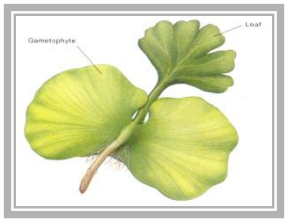
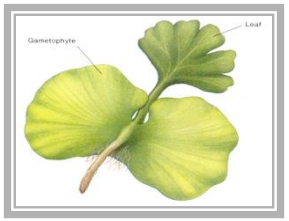


S

GAMETOPHYTE

L.S.

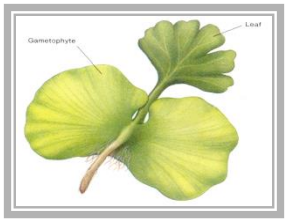


P

SPOROPHYTE

GAMETOPHYTE

L.S.



N

SPOROPHYTE

PHYSICALLY ATTACHED

GAMETOPHYTE

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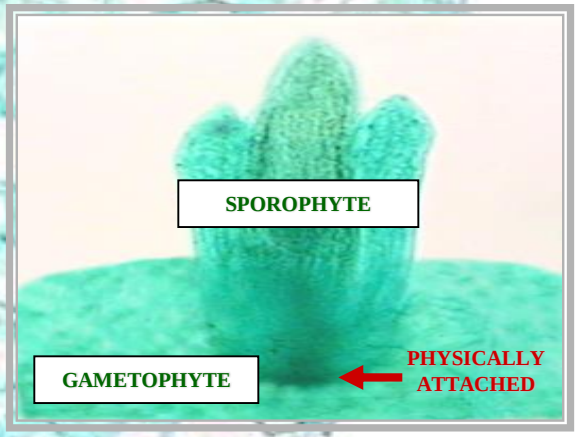

