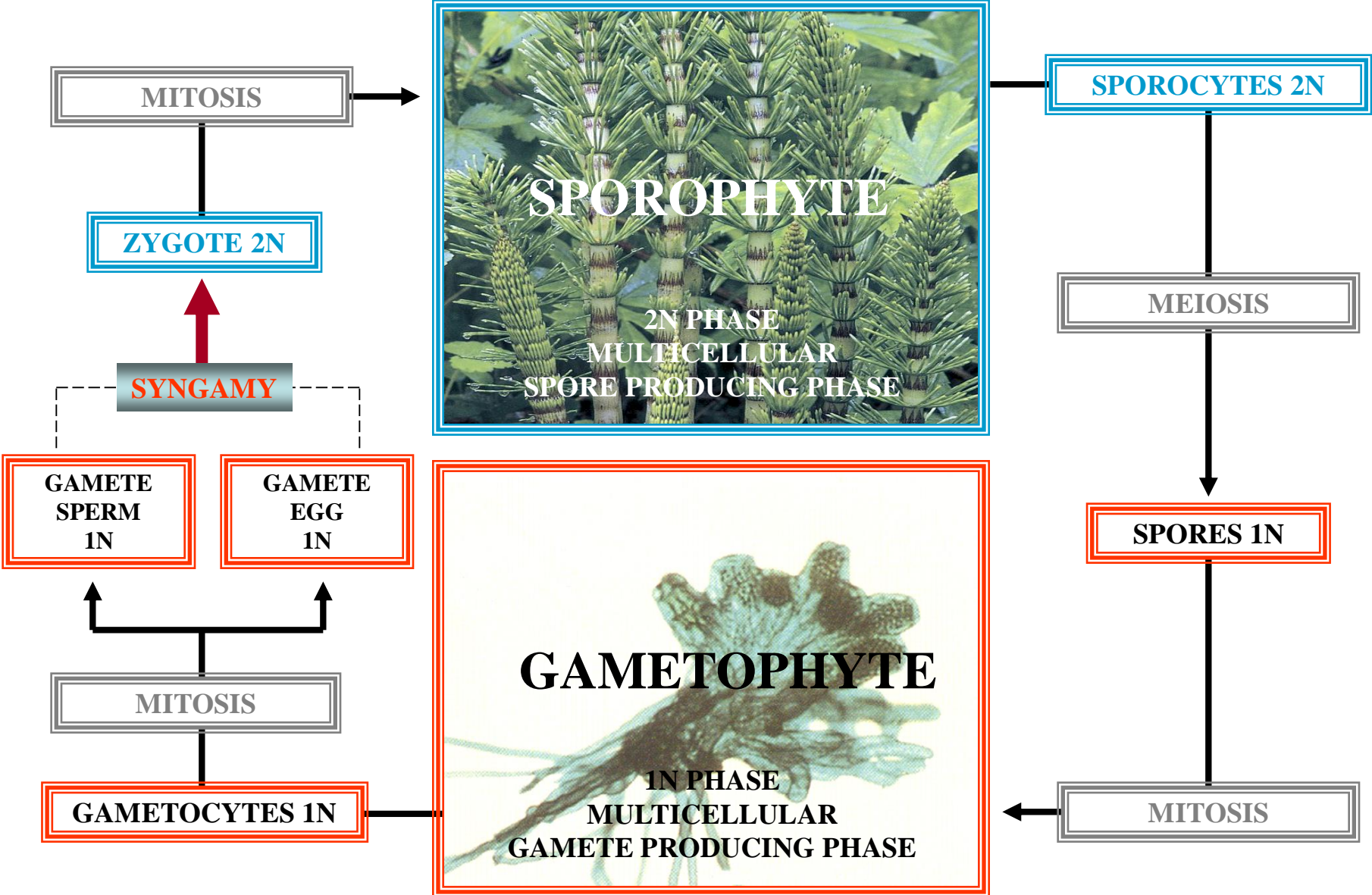


DRY CONDITIONS



MOIST CONDITIONS

