



MEGASPORES

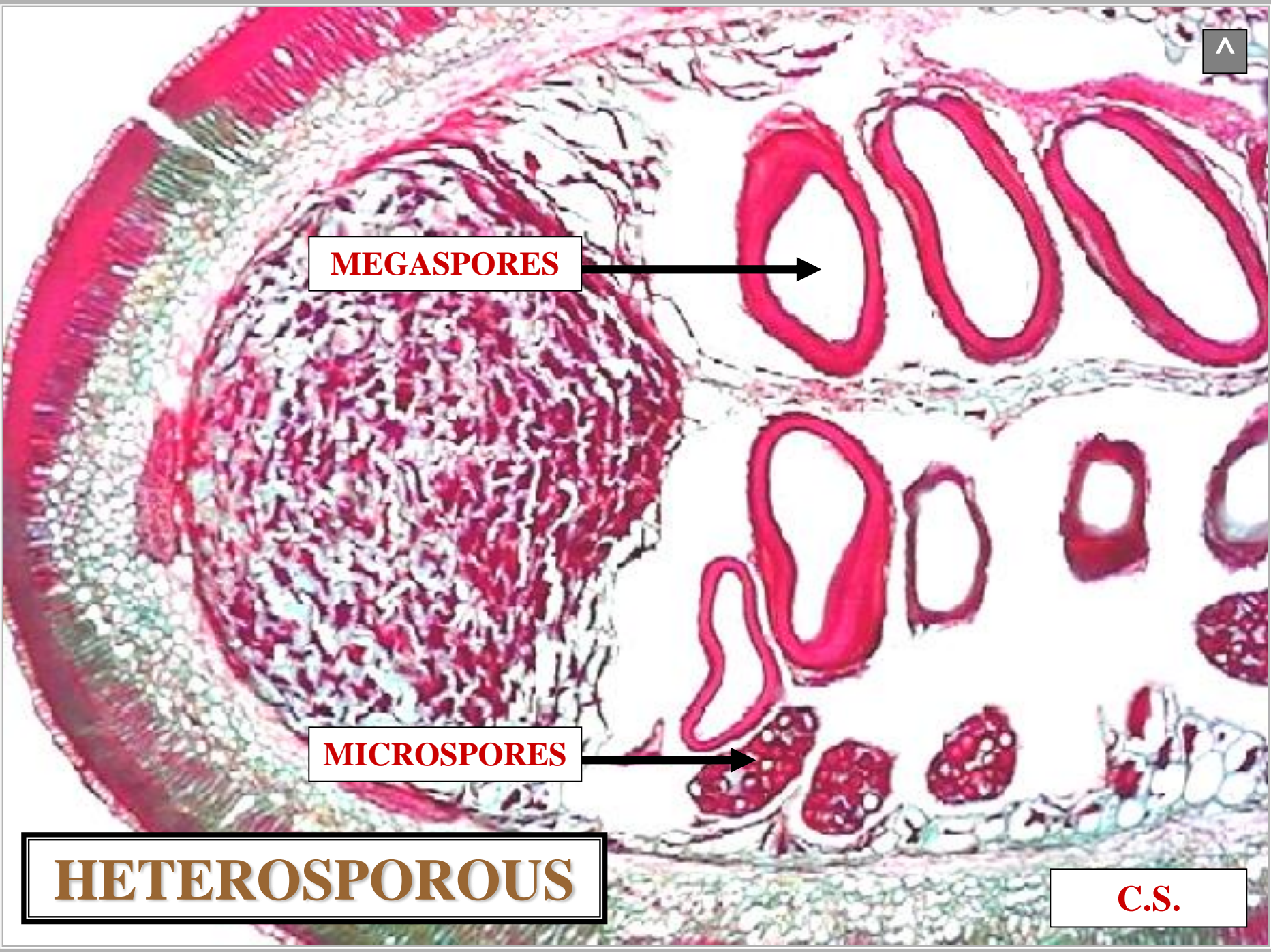


MICROSPORES



HETEROSPOROUS

C.S.