EQUISETALES LIFE CYCLE





GAMETOPHYTE CHARACTERS

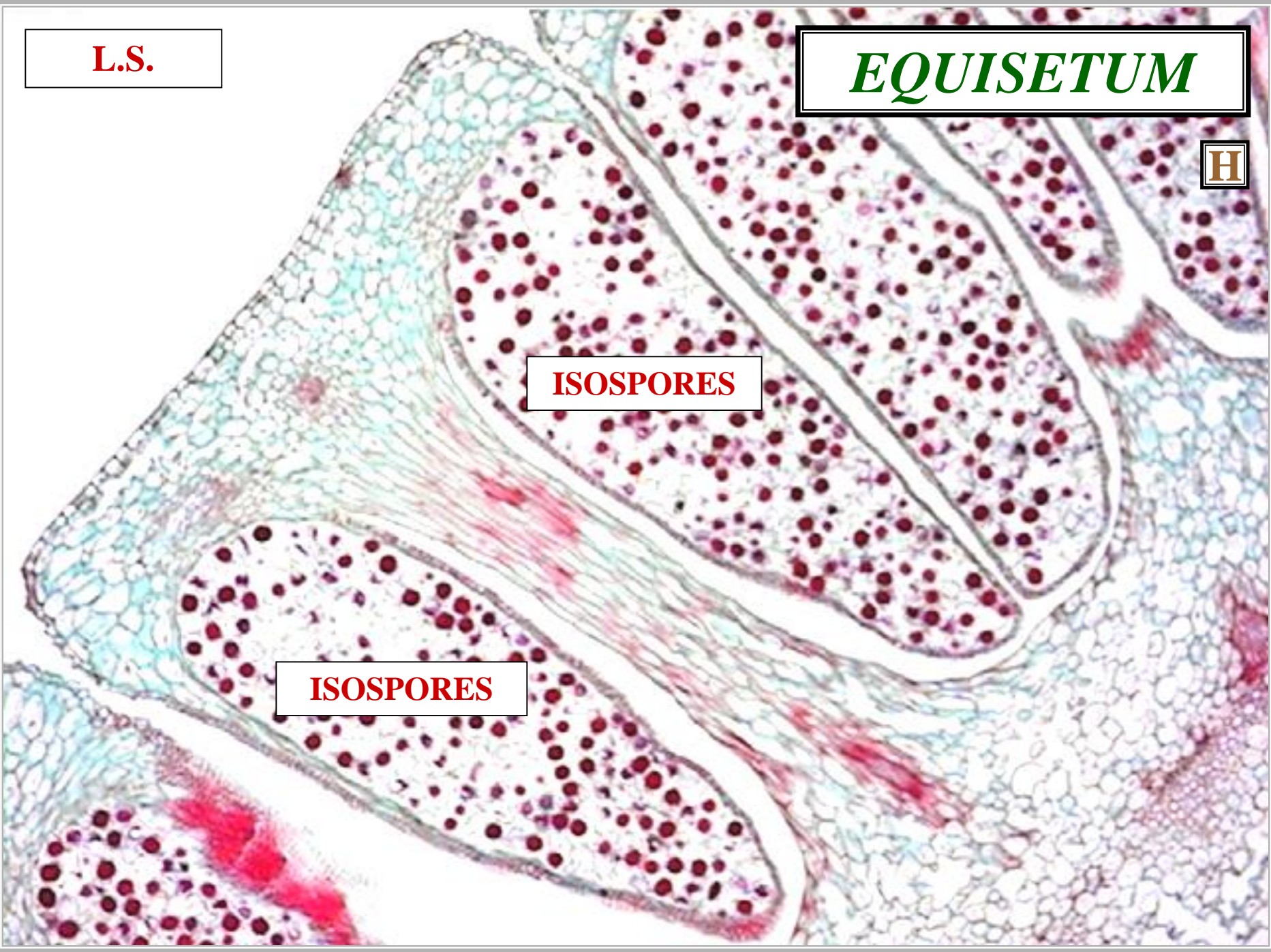
L.S.

EQUISETUM

H

ISOSPORES

ISOSPORES



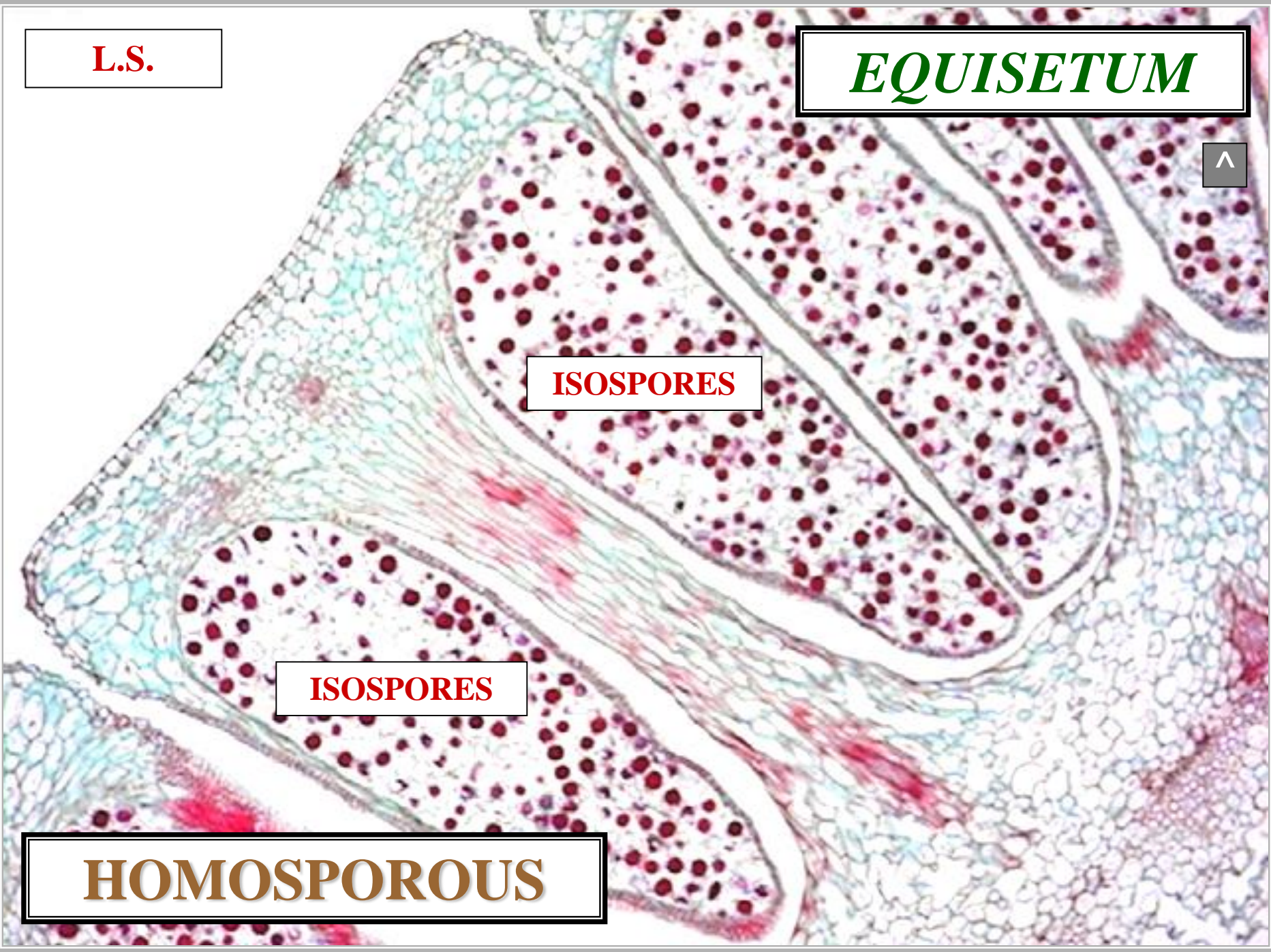
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EQUISETUM