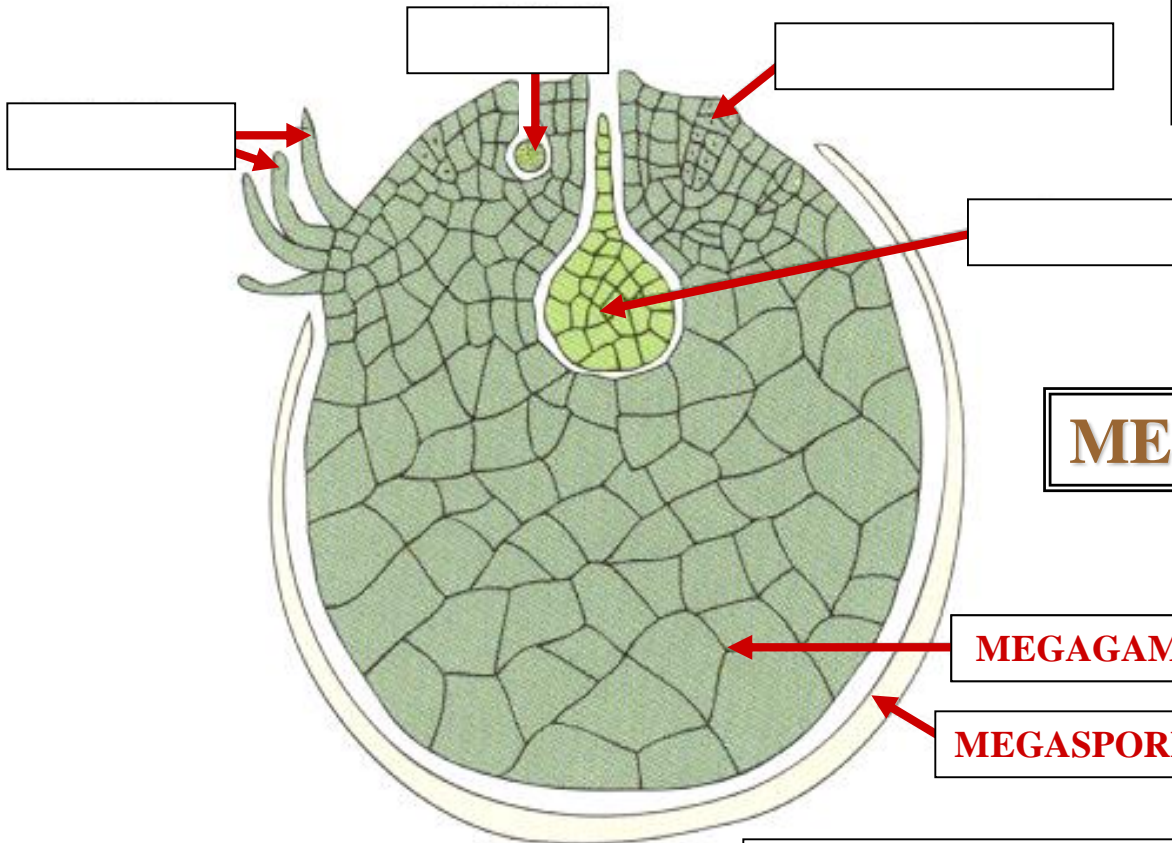




ENDOSPORIC GAMETOPHYTE

FERN

EN



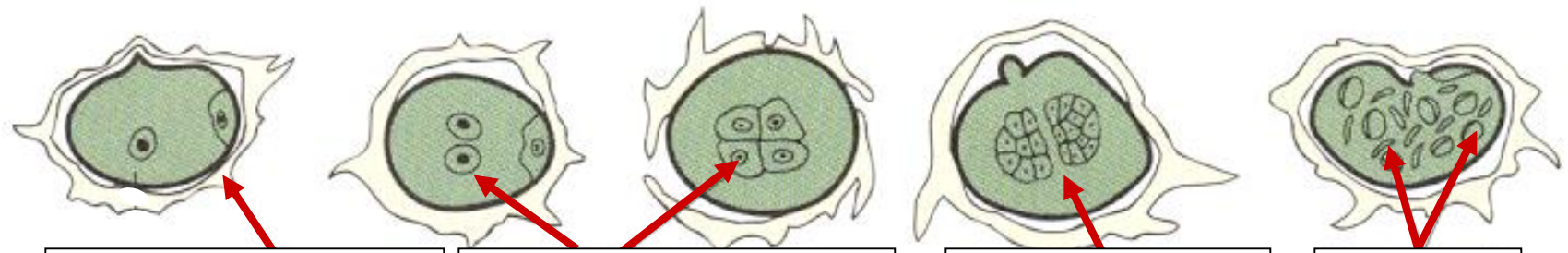
MEGASPORE

MEGAGAMETOPHYTE

MEGASPORE WALL

MICROSPORE

GAMETOPHYTE

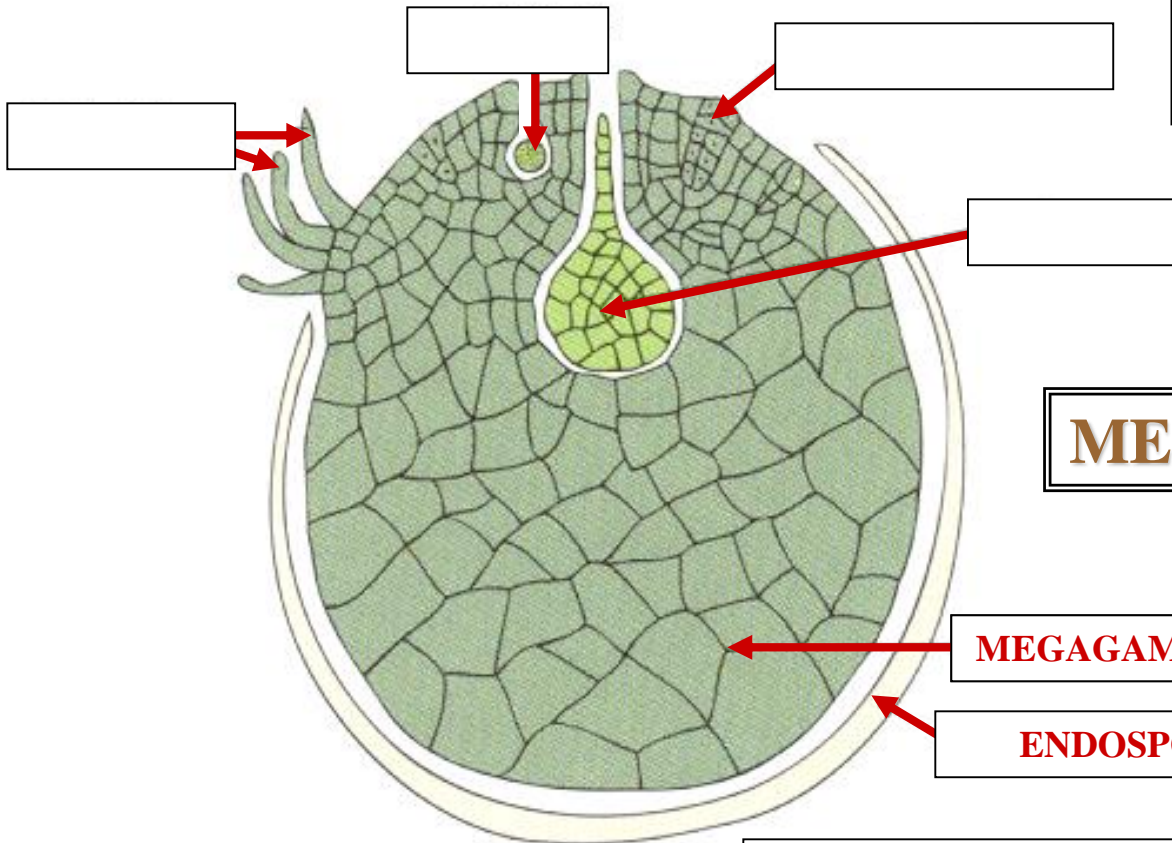


MICROSPORE WALL

MICROGAMETOPHYTE

FERN

EP



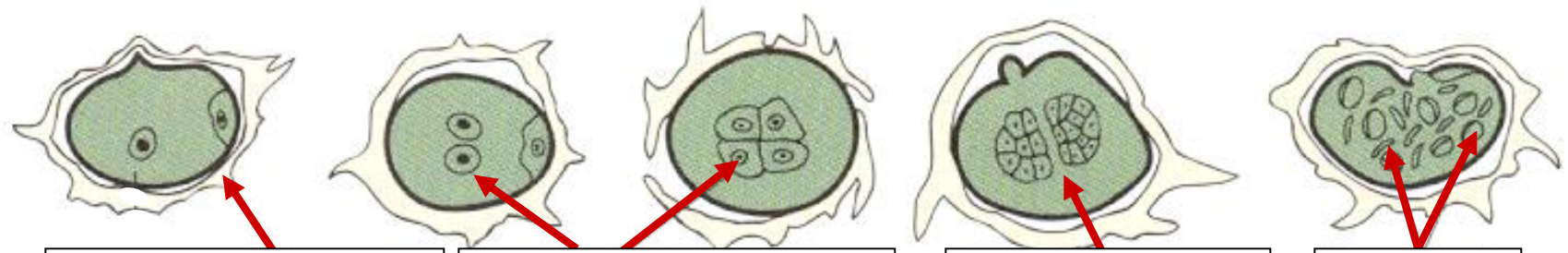
MEGASPORE

MEGAGAMETOPHYTE

ENDOSPORIC

MICROSPORE

GAMETOPHYTE

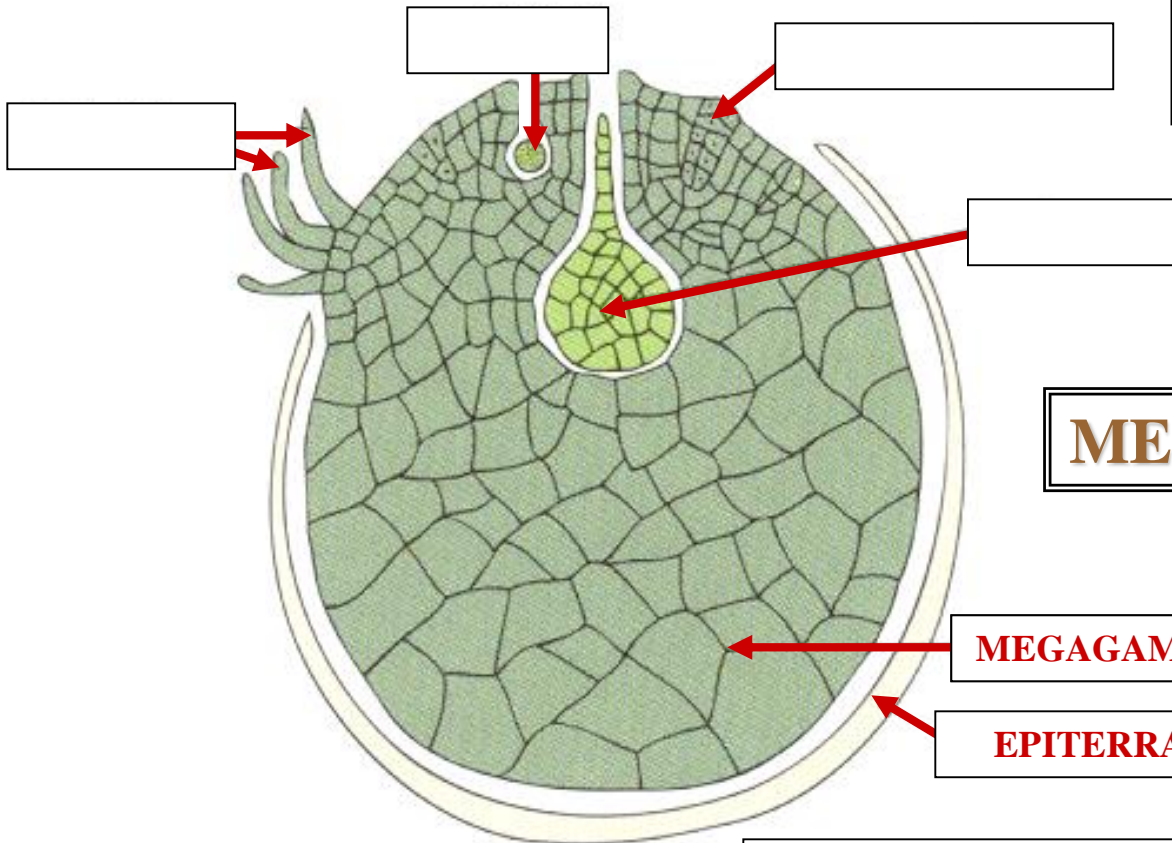


ENDOSPORIC

MICROGAMETOPHYTE

FERN

W



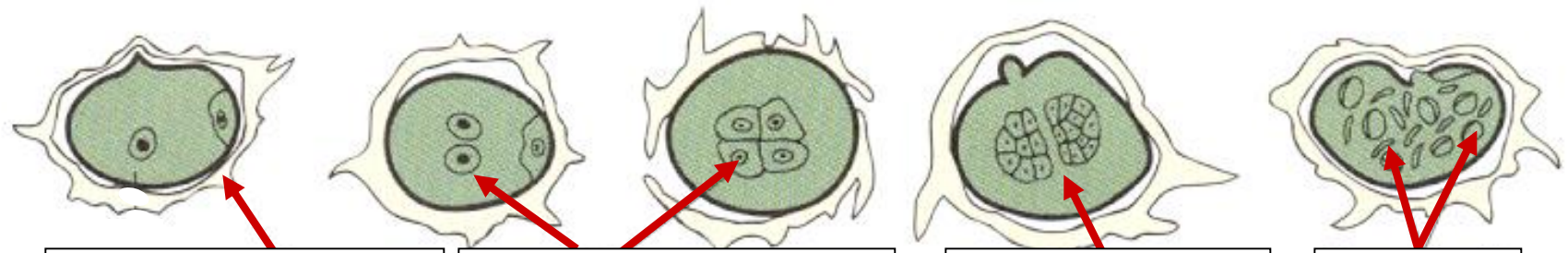
MEGASPORE

MEGAGAMETOPHYTE

EPITERRANEAN

MICROSPORE

GAMETOPHYTE

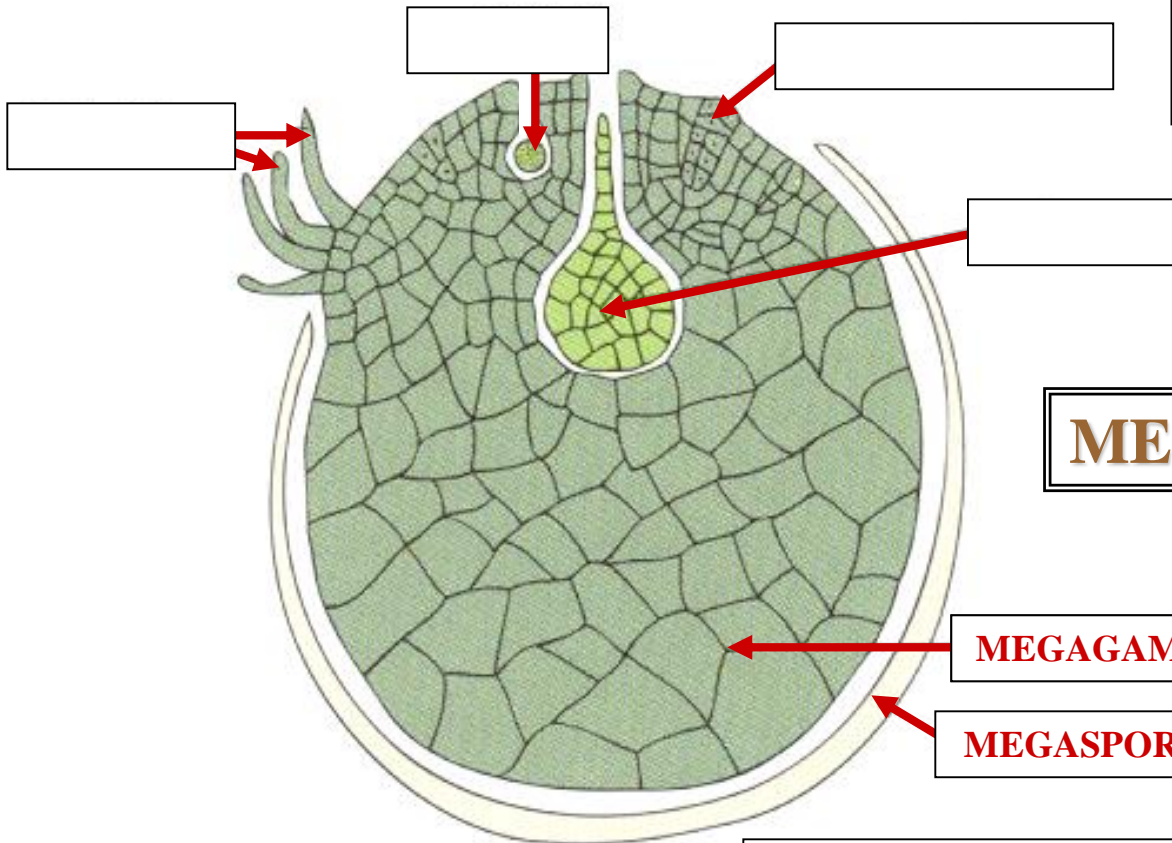


EPITERRANEAN

MICROGAMETOPHYTE

FERN

N



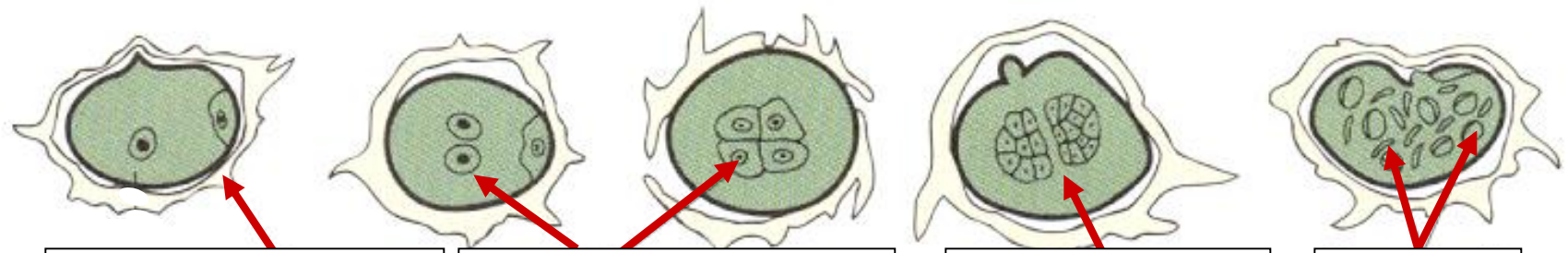
MEGASPORE

MEGAGAMETOPHYTE

MEGASPORE WALL

MICROSPORE

GAMETOPHYTE

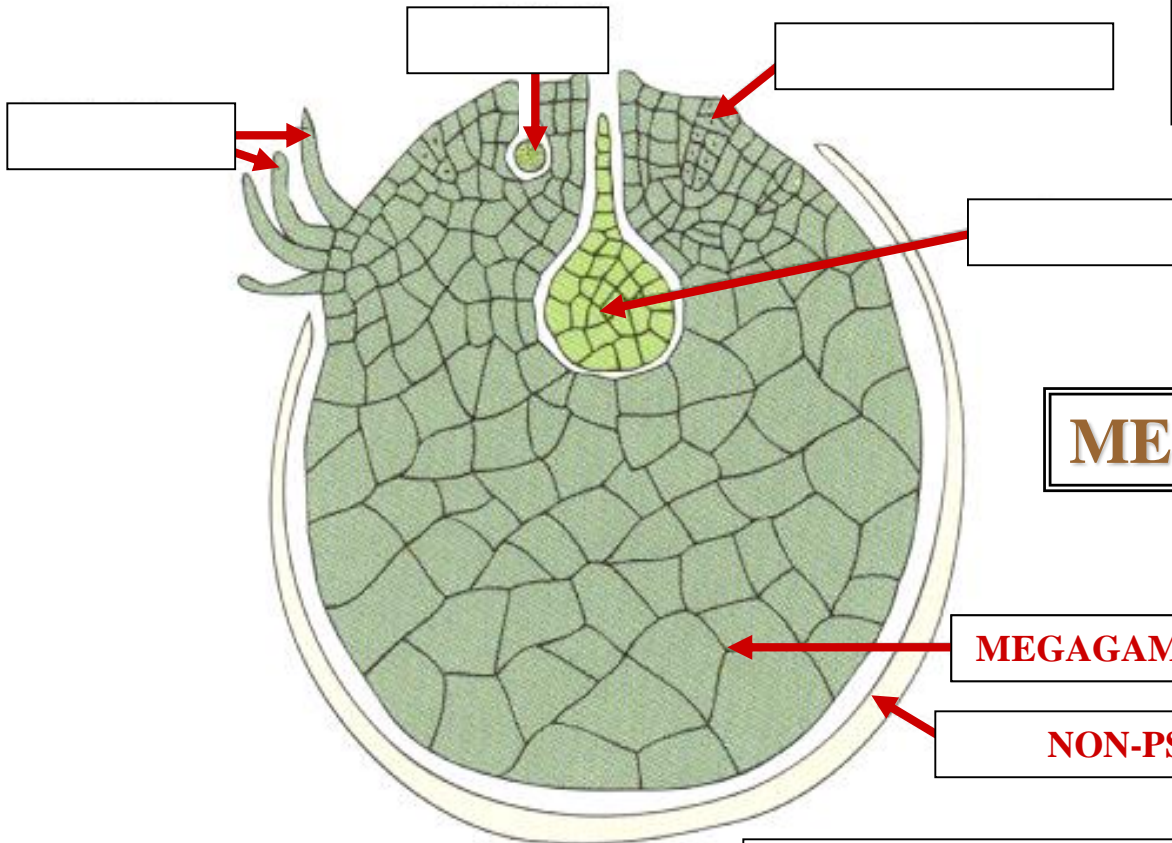


MICROSPORE WALL

MICROGAMETOPHYTE

FERN

W



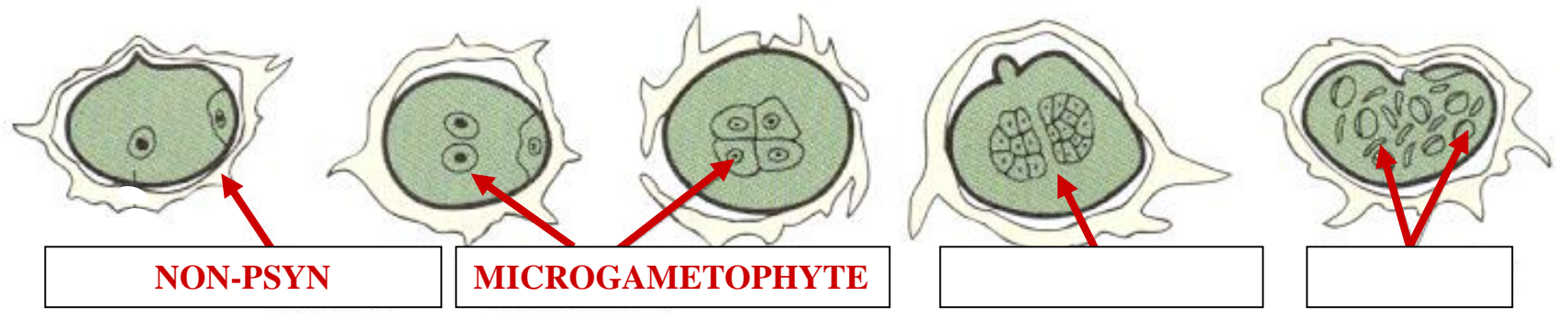
MEGASPORE

MEGAGAMETOPHYTE

NON-PSYN

MICROSPORE

GAMETOPHYTE

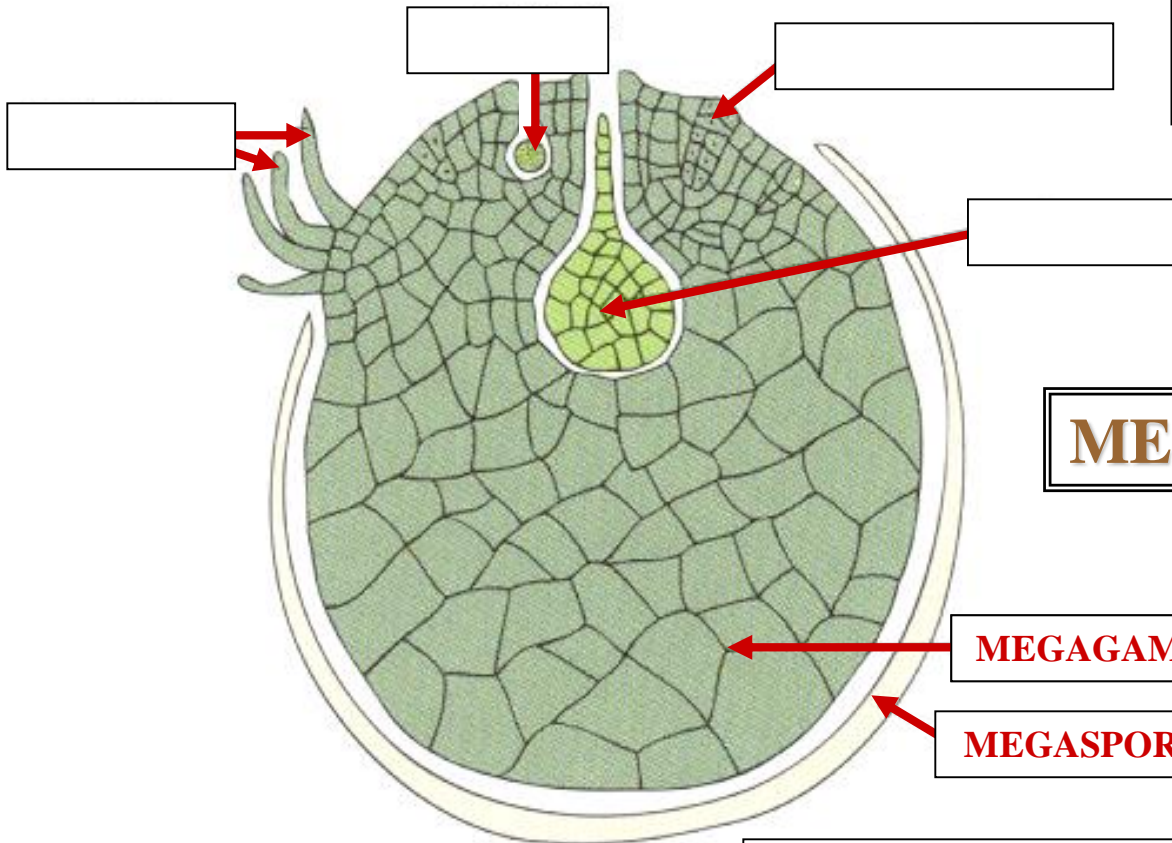


NON-PSYN

MICROGAMETOPHYTE

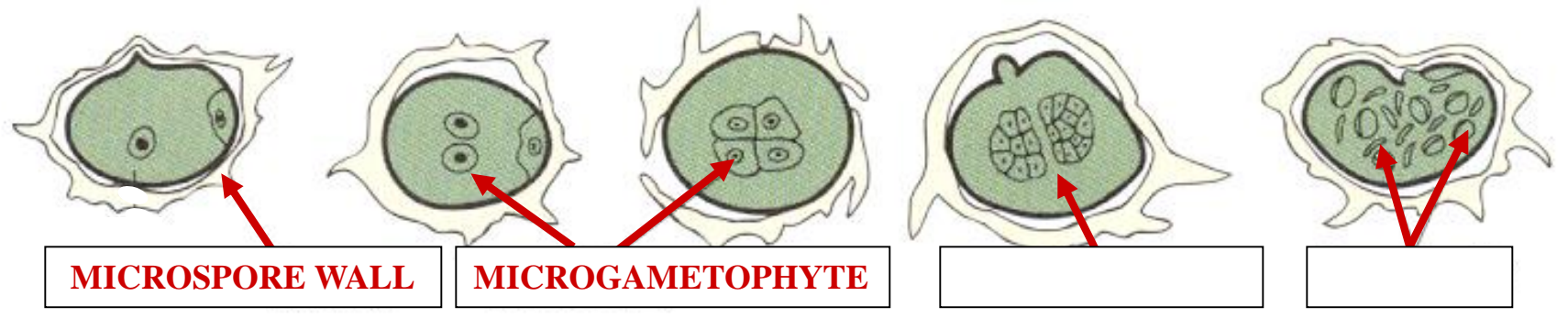
FERN

M



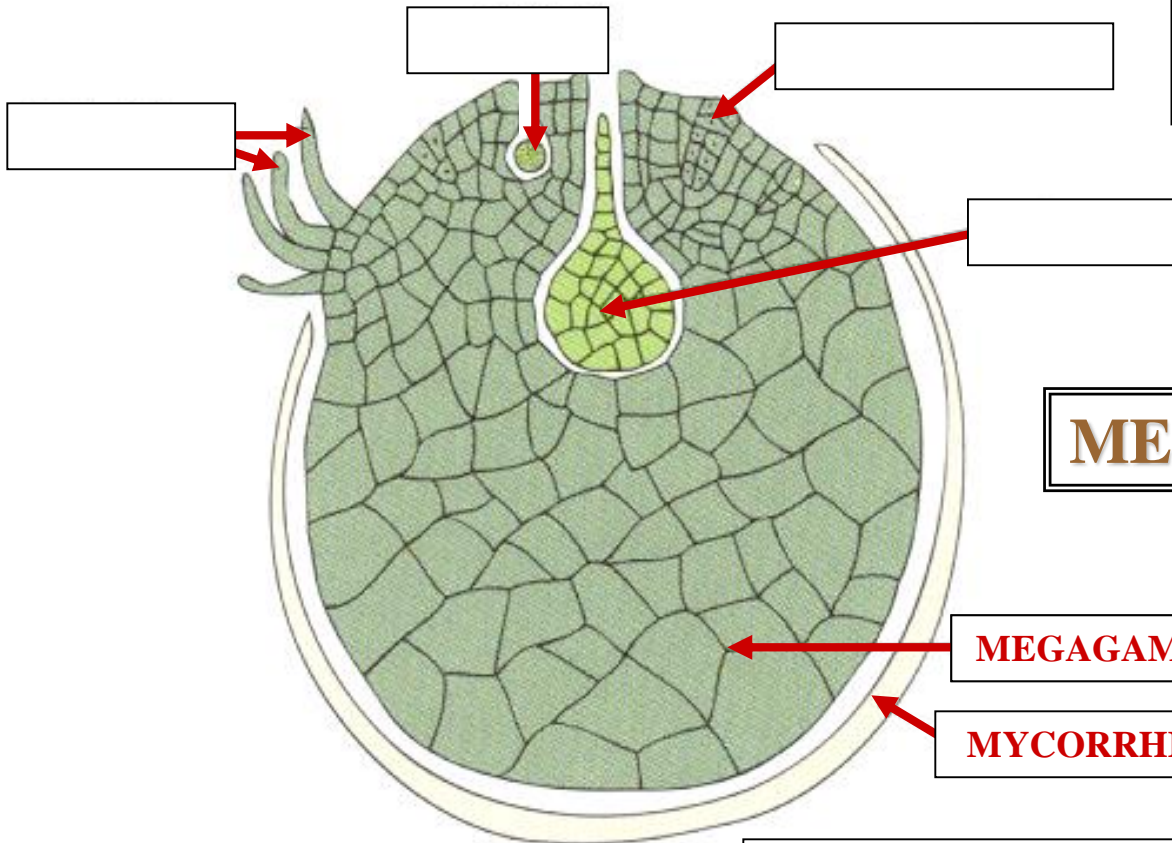
MICROSPORE

GAMETOPHYTE



FERN

EN



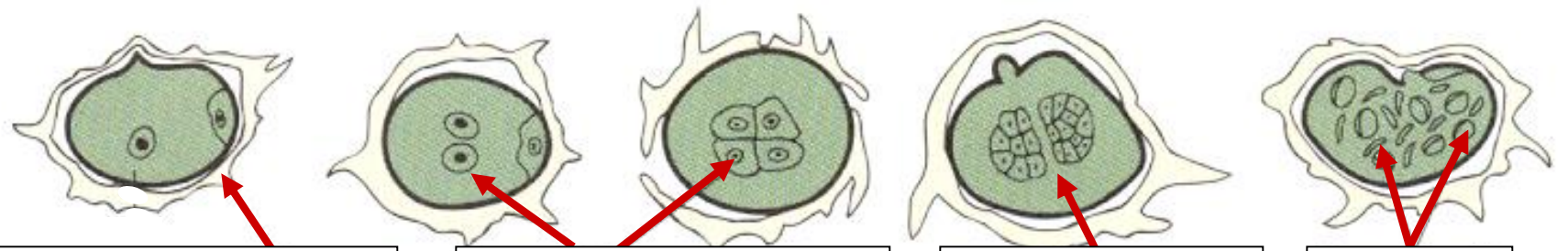
MEGASPORE

MEGAGAMETOPHYTE

MYCORRHIZAE ABSENT

MICROSPORE

GAMETOPHYTE



MYCORRHIZAE ABSENT

MICROGAMETOPHYTE

FERN

U

ARCHEGONIUM

[]

[]

[]

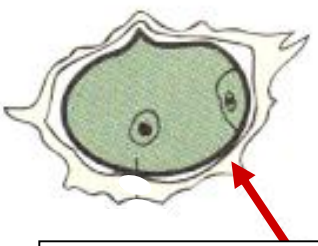
MEGASPORE

MEGAGAMETOPHYTE

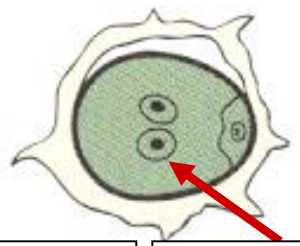
ENDOSPORIC

MICROSPORE

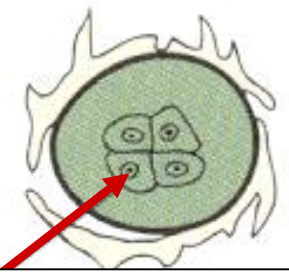
GAMETOPHYTE



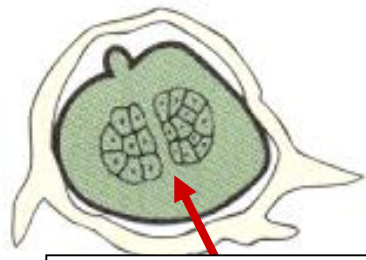
ENDOSPORIC



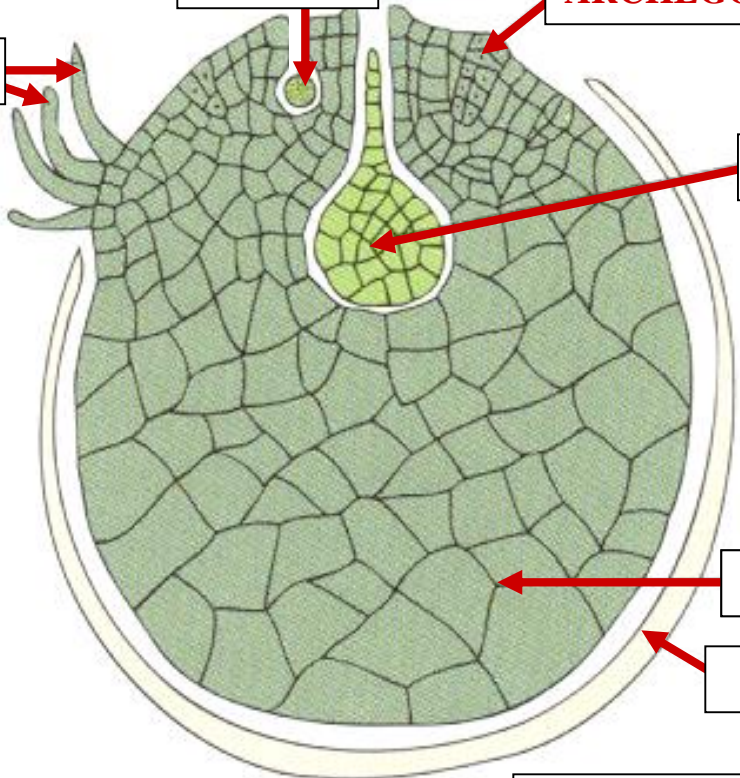
MICROGAMETOPHYTE



ANTHERIDIUM



[]



FERN

ARCHEGONIUM

[]

[]

[]

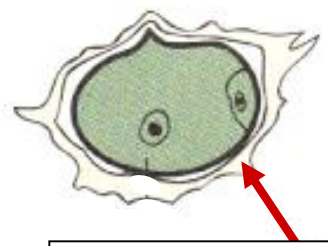
MEGASPORE

MEGAGAMETOPHYTE

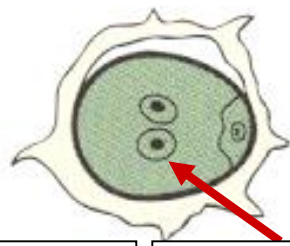
UNISEXUAL

MICROSPORE

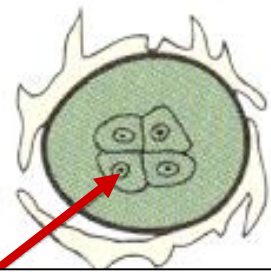
GAMETOPHYTE



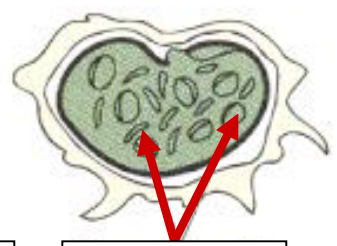
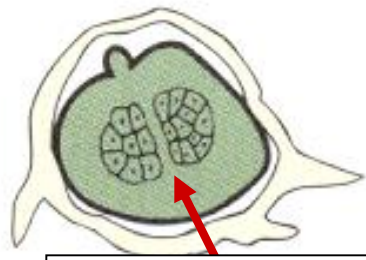
UNISEXUAL