ISOSPORES

ISOSPORES

HOMOSPOROUS

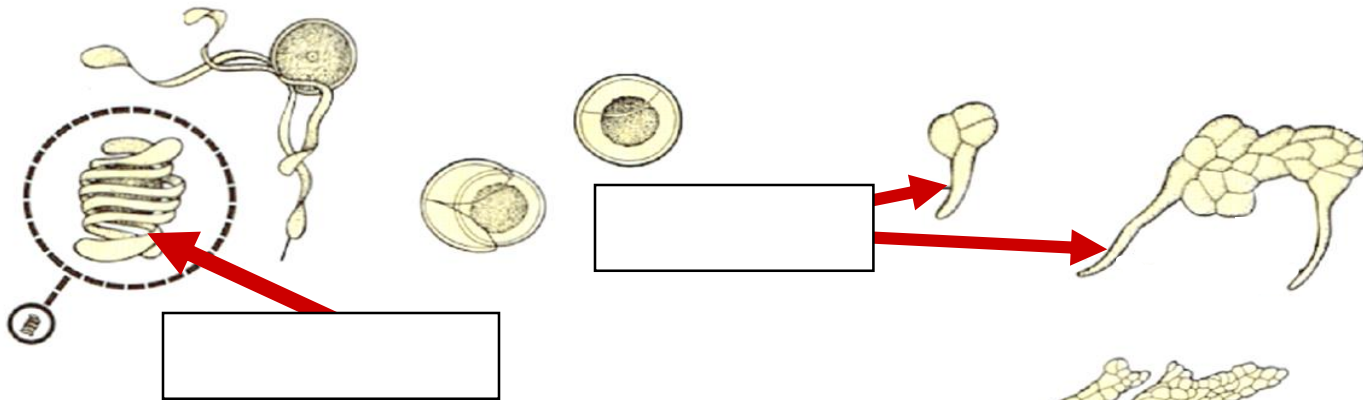




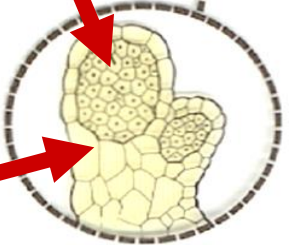
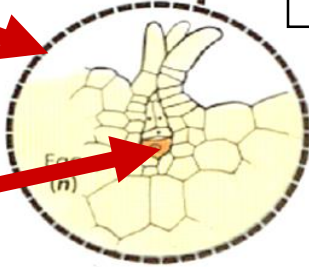
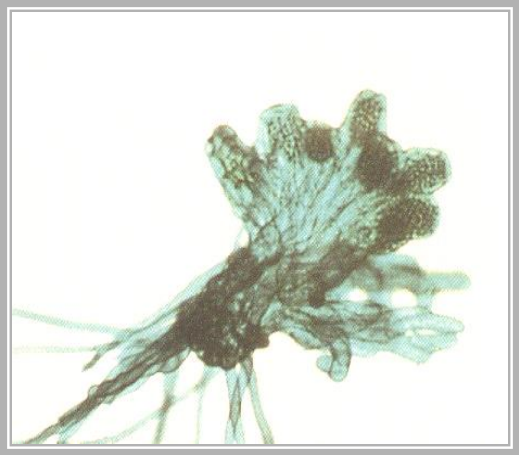
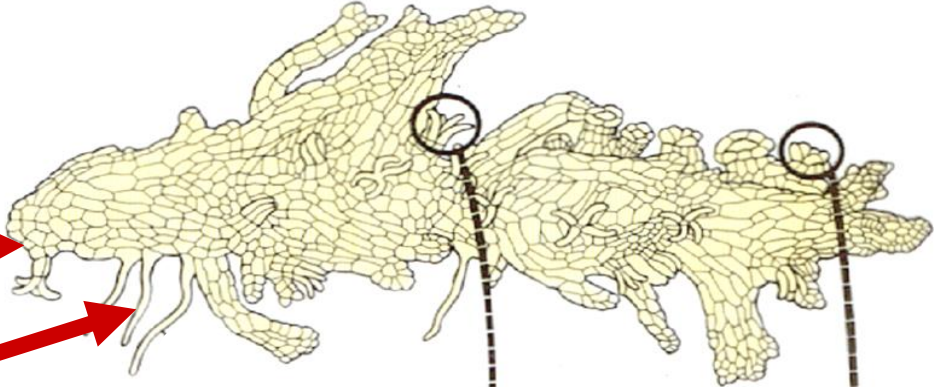
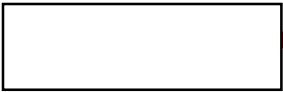
EXOSPORIC GAMETOPHYTE

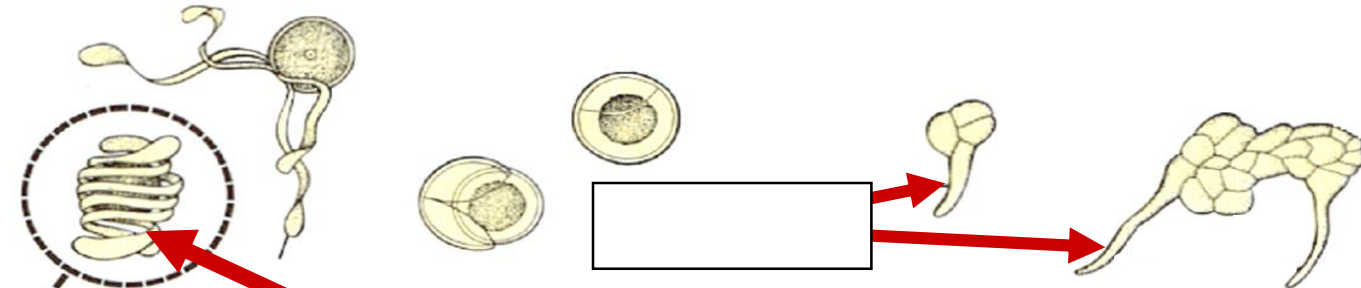
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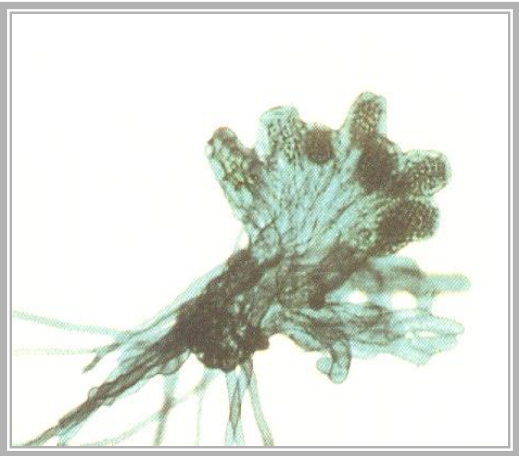
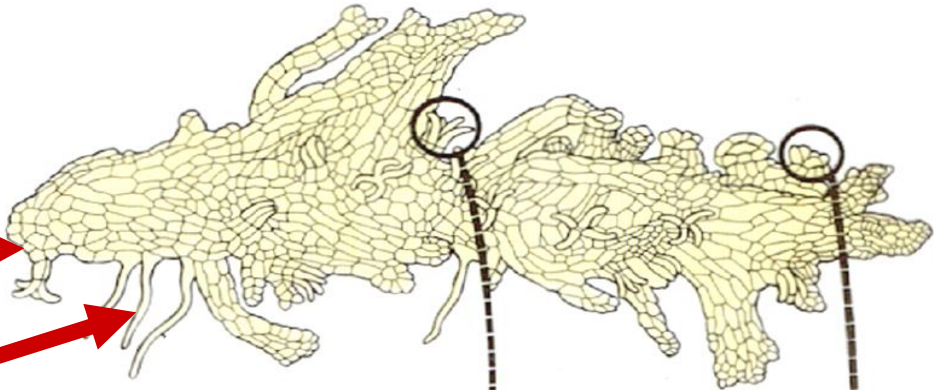
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EXOSPORIC

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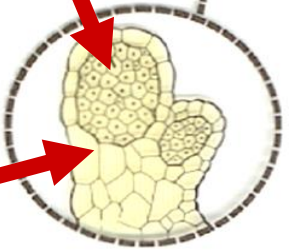