MICROGAMETOPHYTE



ANTHERIDIUM



[]

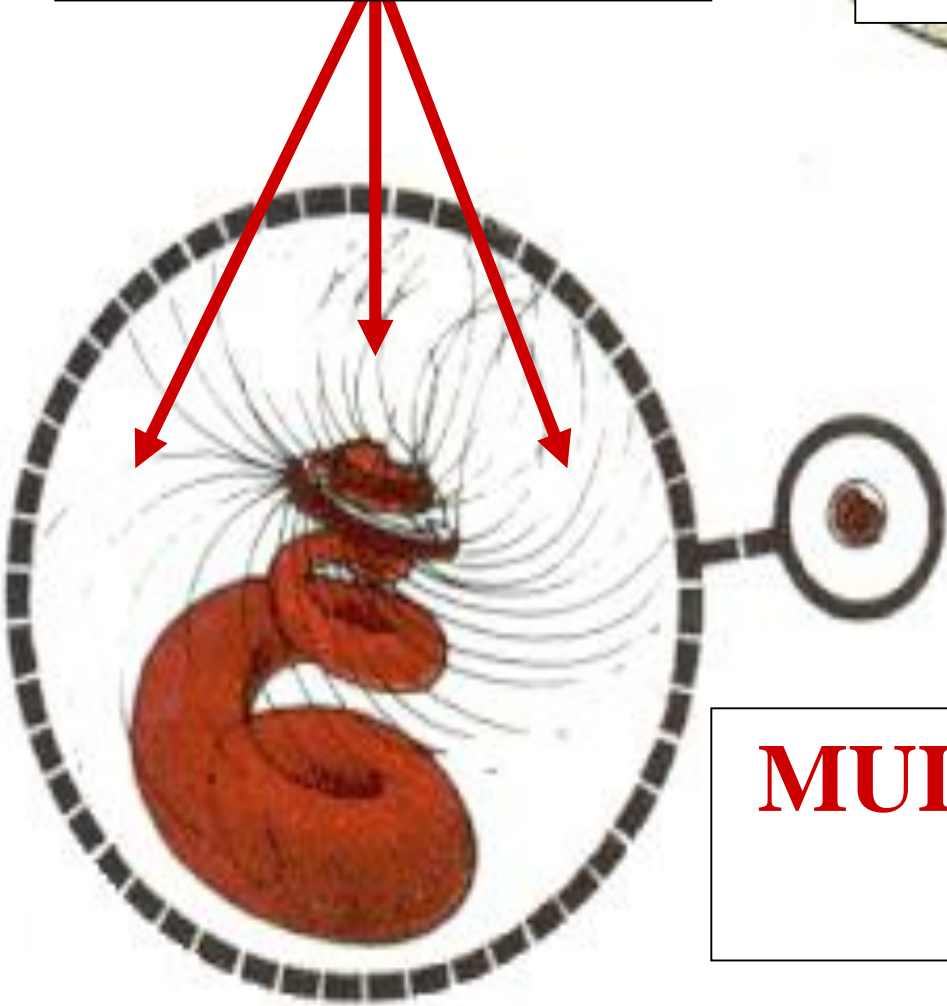




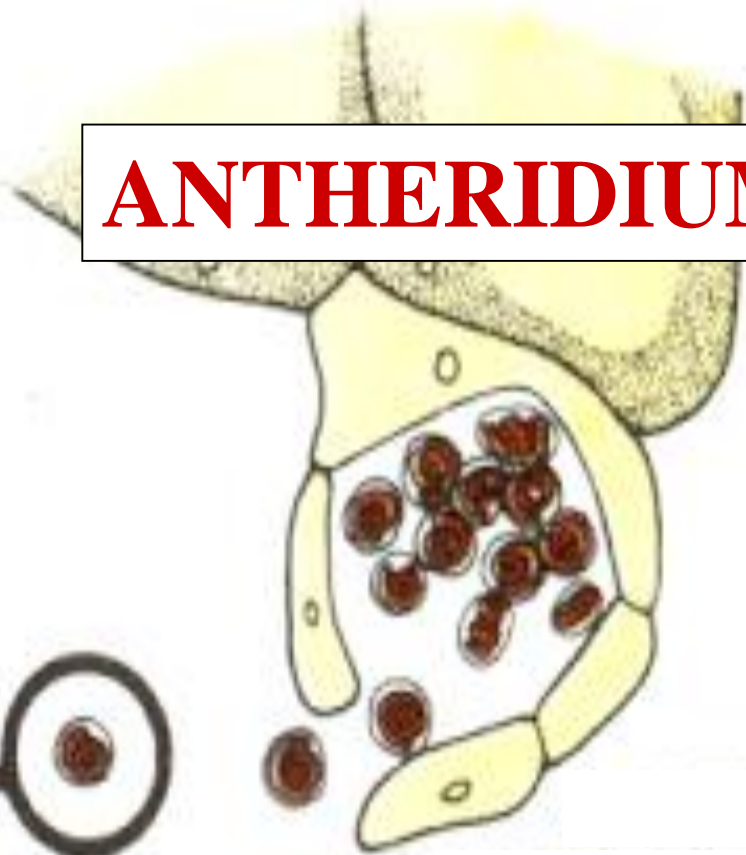
SPERM

**MULTIPLE
FLAGELLA**

ANTHERIDIUM



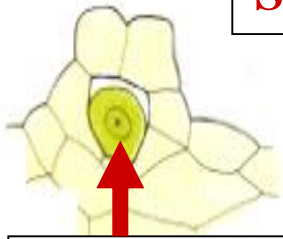
**MULTIFLAGELLATED
SPERM**



SYNGAMY REQUIRES



SYNGAMY



ZYGOTE



EGG

SPERM

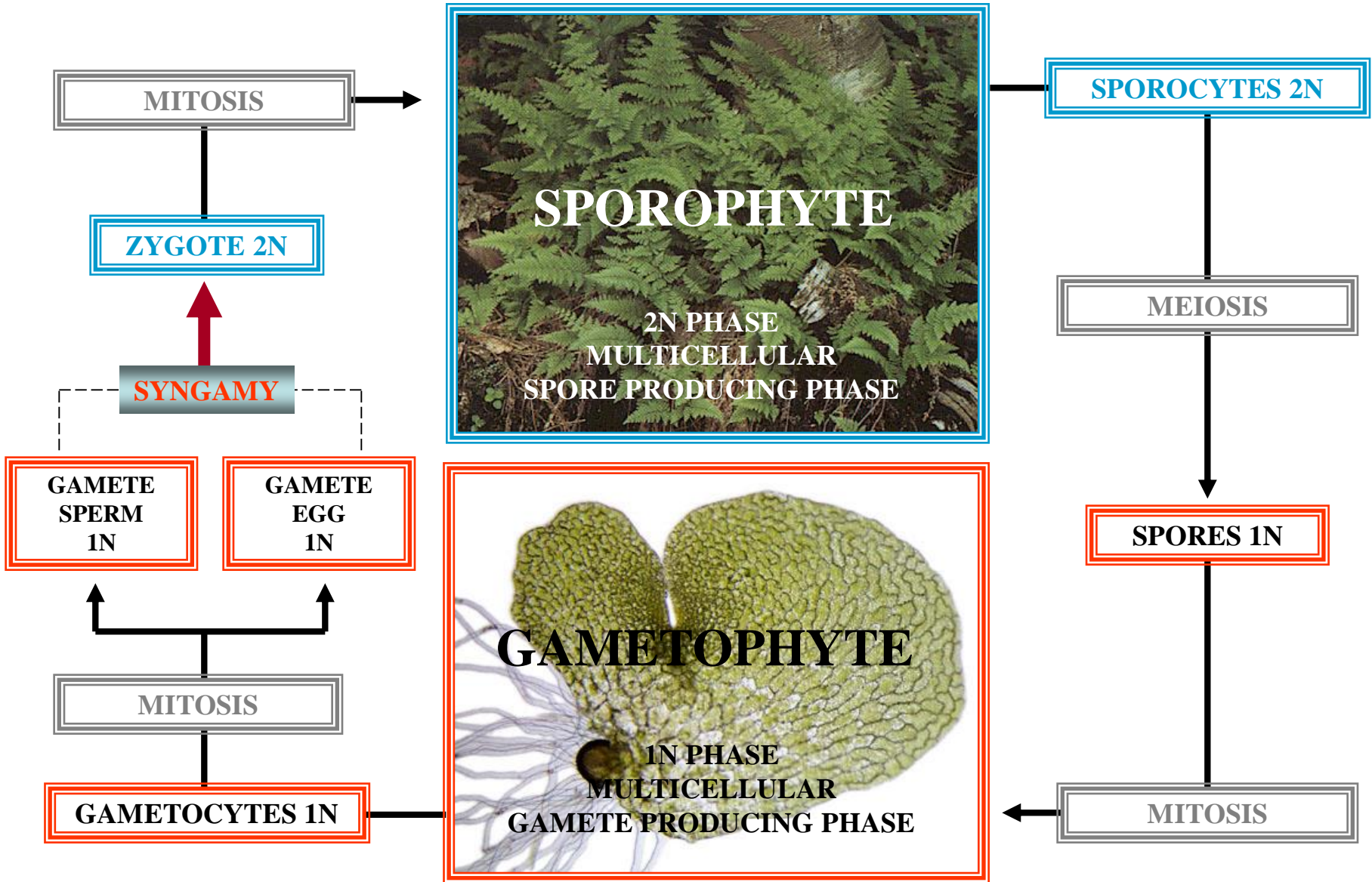
FERNS



SYNGAMY REQUIRES WATER



PTERIDOPHYTA LIFE CYCLE





FERN FOSSIL RECORD



~385

MILLION YEARS

~385 MILLION YEARS AGO

F

DEVONIAN



~385 MILLION YEARS AGO

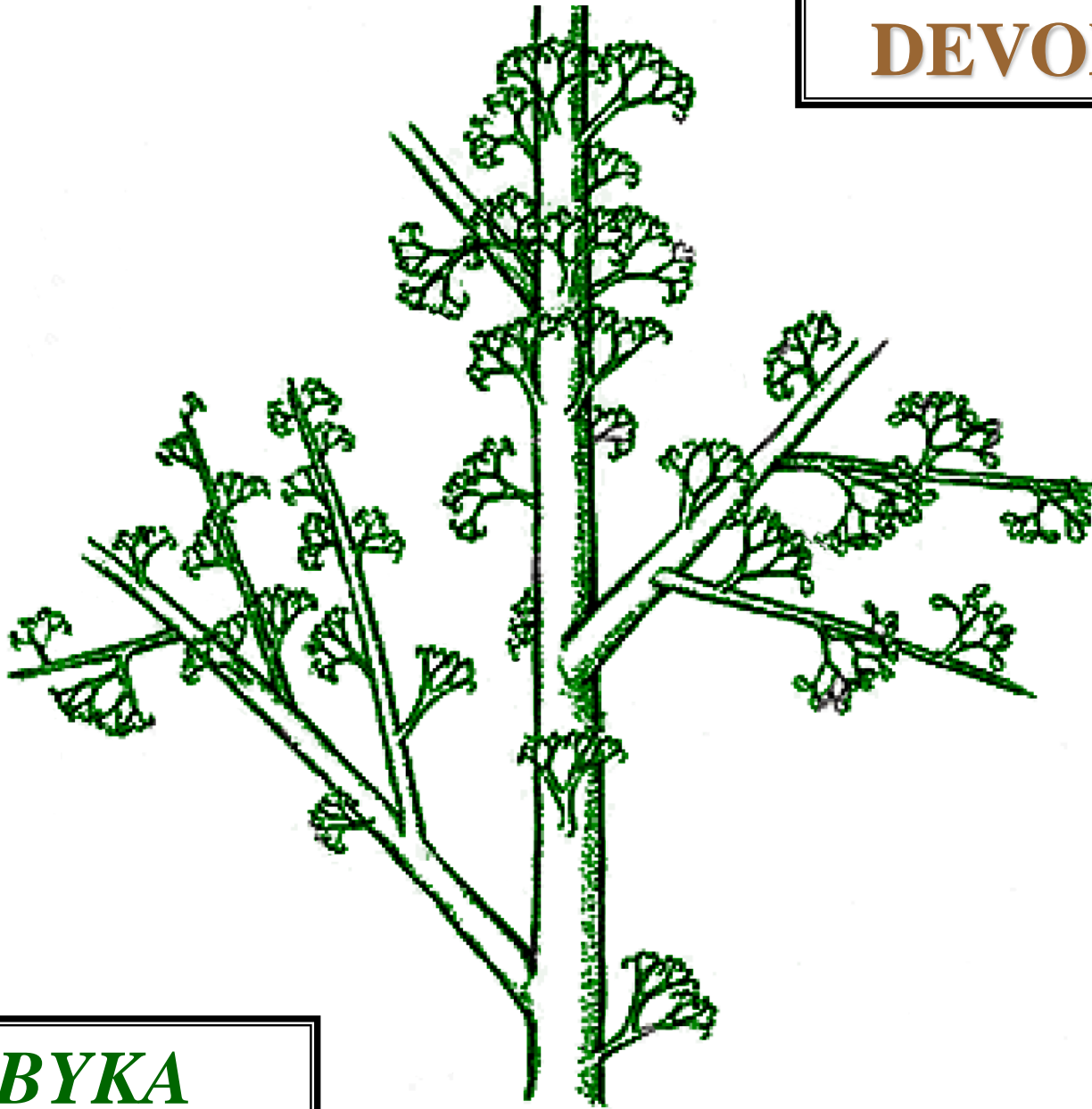


FERNS EVOLVE



DEVONIAN

0



IBYKA

DEVONIAN



**OLDEST
KNOWN
FERN**

IBYKA

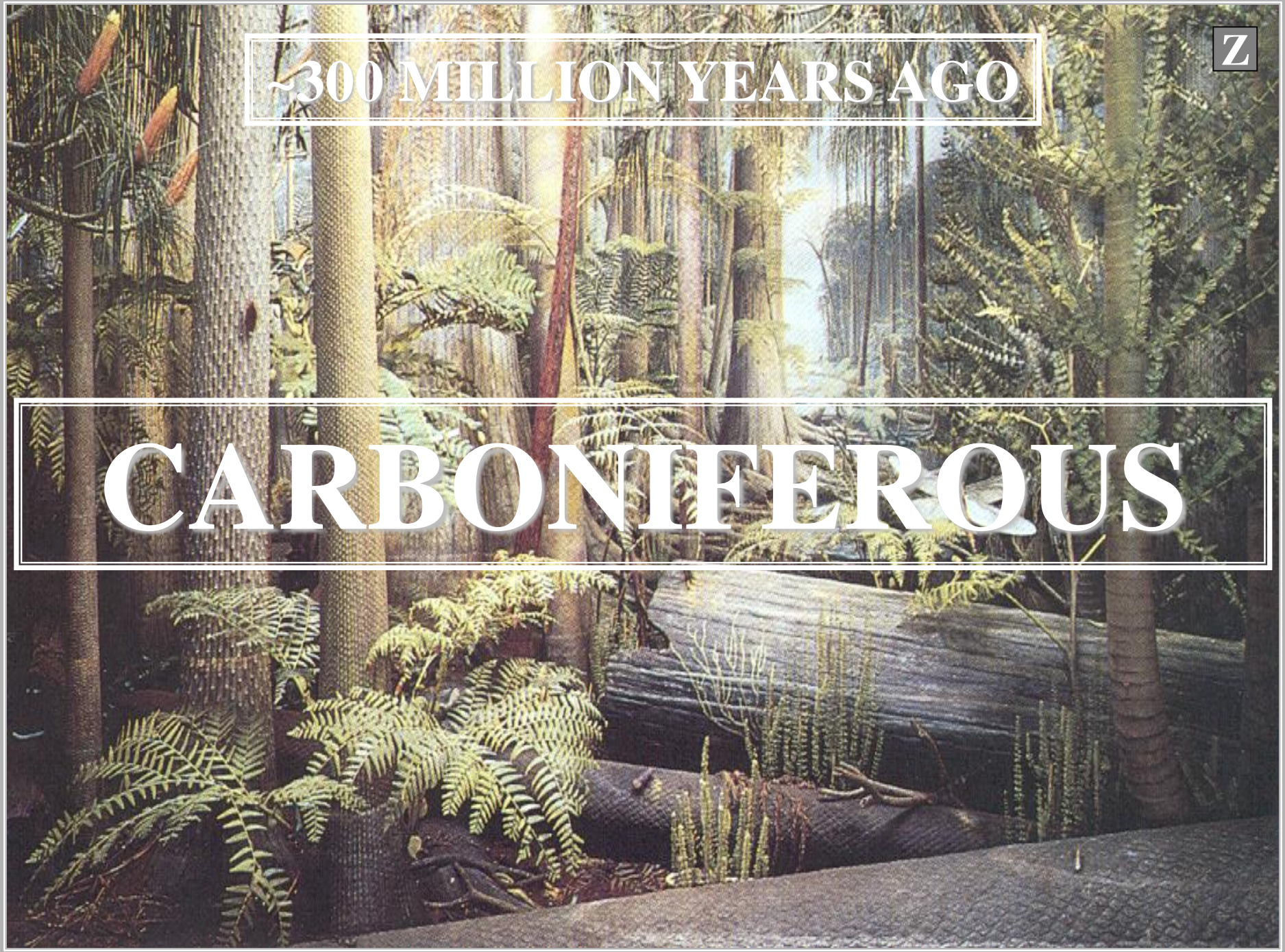




**~300
MILLION YEARS**

~300 MILLION YEARS AGO

CARBONIFEROUS





~300 MILLION YEARS AGO

CARBONIFEROUS FERN ZENITH

PTERIDOPHYTA CLASSIFICATION



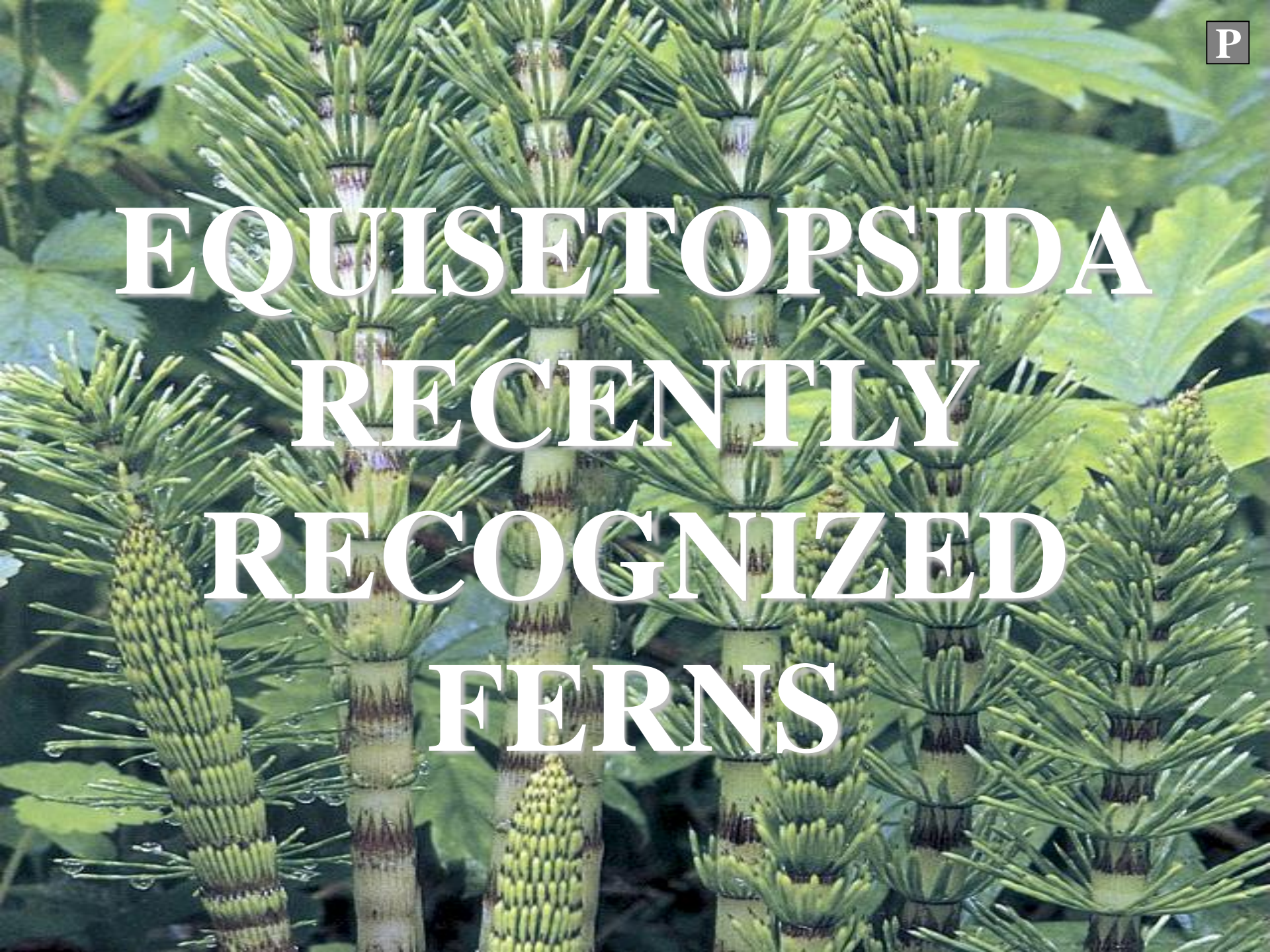
R

ALABAMA
TRACHEOPHYTE

EQUISETOPSIDA

ALABAMA
TRACHEOPHYTE

EQUISETOPSIDA
RECENTLY
RECOGNIZED
FERNS





**EQUISETOPSIDA
PREVIOUSLY
ASSIGNED
OWN PHYLUM
SPHENOPHYTA**

SYNONYMS

A close-up photograph of a horsetail plant (Equisetum). The image shows several upright, segmented stems. Each segment is covered with small, sharp, needle-like leaves that are arranged in whorls. The stems are light green and have a distinct jointed appearance. The background is filled with more green foliage, including larger, broad leaves.

SPHENOPHYTA

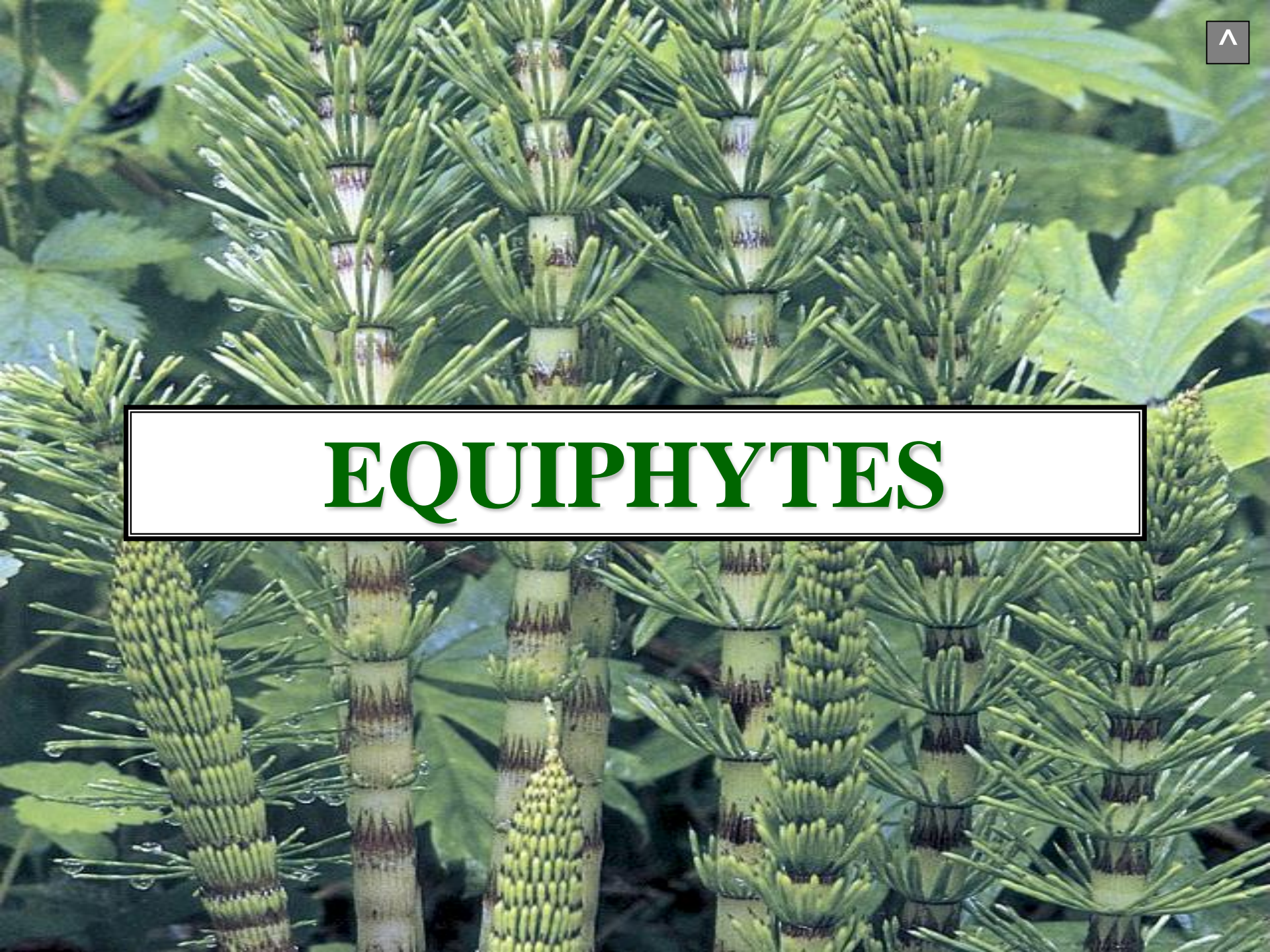
The background of the slide is a close-up photograph of a horsetail plant (Equisetum). The image shows several upright, segmented stems. Each stem is composed of a series of nodes, with small, dark, pointed structures (leaves or bracts) emerging from the nodes. The stems are green and appear to have a slightly fuzzy or scaly texture. The background is filled with more of these plants and some larger, broad green leaves, creating a dense, natural setting.