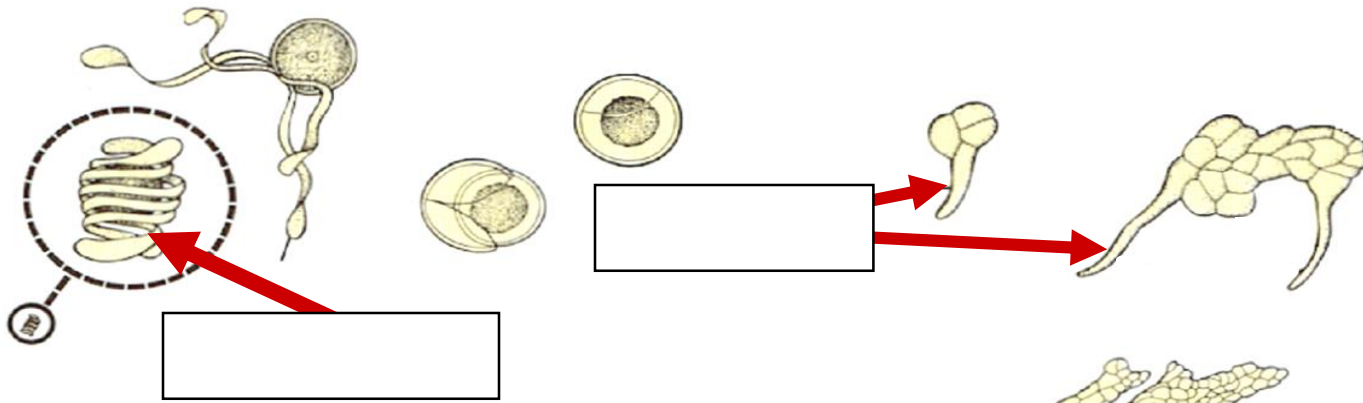
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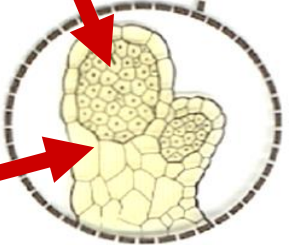
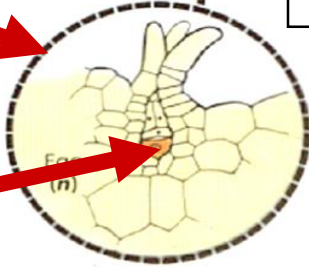
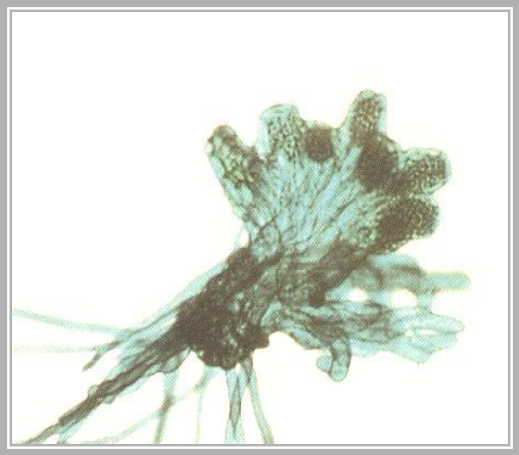
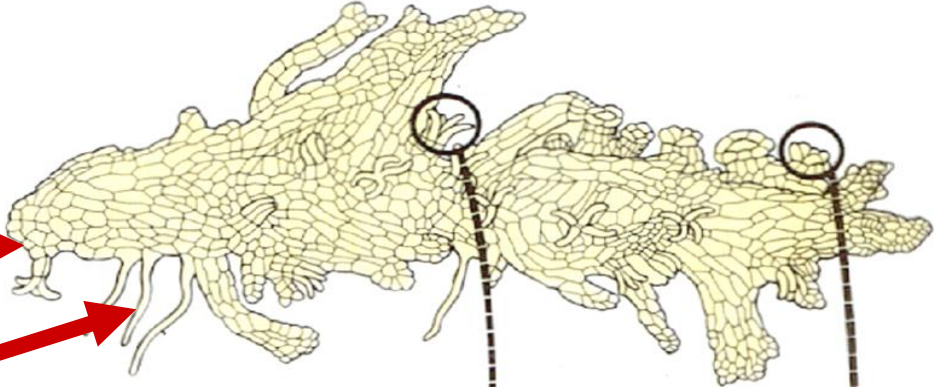
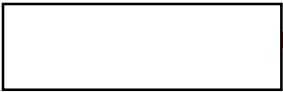
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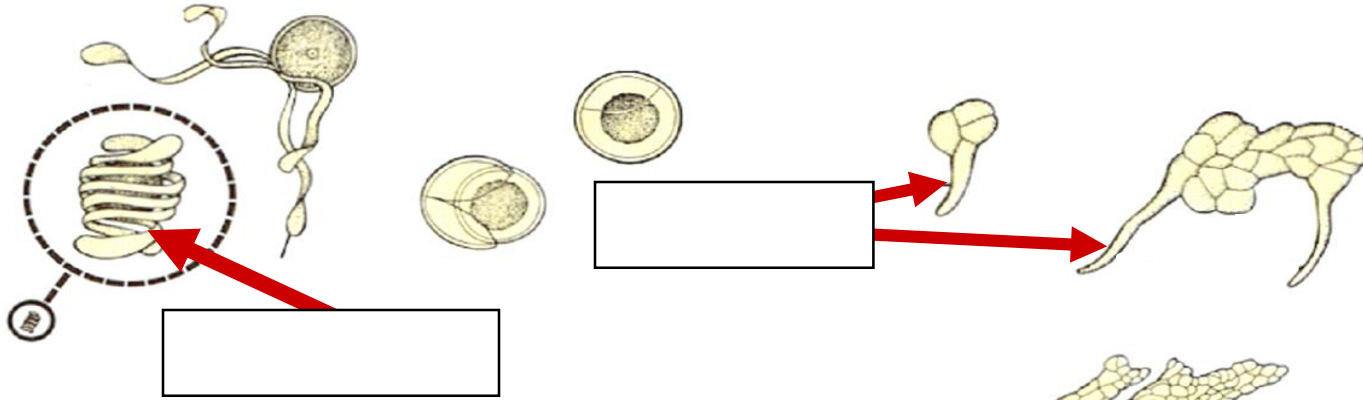