ARTHROPHYTA

COMMON NAME



EQUIPHYTES



EQUISETOPSIDA CHARACTERS

EQUISETOPSIDA CHARACTERS

WETLANDS

EQUISETOPSIDA CHARACTERS

**EQUISETOPSIDA
CHARACTERS**

WETLANDS

FROND REDUCED

**EQUISETOPSIDA
CHARACTERS**

EQUISETOPSIDA CHARACTERS

WETLANDS

FROND REDUCED

EUSPORANGIATE

EQUISETOPSIDA CHARACTERS

EQUISETOPSIDA CHARACTERS

WETLANDS

FROND REDUCED

EUSPORANGIATE

NON-SYNANGIATE

EQUISETOPSIDA CHARACTERS

EQUISETOPSIDA CHARACTERS



WETLANDS

FROND REDUCED

EUSPORANGIATE

NON-SYNANGIATE

HOMOSPOROUS

EQUISETOPSIDA CHARACTERS



EQUISETOPSIDA FOSSIL RECORD

~380

MILLION YEARS

~380 MILLION YEARS AGO

E

DEVONIAN

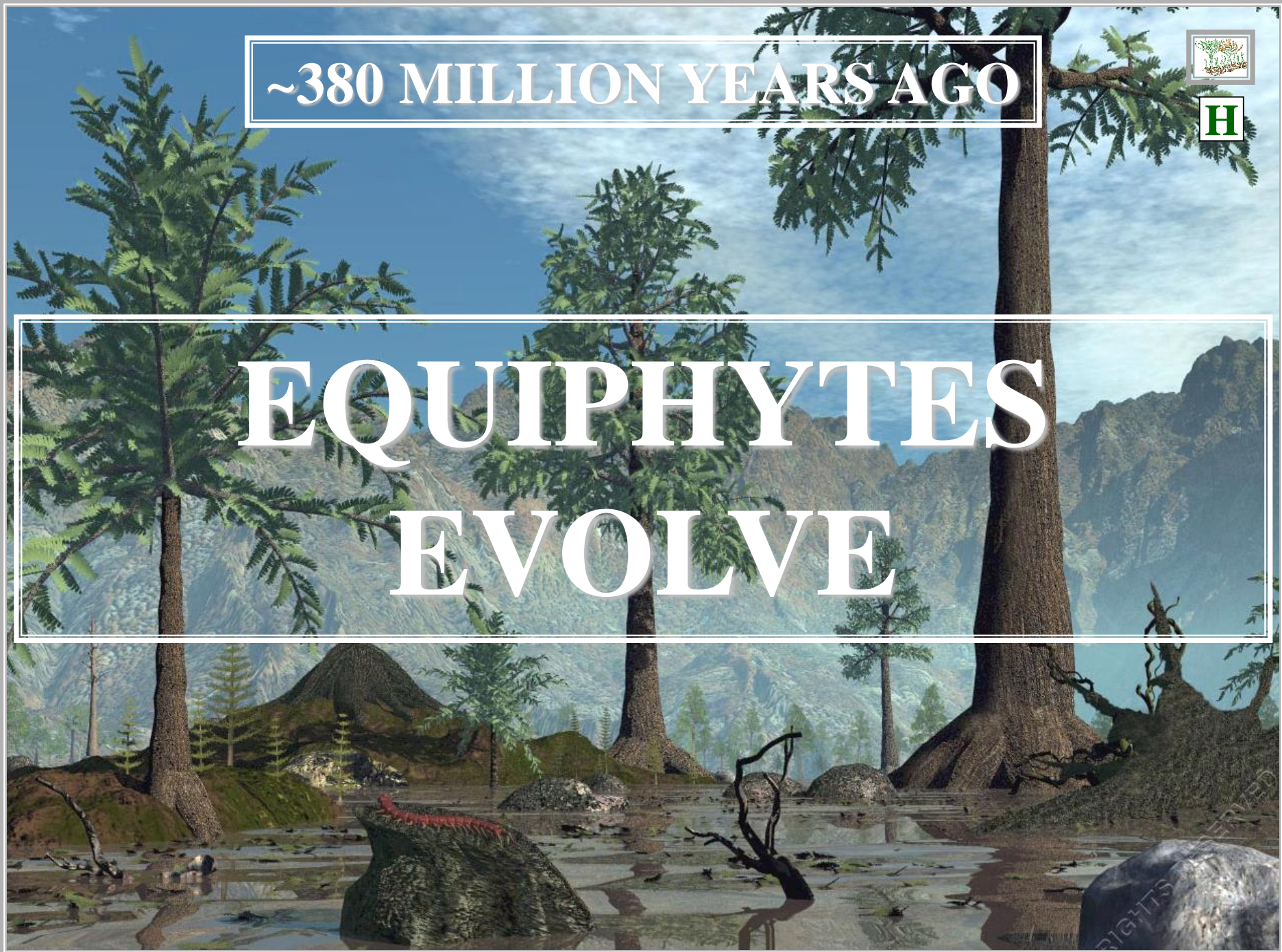


~380 MILLION YEARS AGO

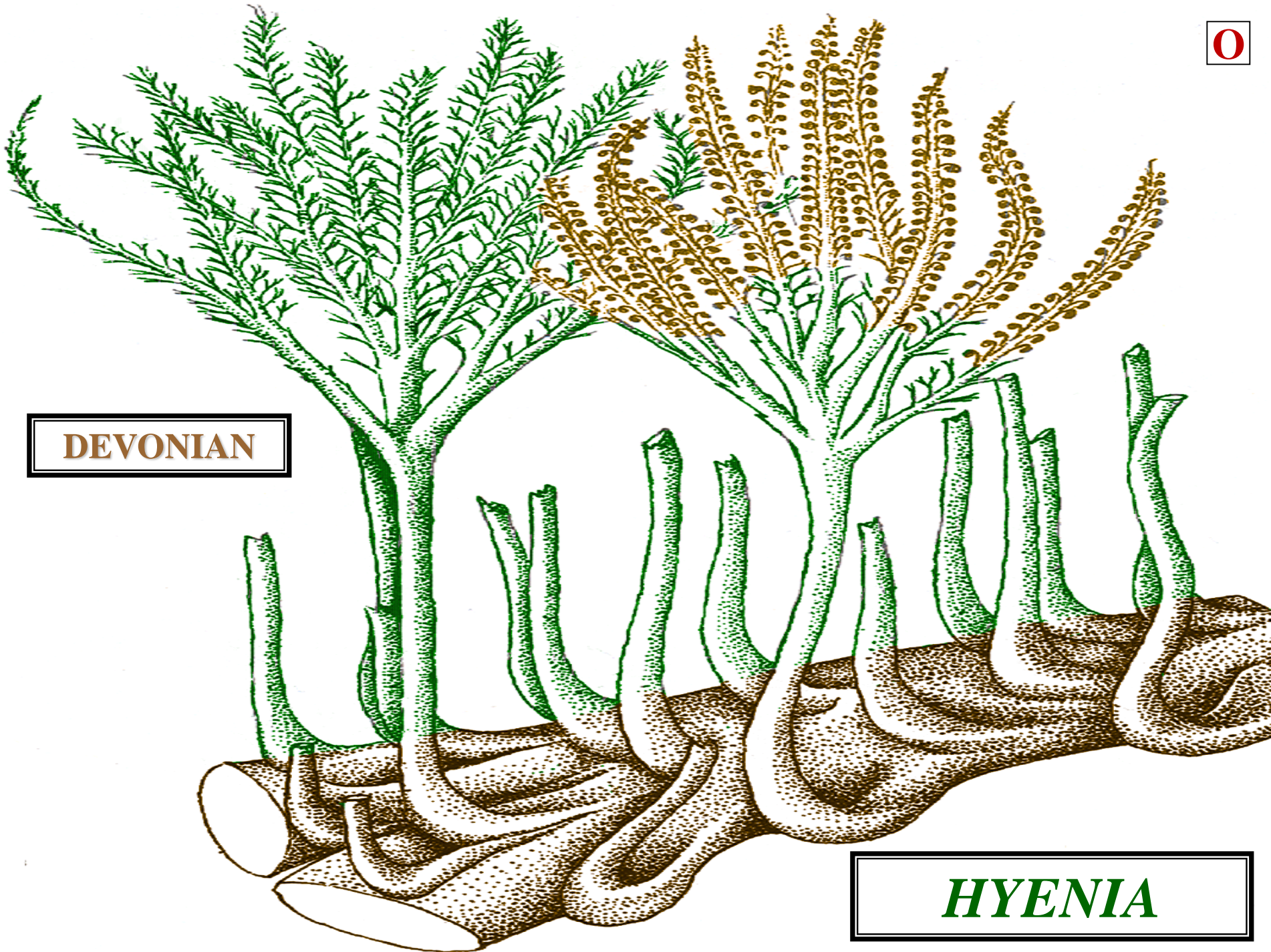


H

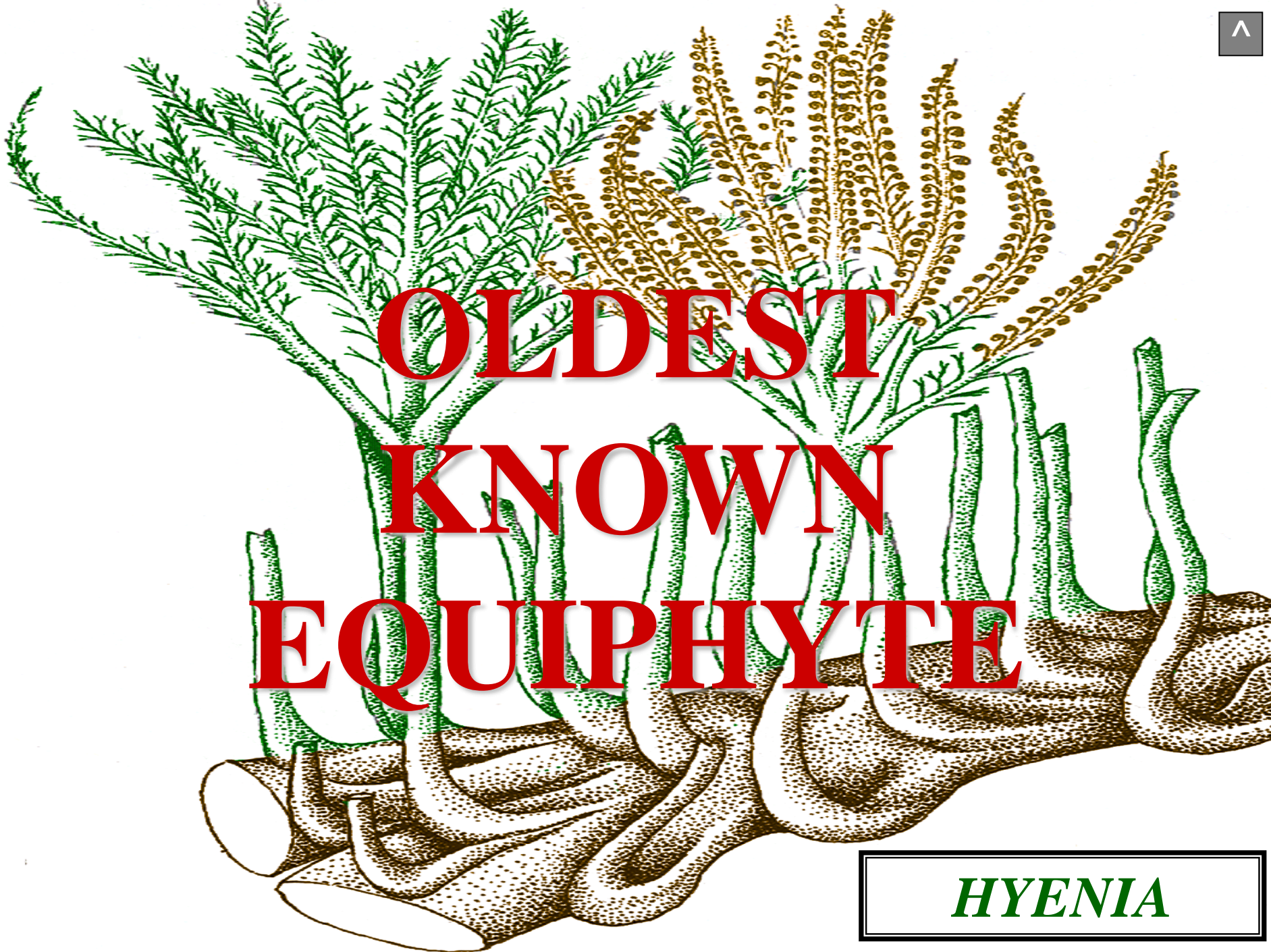
EQUIPHYTES EVOLVE



DEVONIAN



HYENIA



**OLDEST
KNOWN
EQUIPHYTE**

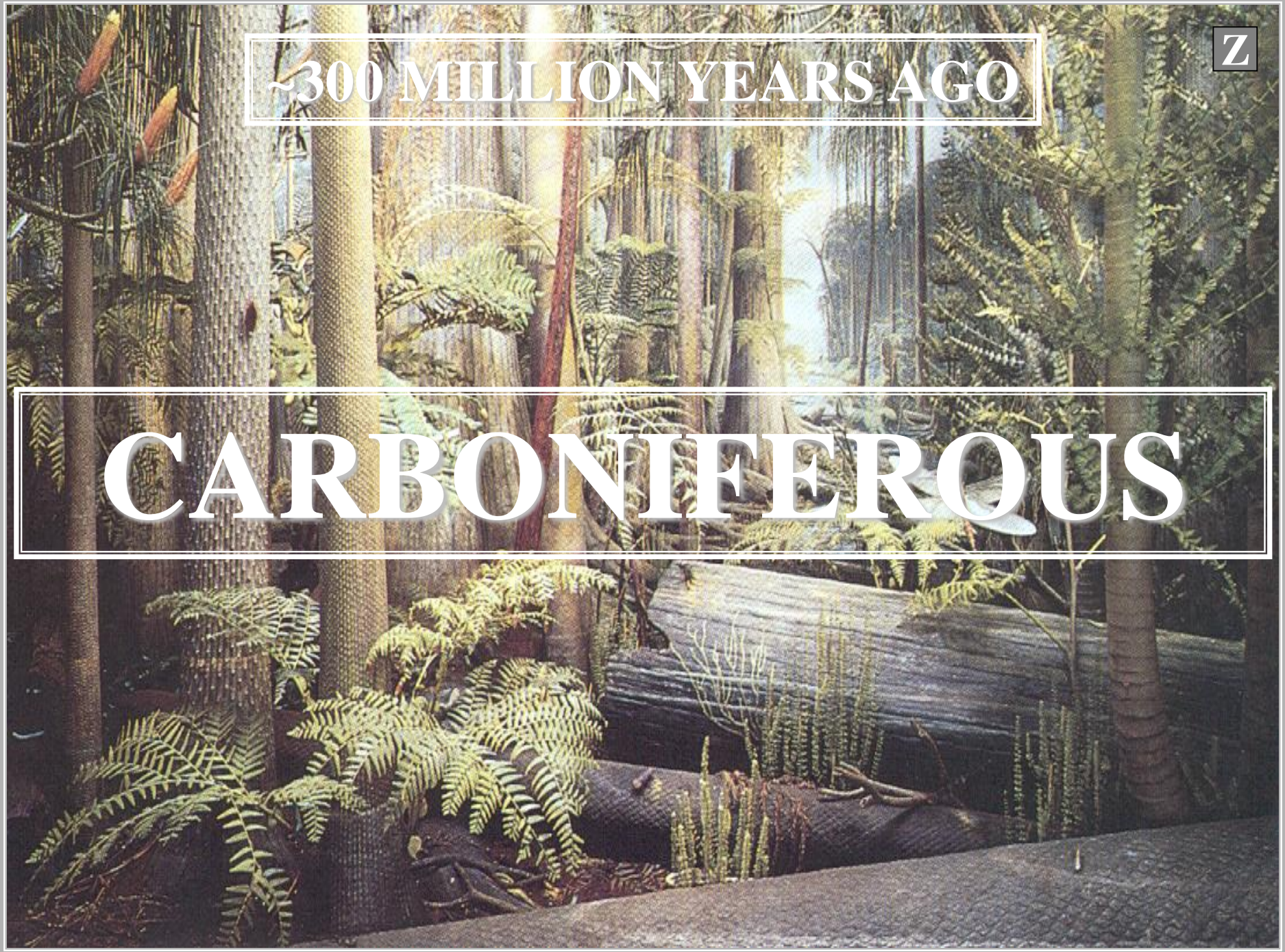
HYENIA



**~300
MILLION YEARS**

~300 MILLION YEARS AGO

CARBONIFEROUS



~300 MILLION YEARS AGO

EQUIPHYTES ZENITH





~300 MILLION YEARS AGO

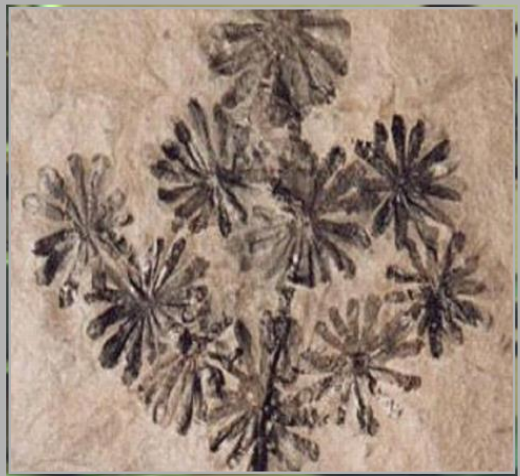


S

EQUIPHYTE
SPHENOPHYLLUM



C



SPHENOPHYLLUM

~300 MILLION YEARS AGO



EQUIPHYTE
CALAMITES
ARBORESCENT



CALAMITES





EQUISETOPSIDA ORDER



ALABAMA
TRACHEOPHYTE

EQUISETALES

ALABAMA
TRACHEOPHYTE



COMMON NAMES

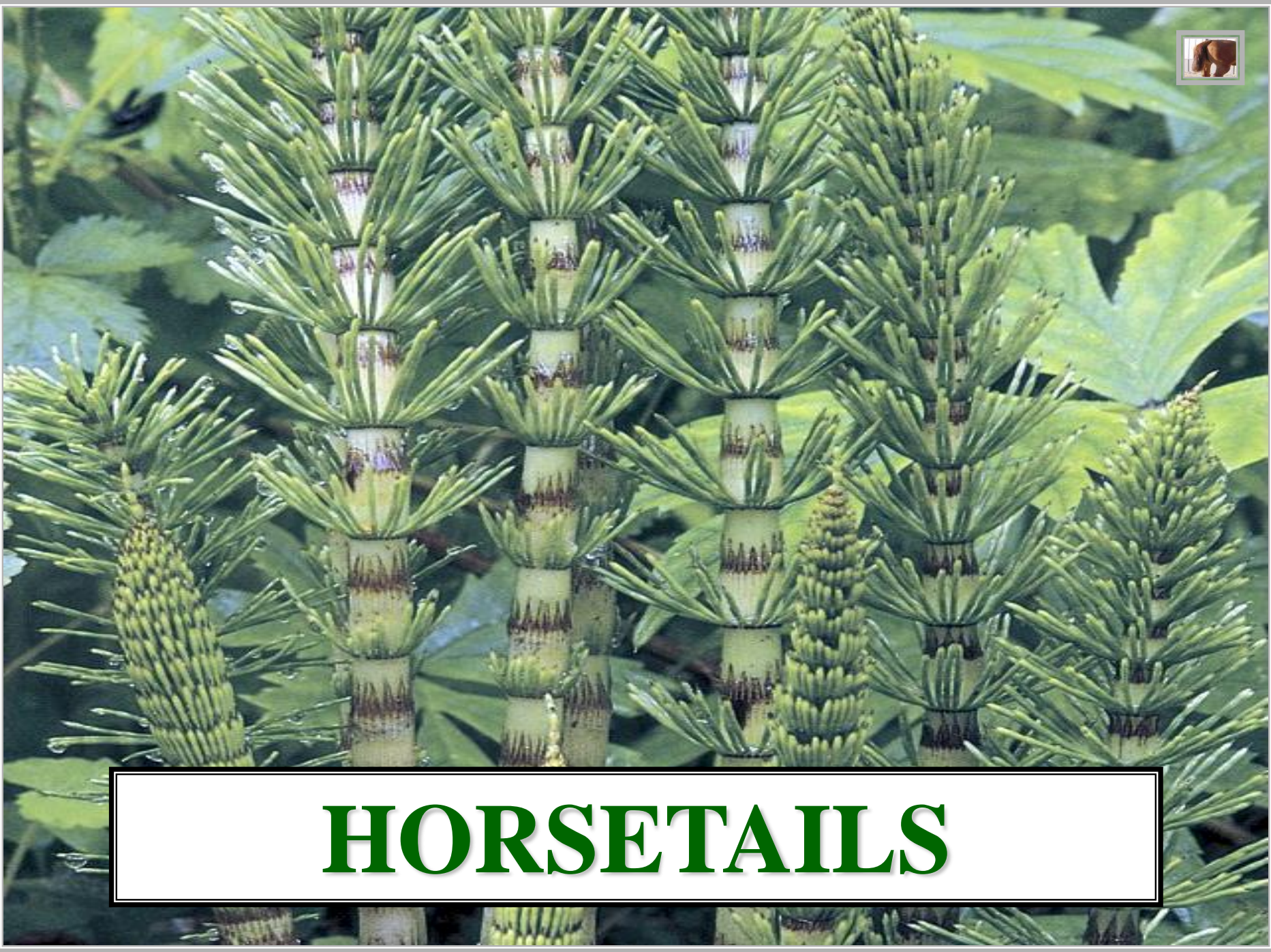


SCOURING RUSHES

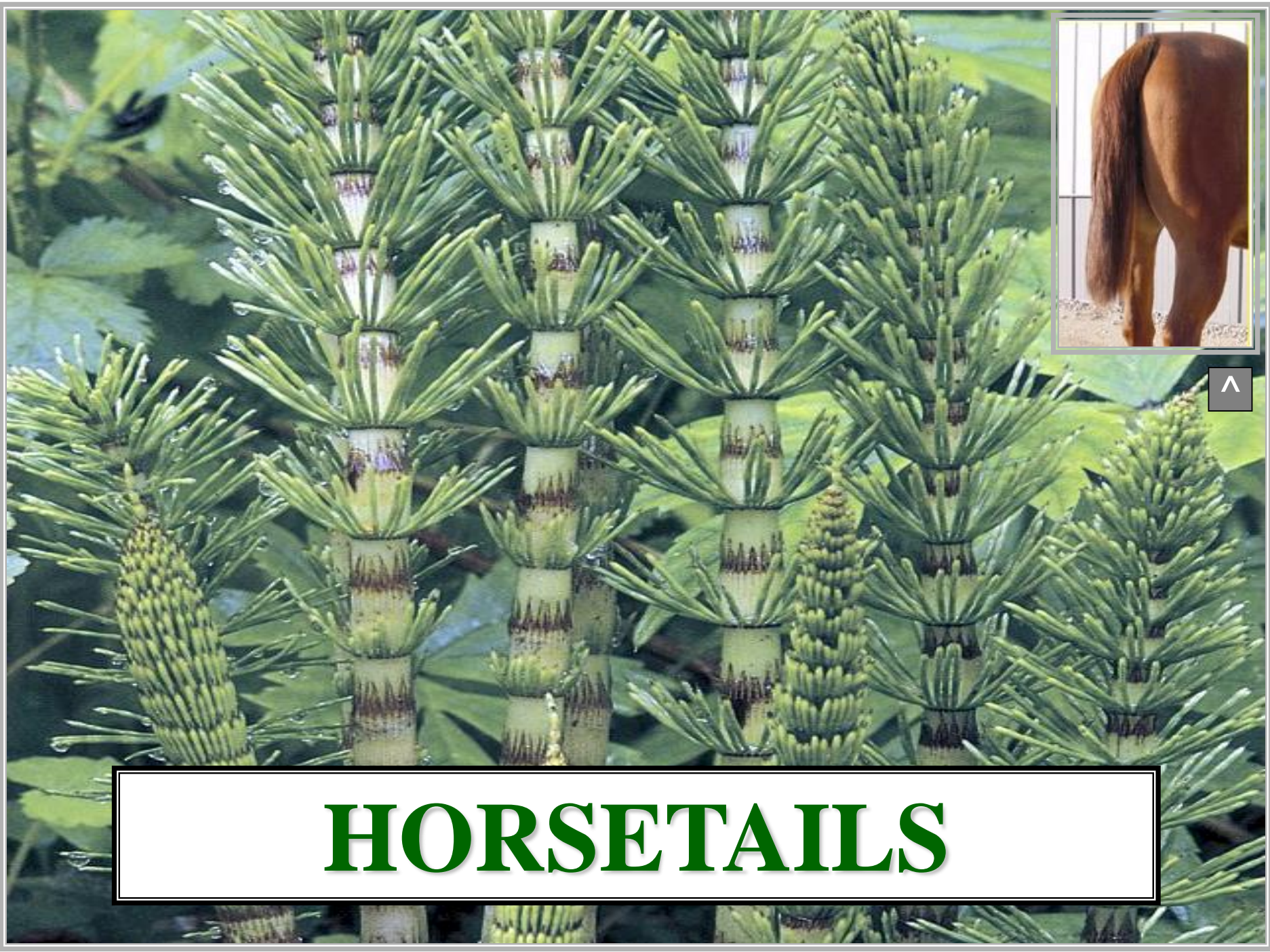


SCOURING RUSH





HORSETAILS



HORSETAILS

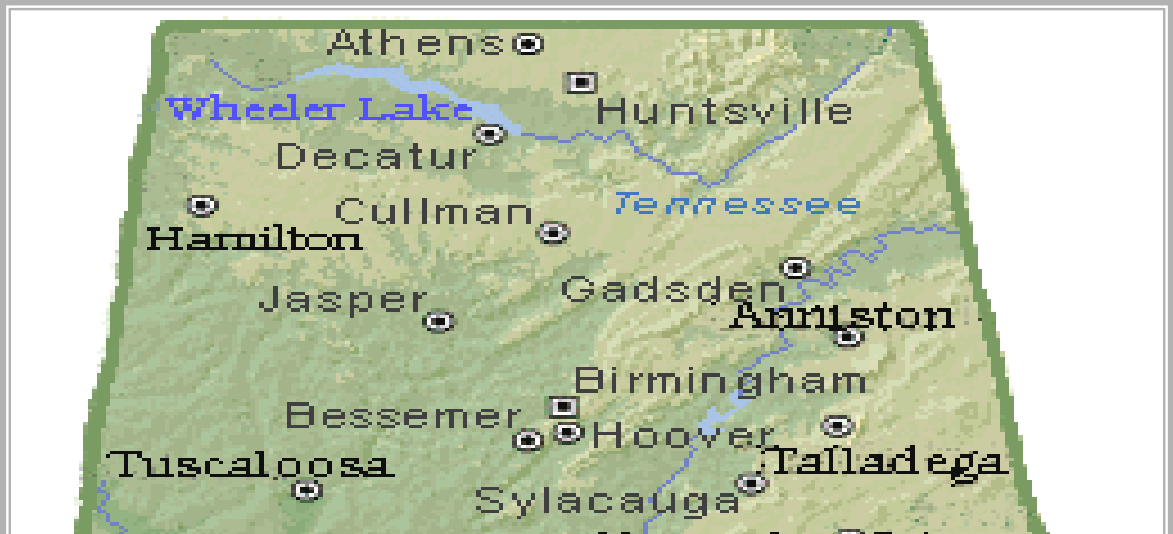


DIVERSITY



~15 SPECIES

EARTH



2 SPECIES





EQUISETALES

VERY MINOR

COMPONENT

ALABAMA FLORA



REPRESENTATIVE GENUS



?



EQUISETUM



HABITAT

WETLANDS



L



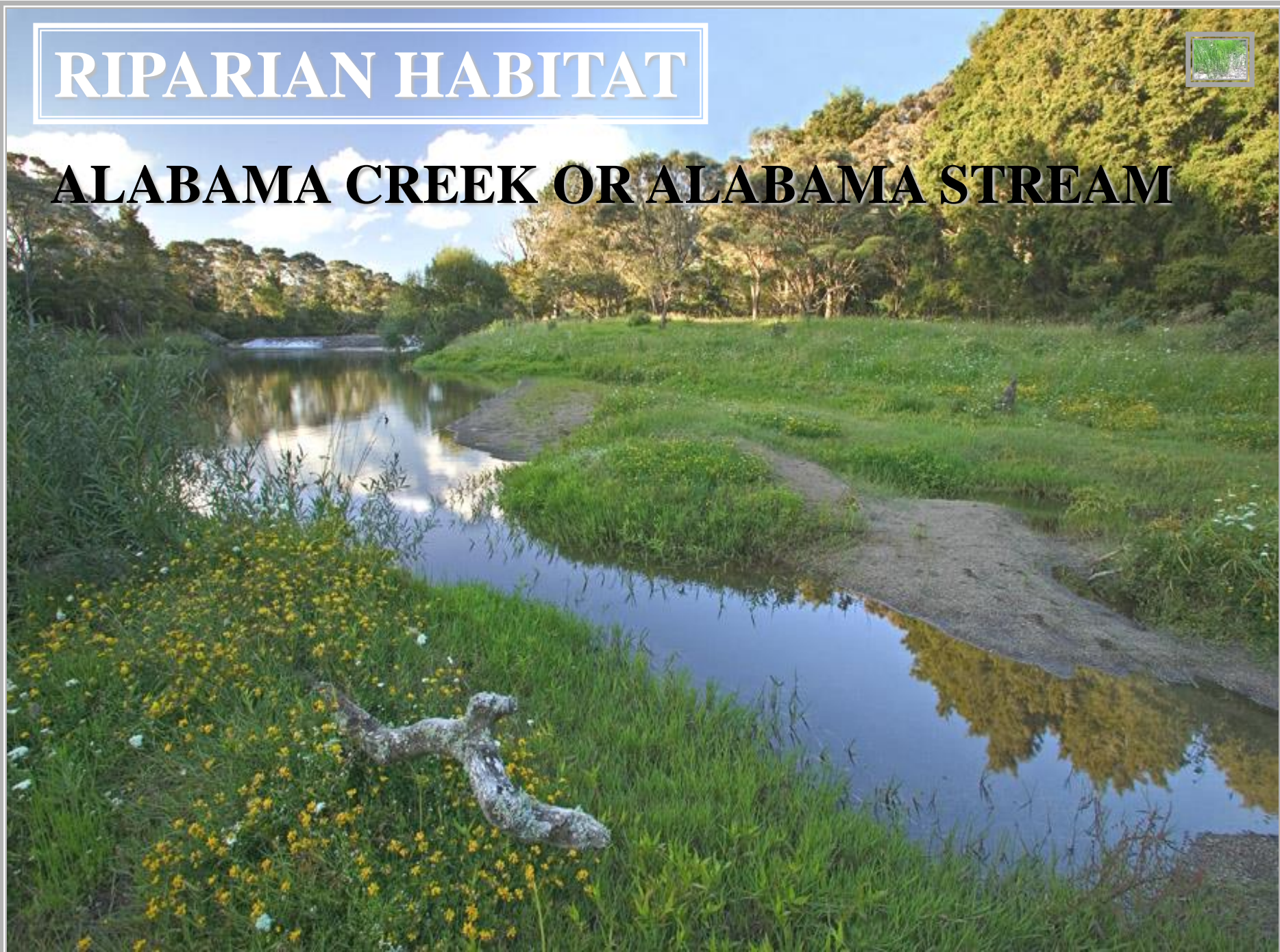
ALABAMA LAKE OR ALABAMA POND



LITTORAL HABITAT

RIPARIAN HABITAT

ALABAMA CREEK OR ALABAMA STREAM



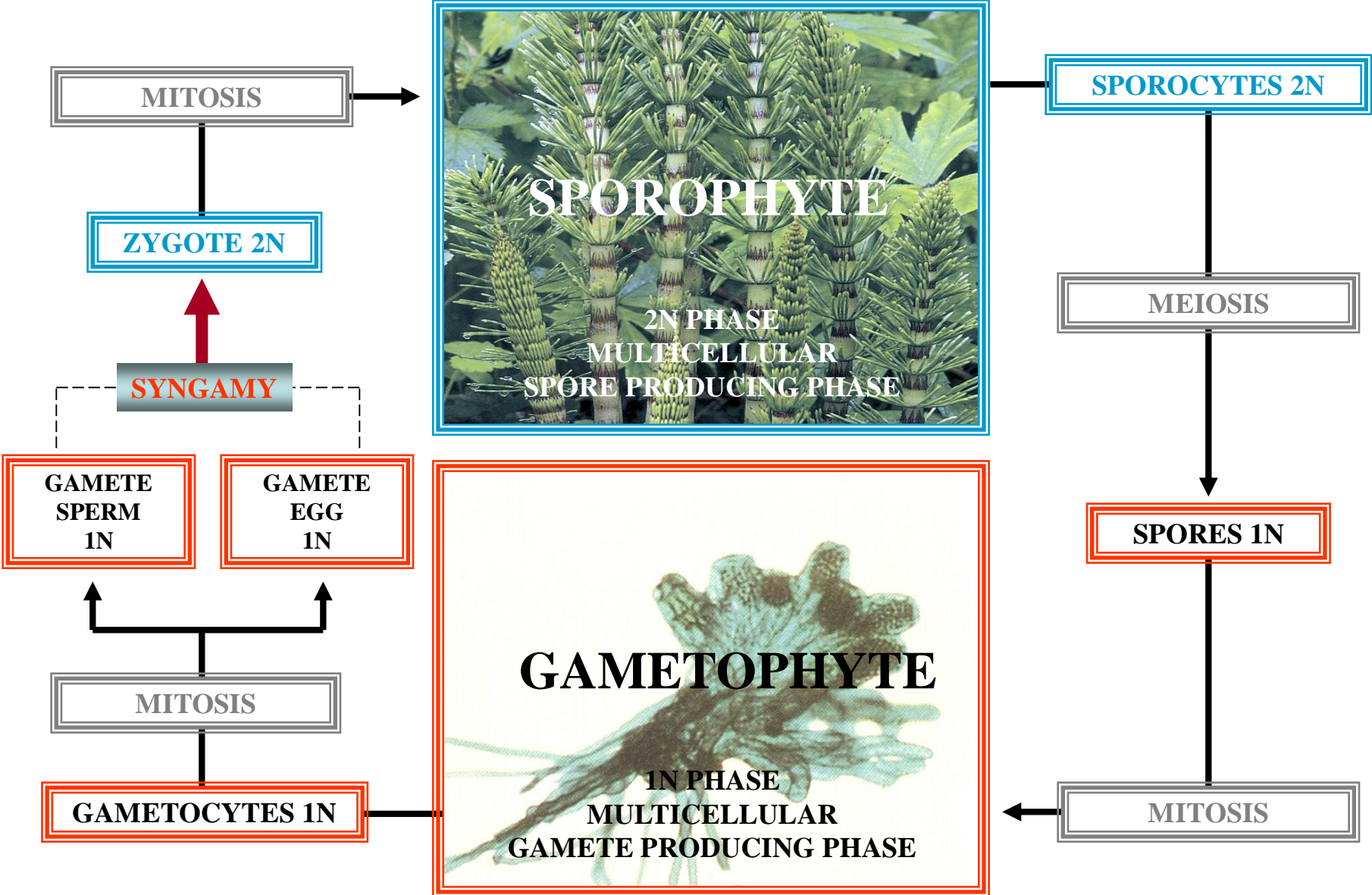


EQUISETUM



GENERAL CHARACTERS

EQUISETALES LIFE CYCLE

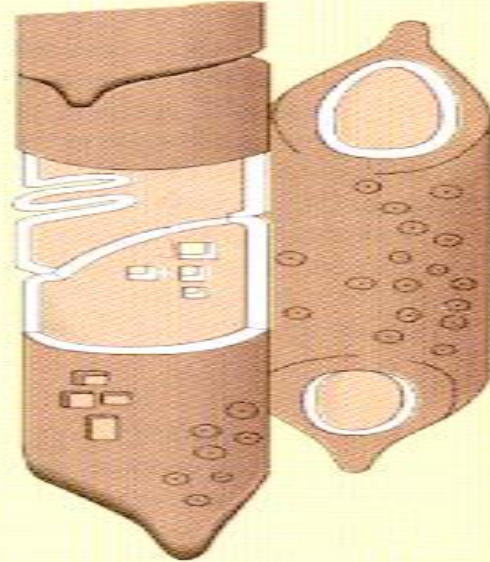
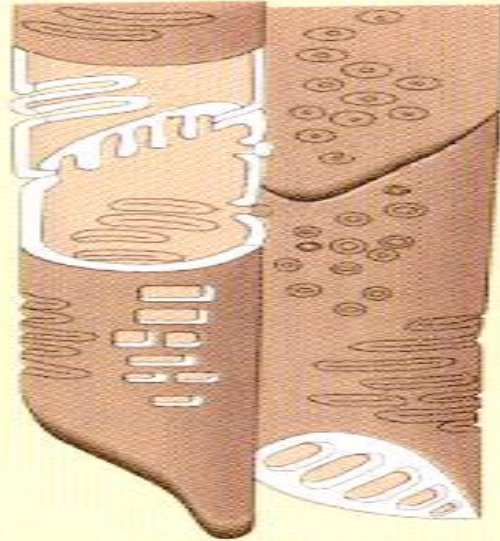
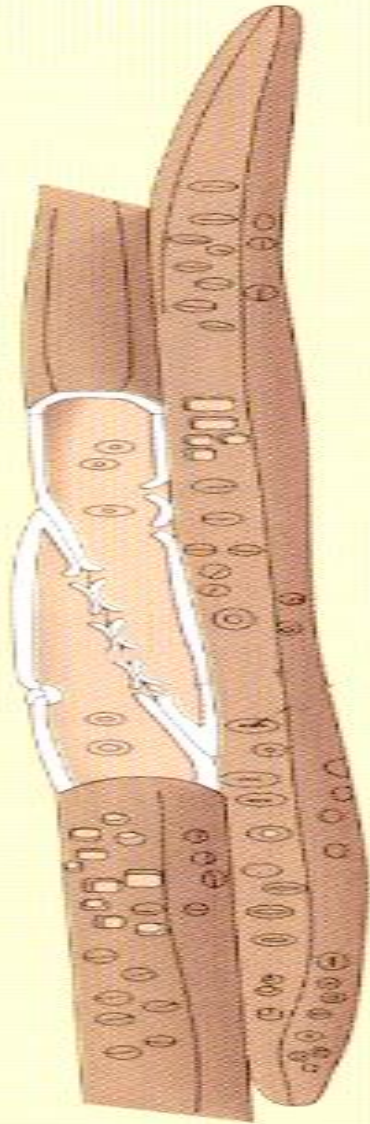




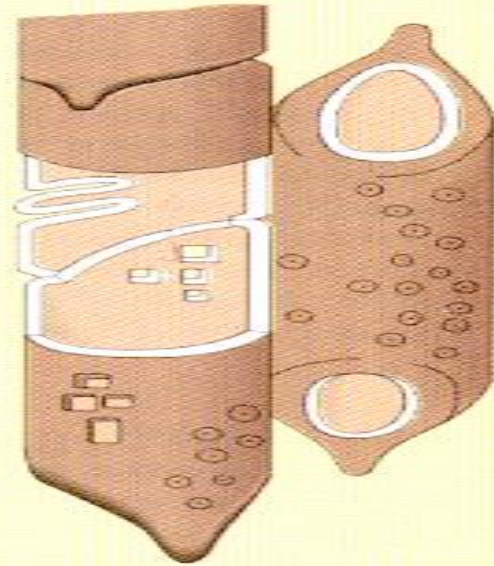
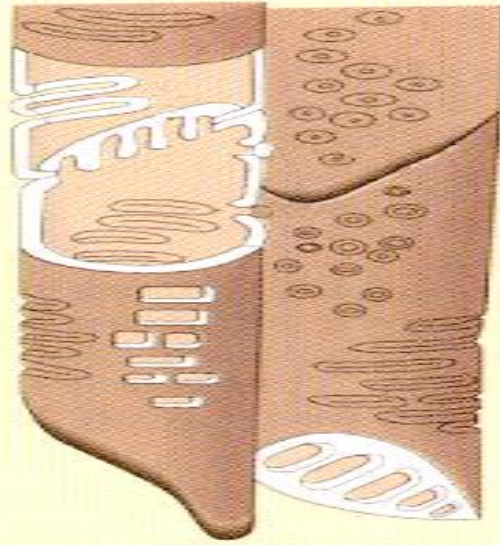
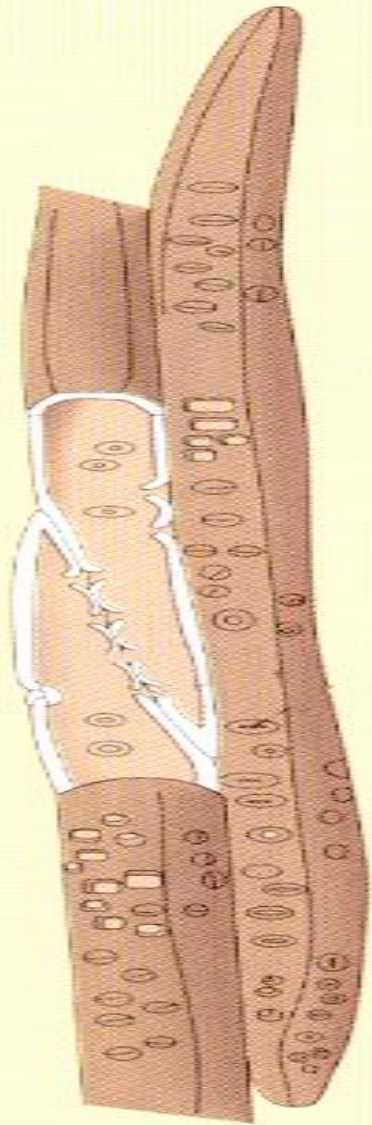
SPOROPHYTE CHARACTERS



XYLEM



XYLEM CELLS



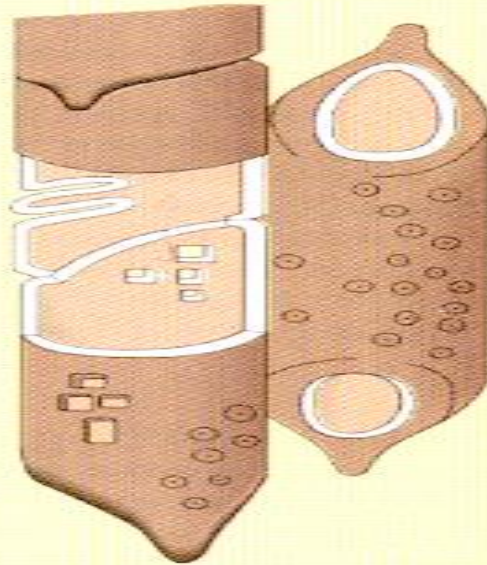
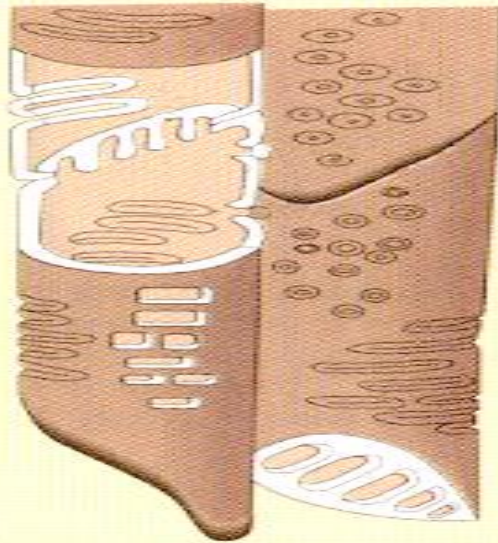
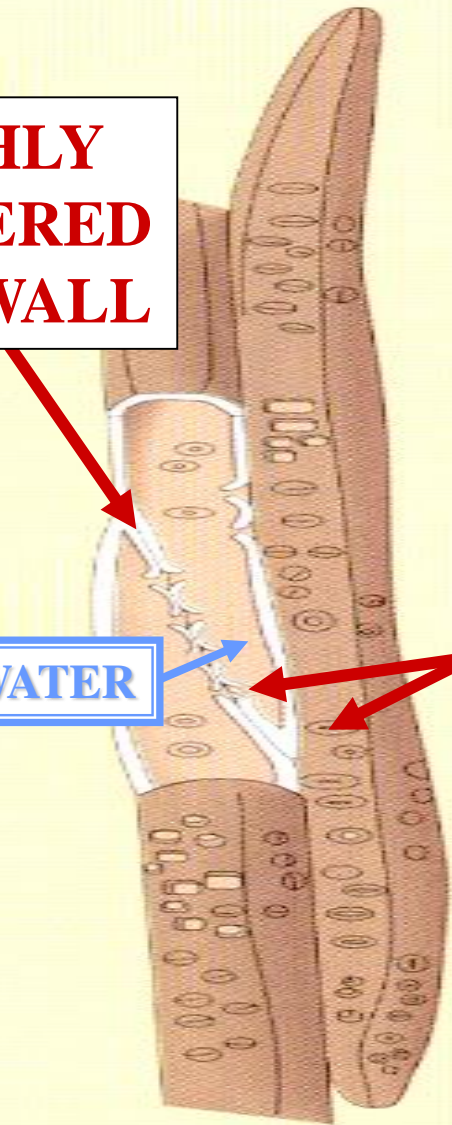
TRACHEARY ELEMENTS

**HIGHLY
TAPPED
END WALL**

WATER

PITS

?

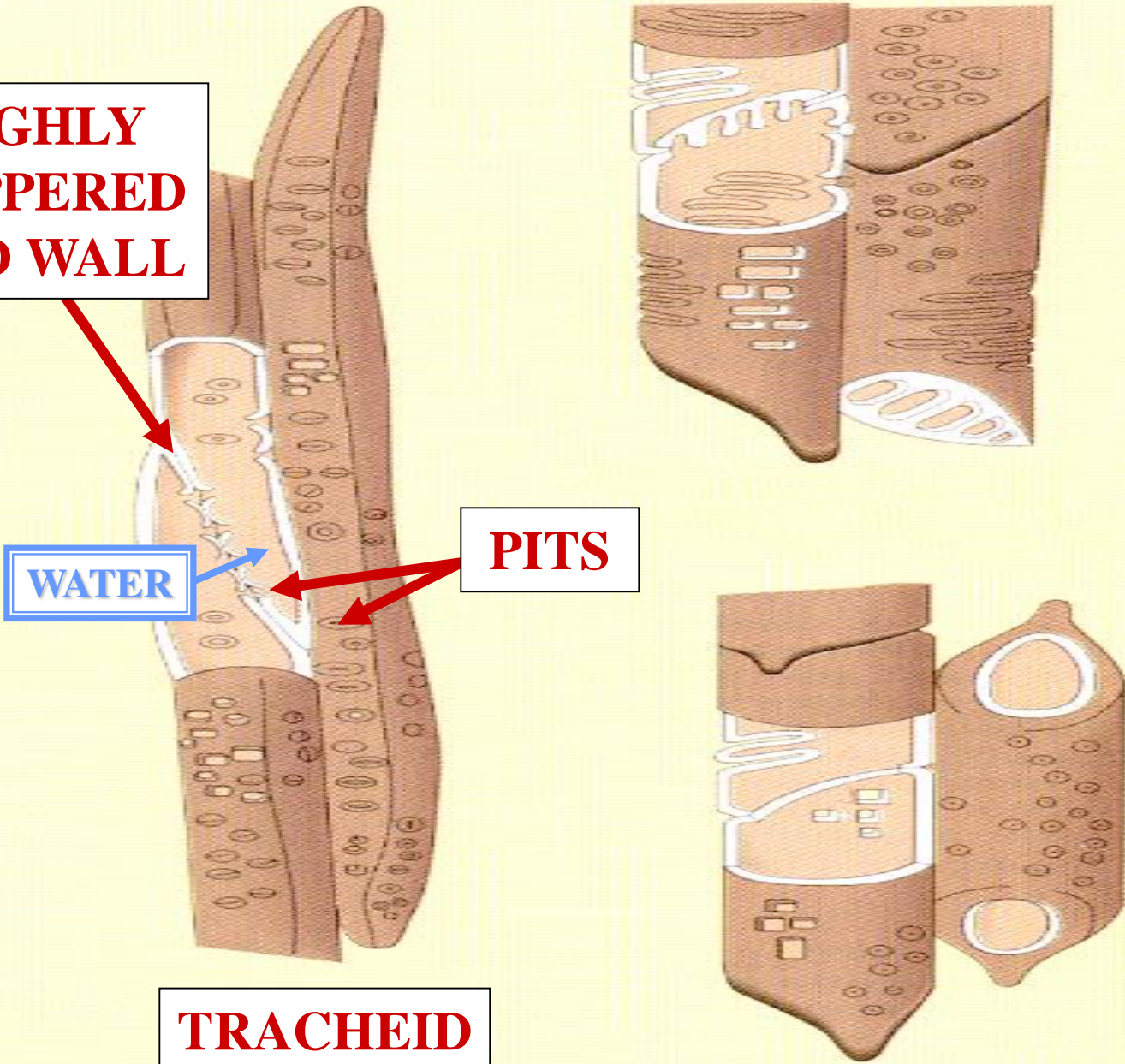


**HIGHLY
TAPPED
END WALL**

WATER

PITS

TRACHEID



**HIGHLY
TAPPED
END WALL**

**LESS
TAPPED
END WALL**

?