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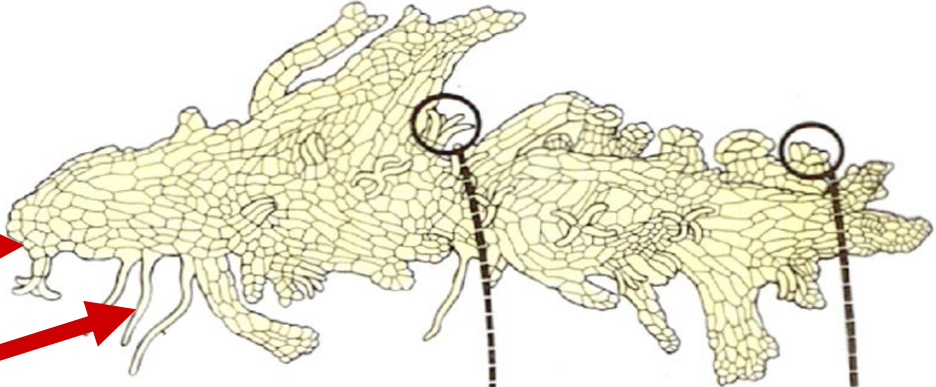
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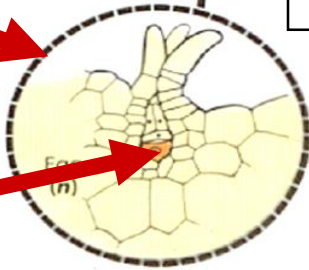
BISEXUAL

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ARCHEGONIUM

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ANTHERIDIUM