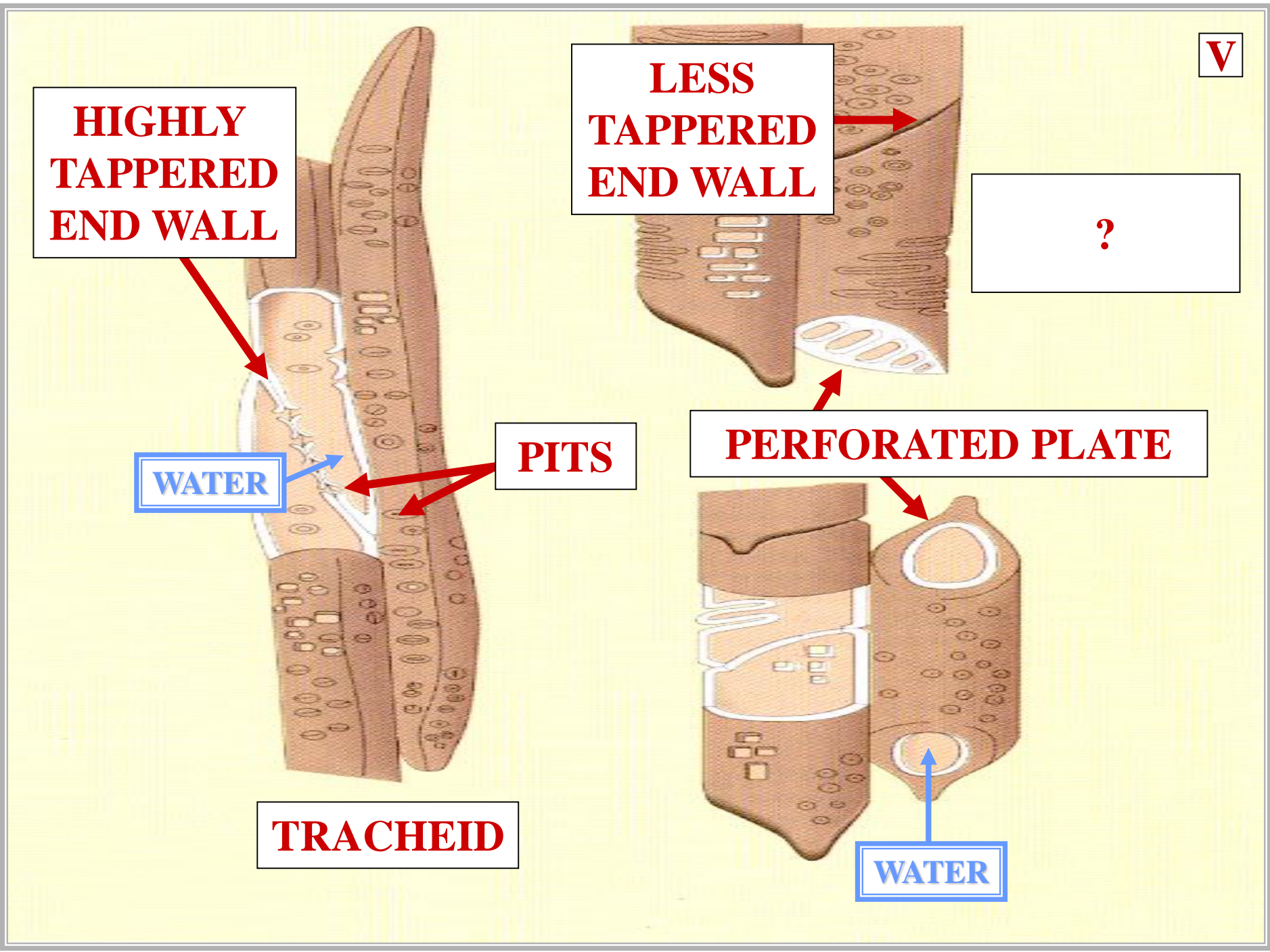
WATER

PITS

PERFORATED PLATE

TRACHEID

WATER





T

**HIGHLY
TAPPED
END WALL**

**LESS
TAPPED
END WALL**

**VESSEL
MEMBER**

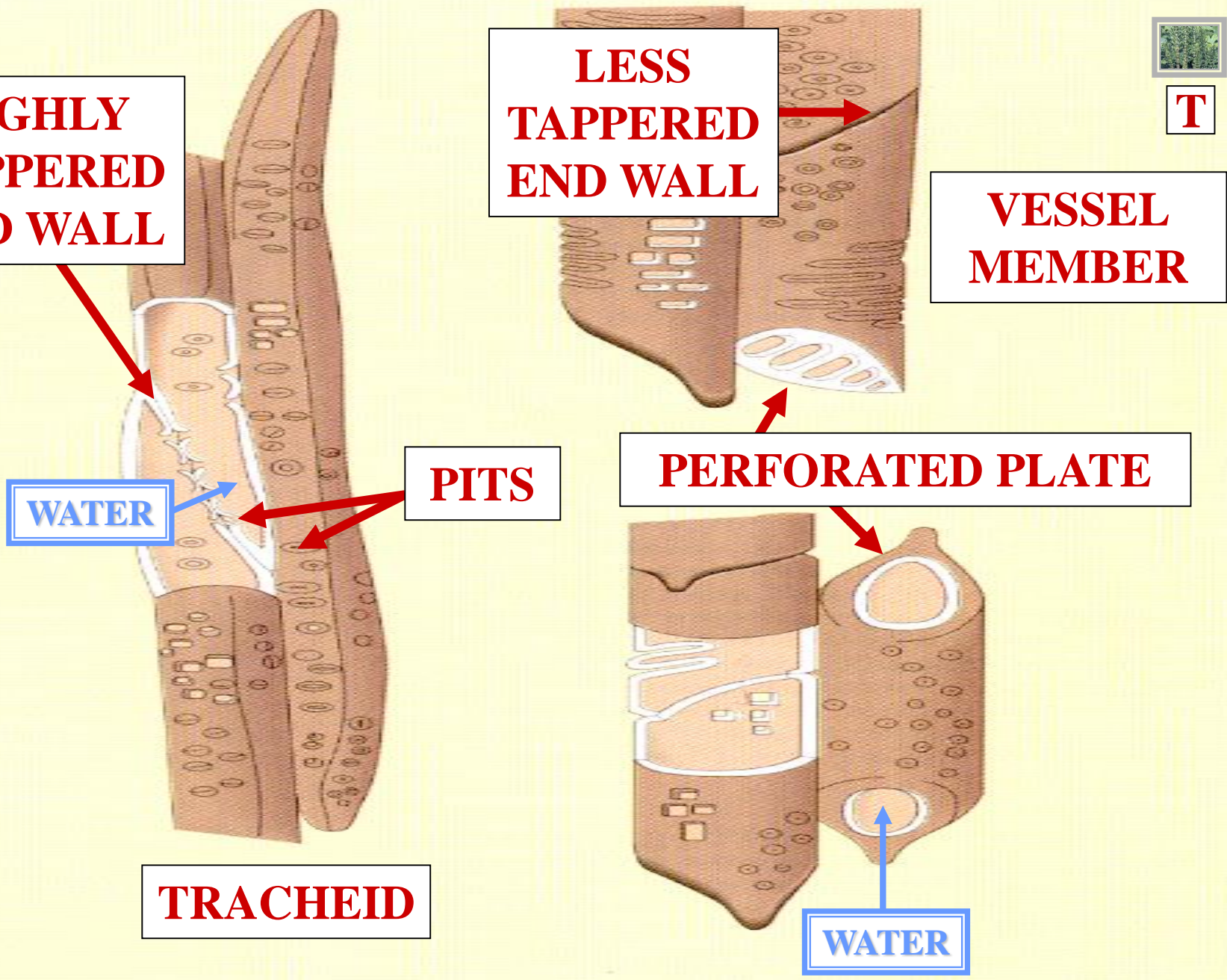
WATER

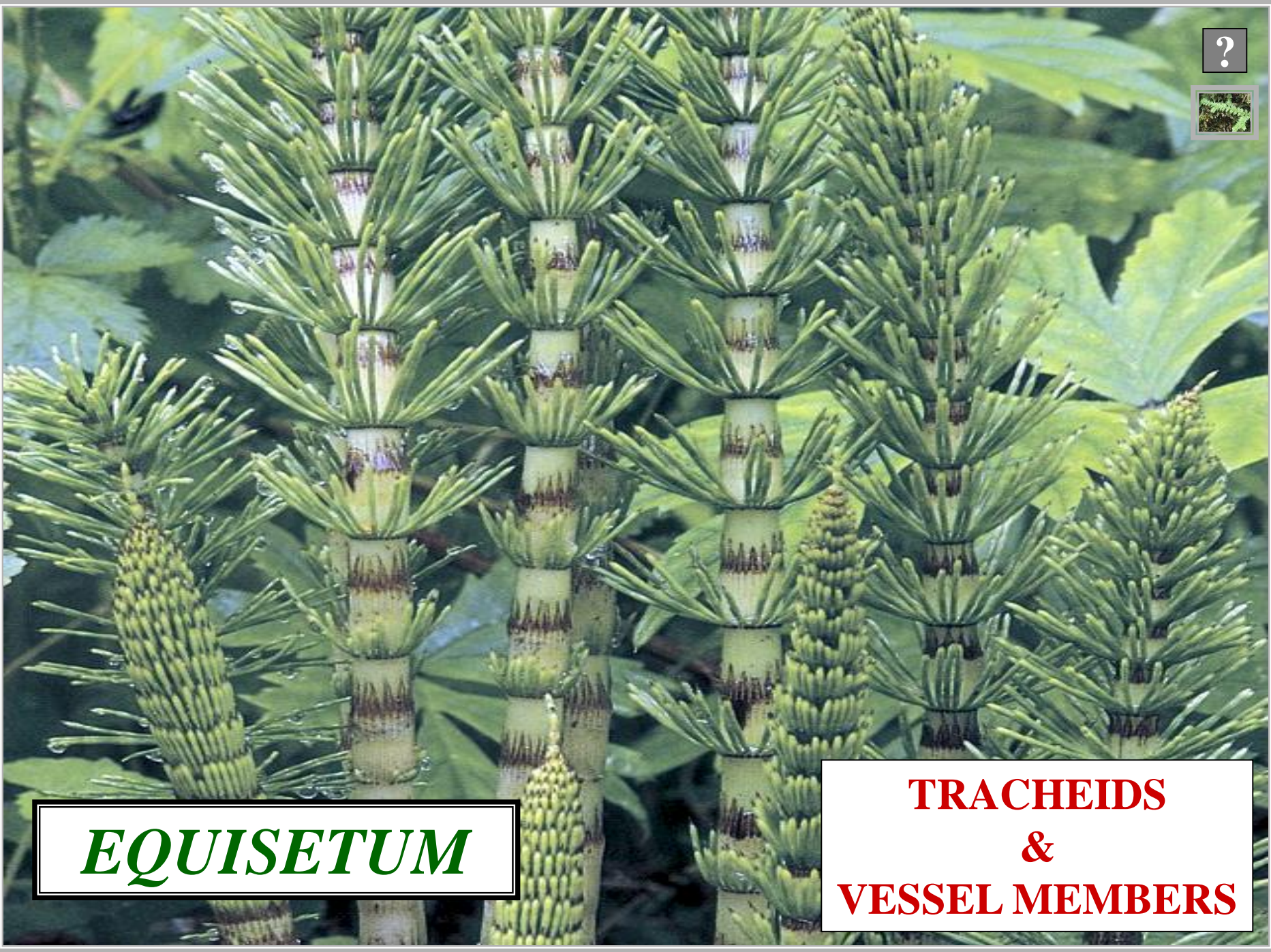
PITS

PERFORATED PLATE

TRACHEID

WATER





EQUISETUM

**TRACHEIDS
&
VESSEL MEMBERS**



S

?

**TRACHEIDS
&
VESSEL MEMBERS**



SELAGINELLA

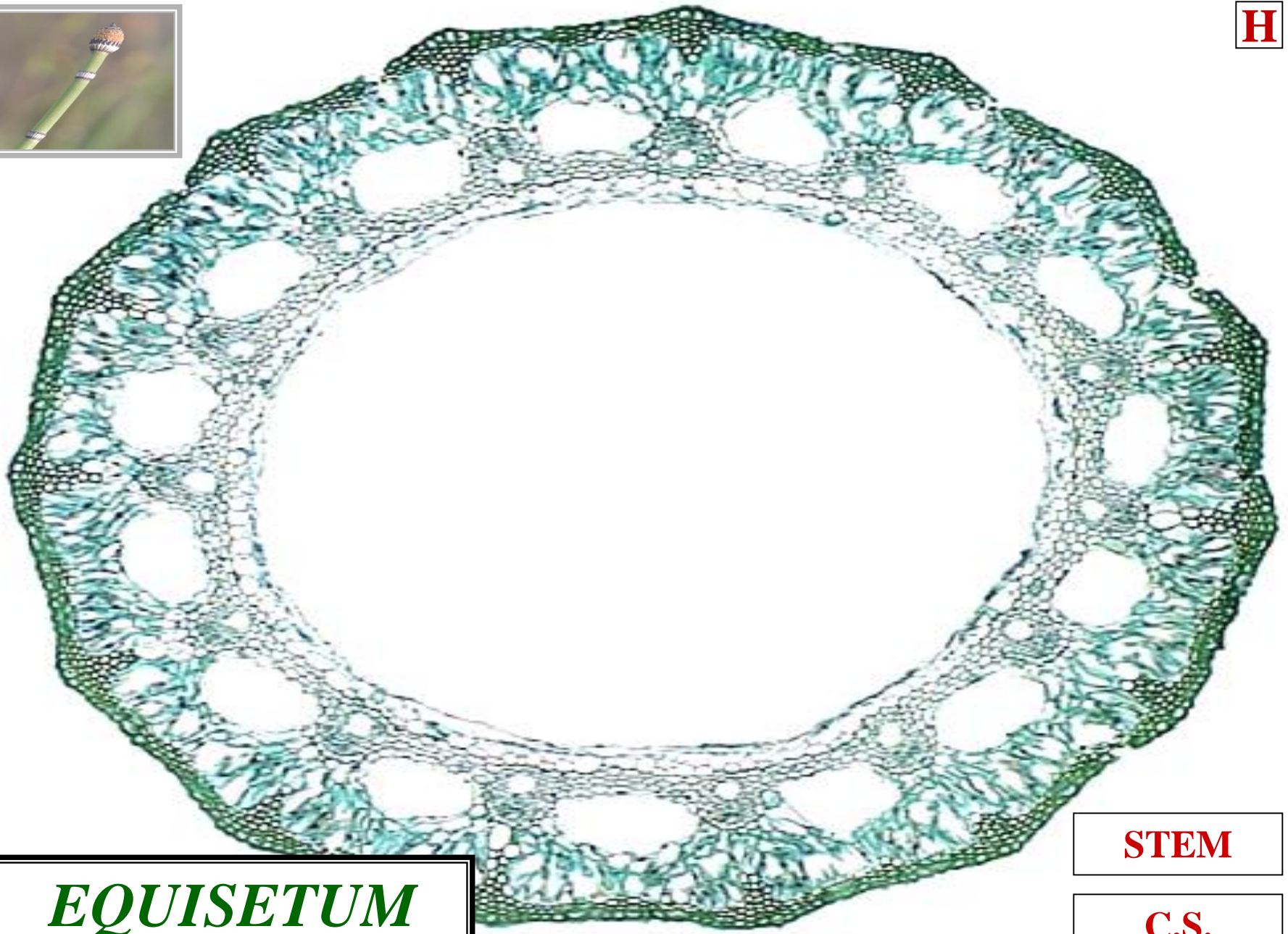
**TRACHEIDS
&
VESSEL MEMBERS**



STEM



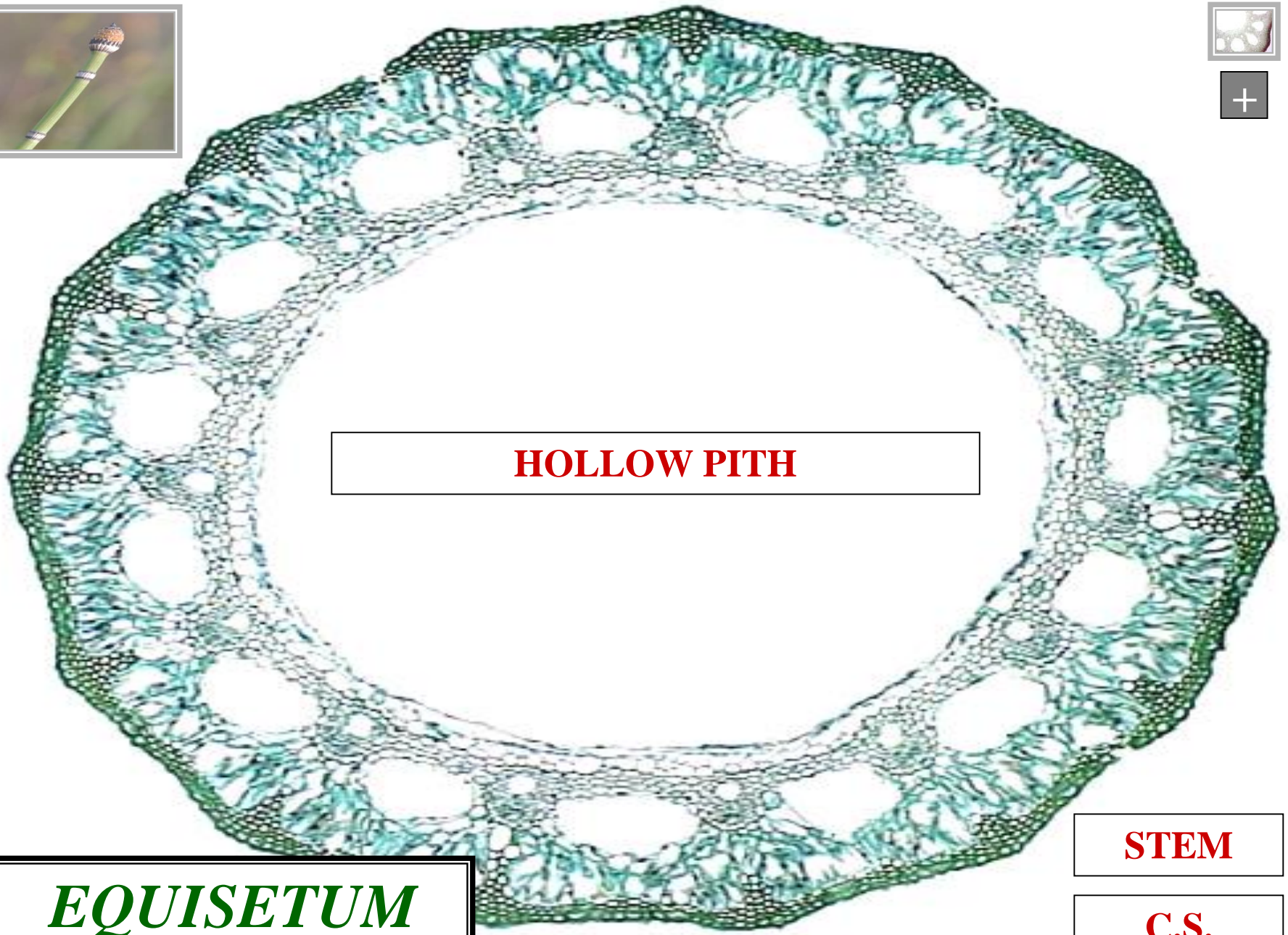
STEM ANATOMY



EQUISETUM

STEM

C.S.



HOLLOW PITH

EQUISETUM

STEM

C.S.

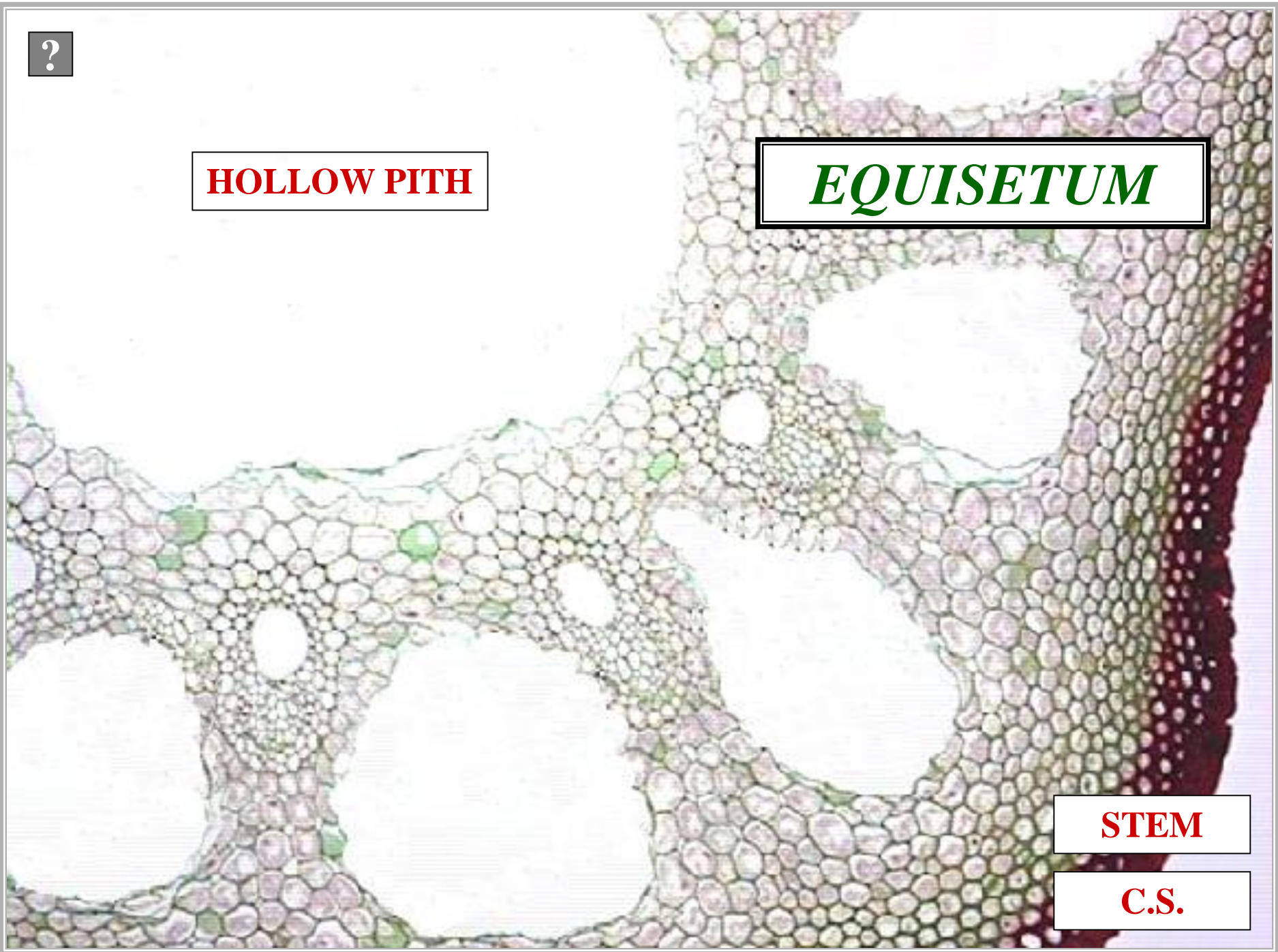
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HOLLOW PITH

EQUISETUM

STEM

C.S.



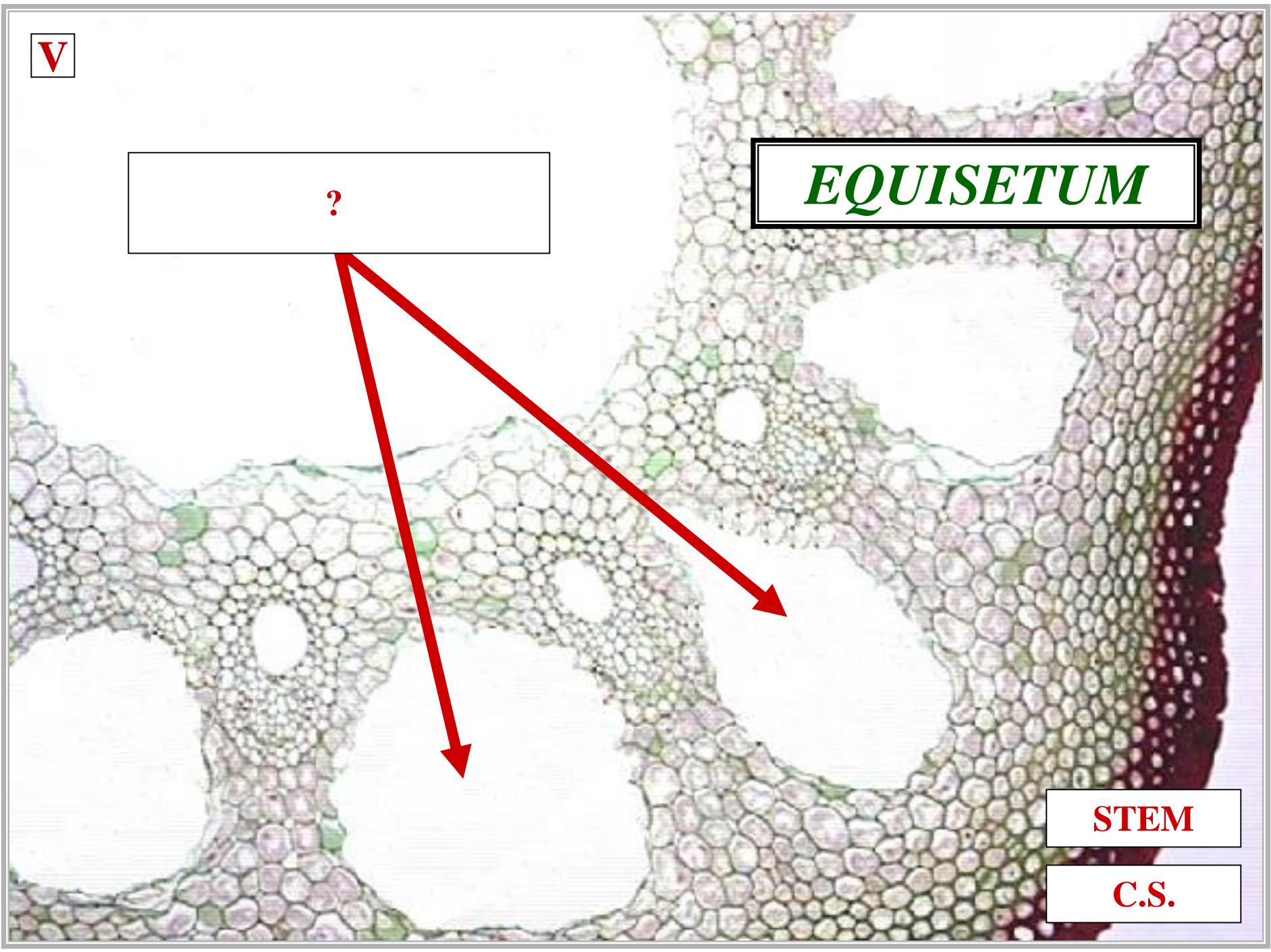
V

?

EQUISETUM

STEM

C.S.



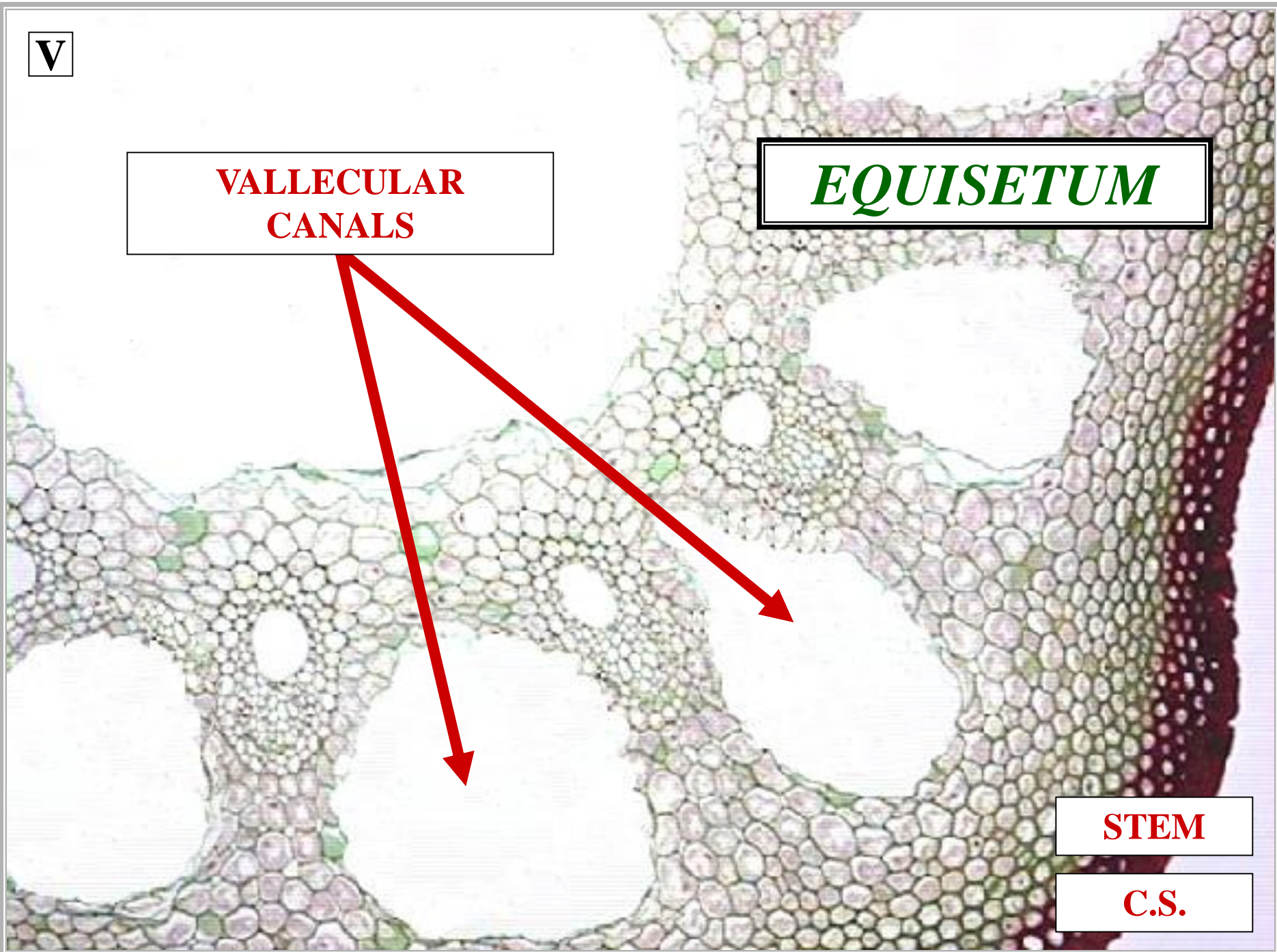
V

**VALLECULAR
CANALS**

EQUISETUM

STEM

C.S.



VALLECULAR CANALS



EQUISETUM

VALLECULAR CANALS

CORTEX CAVITIES

EQUISETUM

VALLECULAR CANALS

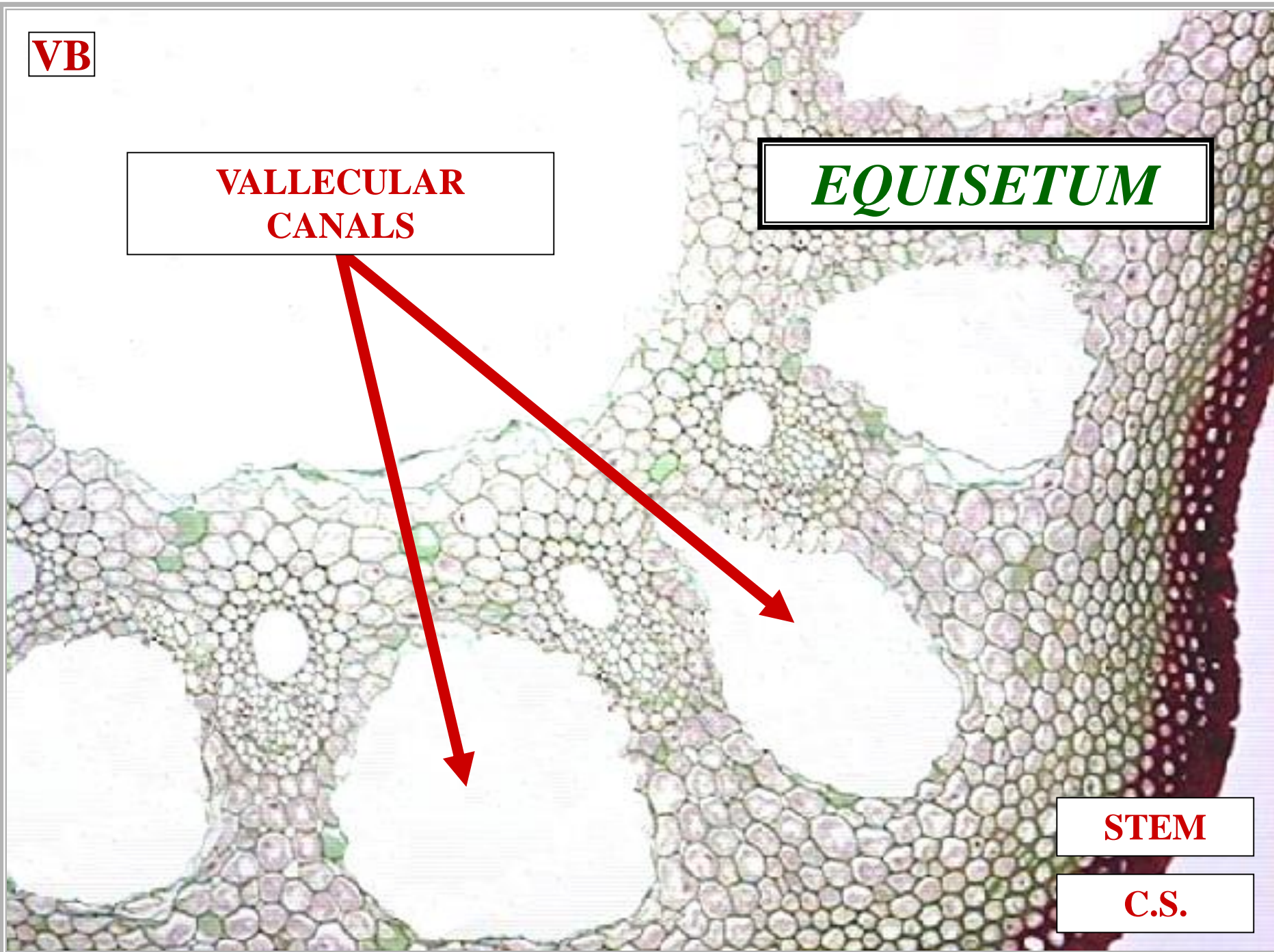
VB

**VALLECULAR
CANALS**

EQUISETUM

STEM

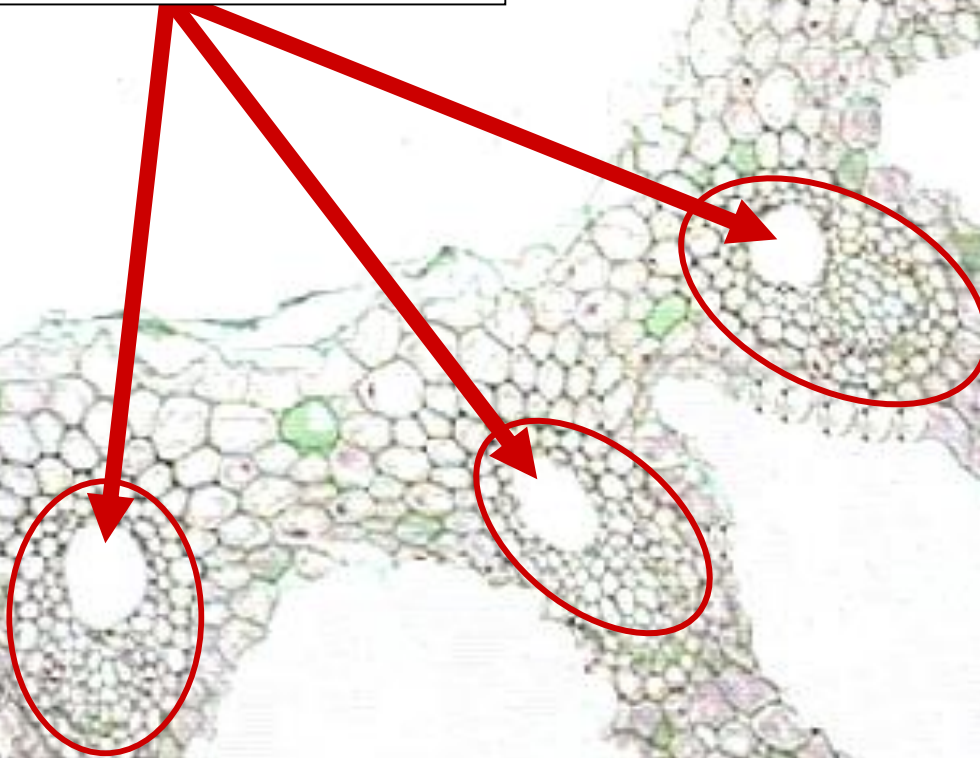
C.S.



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**VASCULAR
BUNDLES**

EQUISETUM



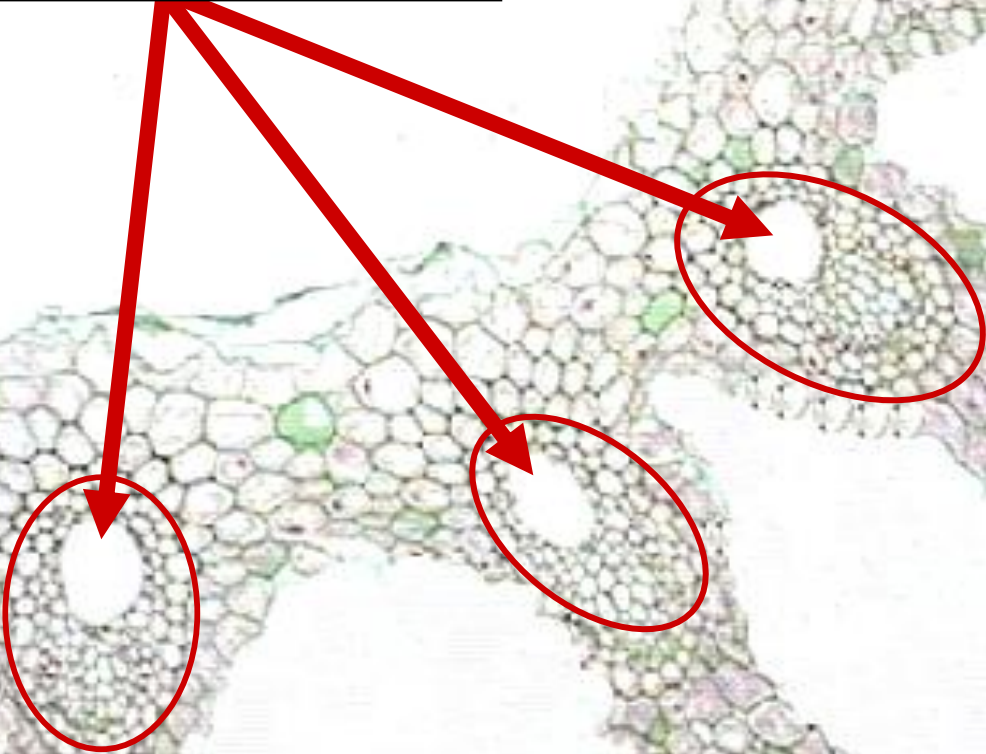
STEM

C.S.

C

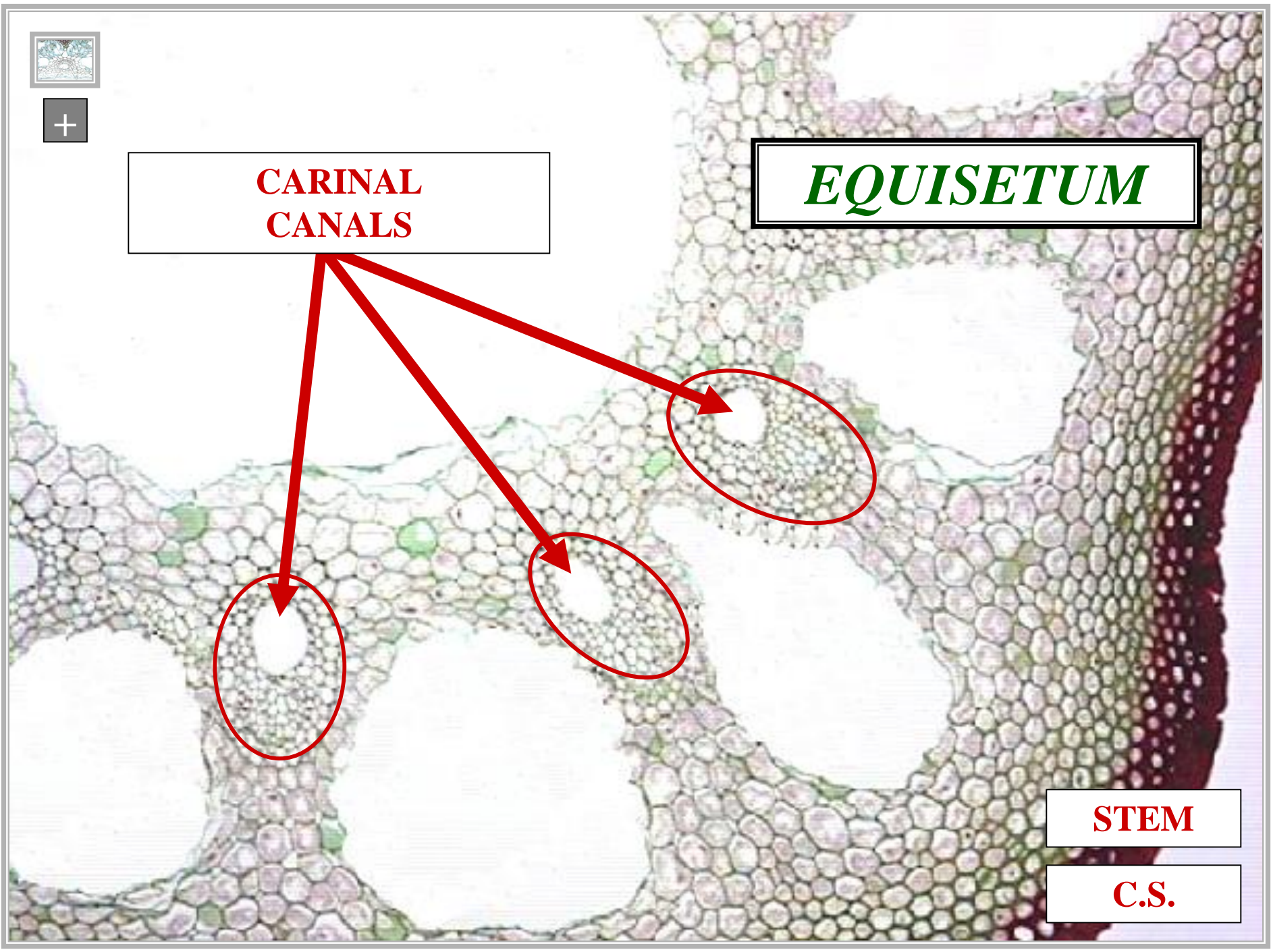
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EQUISETUM



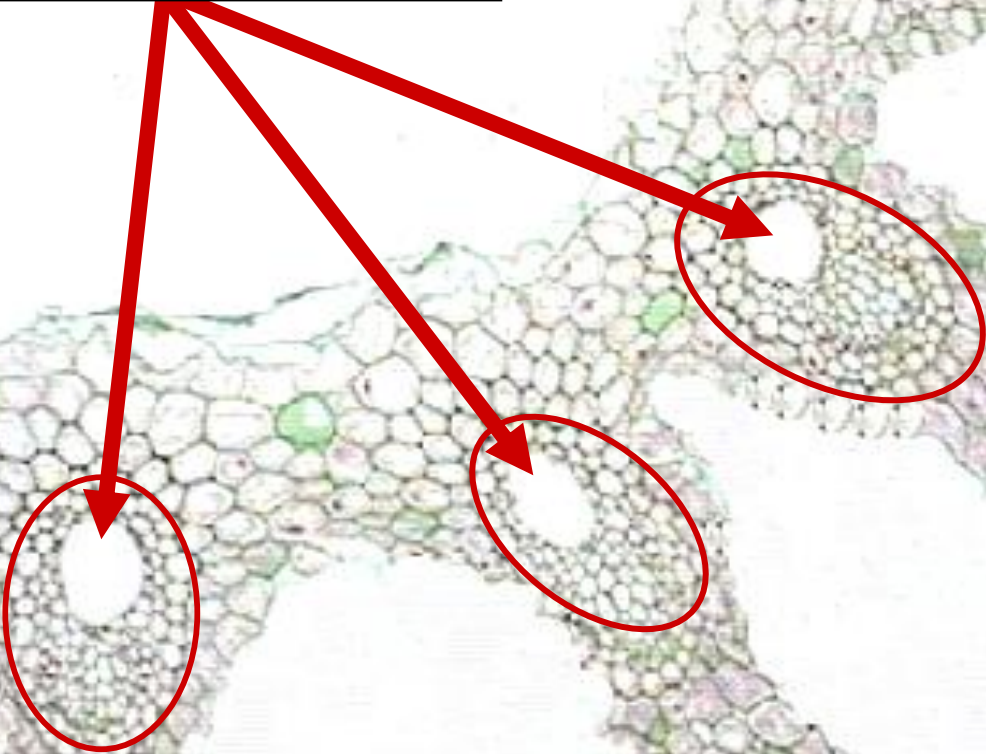
STEM

C.S.



**CARINAL
CANALS**

EQUISETUM



STEM

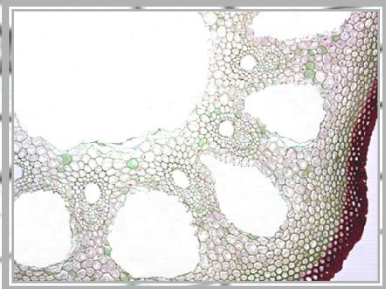
C.S.

PHLOEM

XYLEM

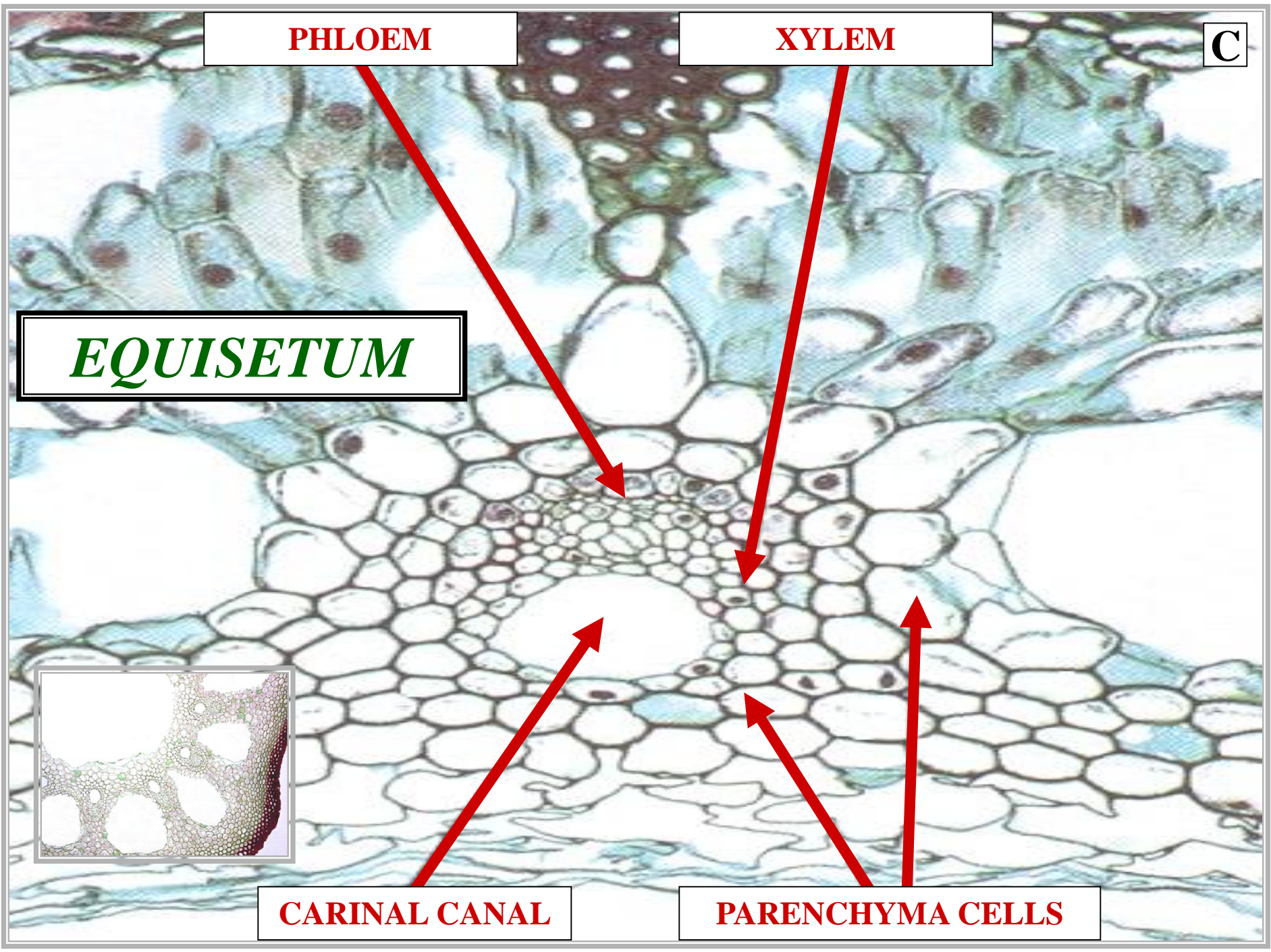
C

EQUISETUM



CARINAL CANAL

PARENCHYMA CELLS



CARINAL CANALS