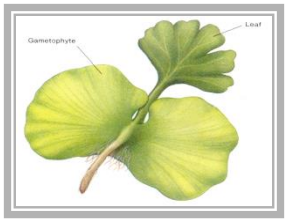

SPOROPHYTE

NUTRIENTS

GAMETOPHYTE

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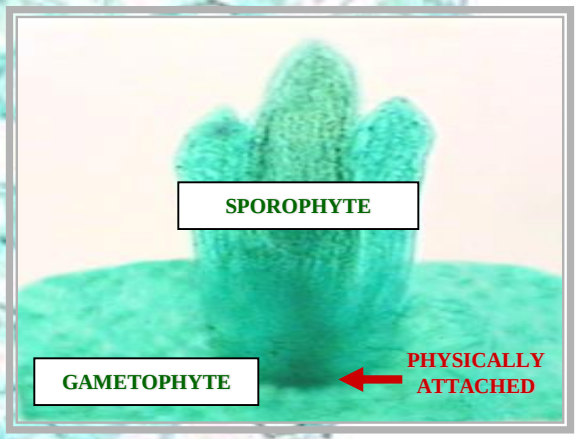
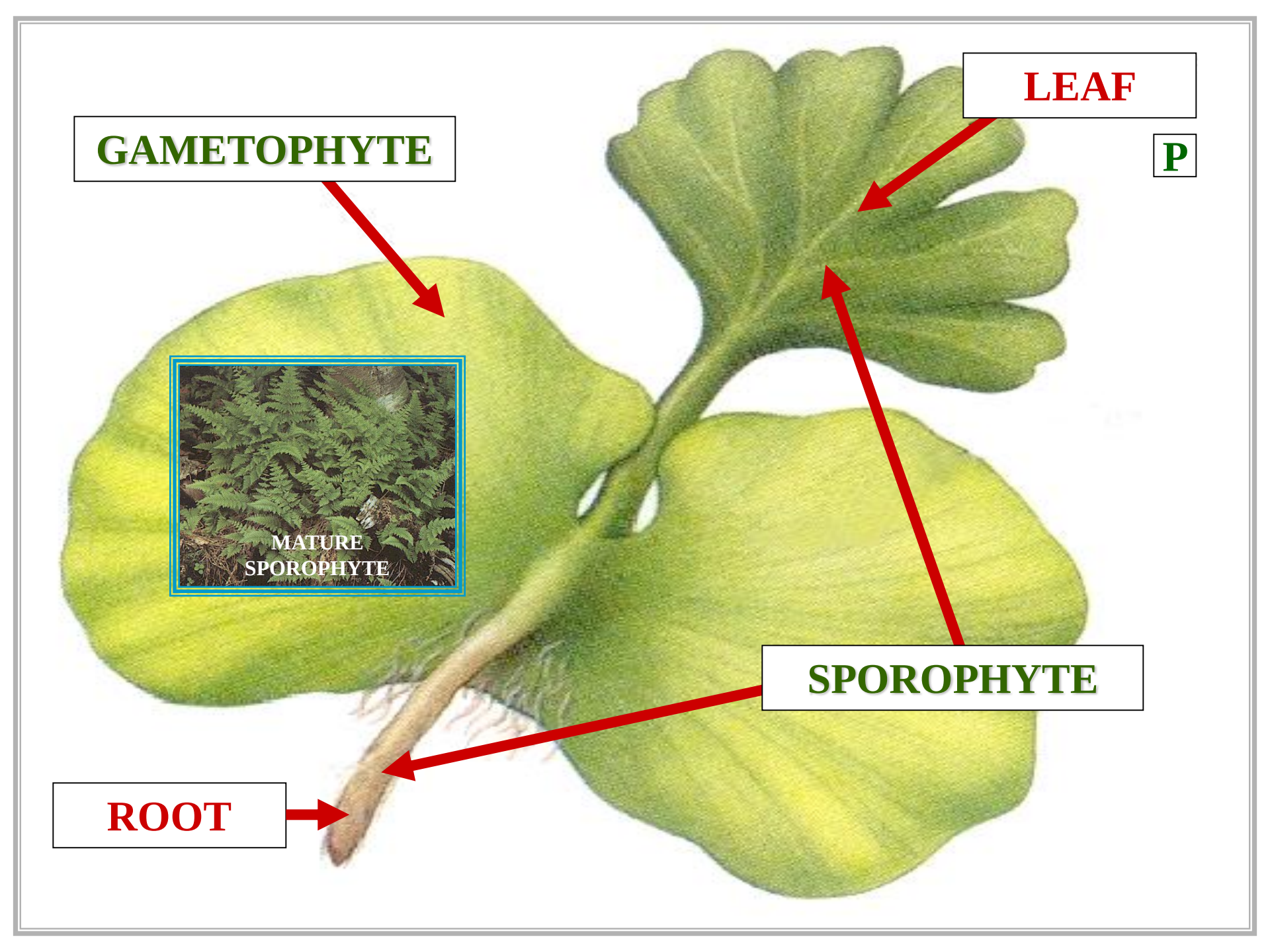
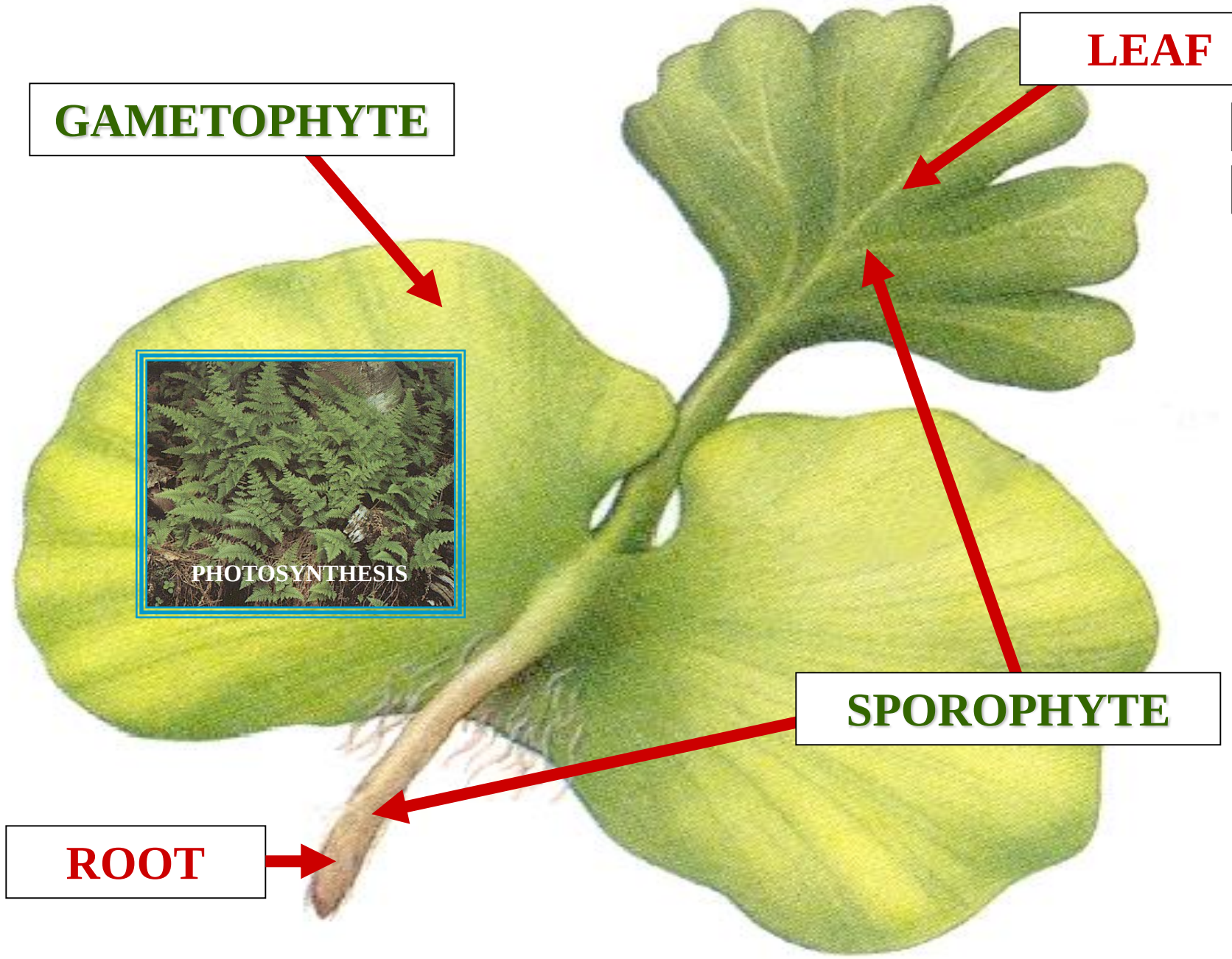
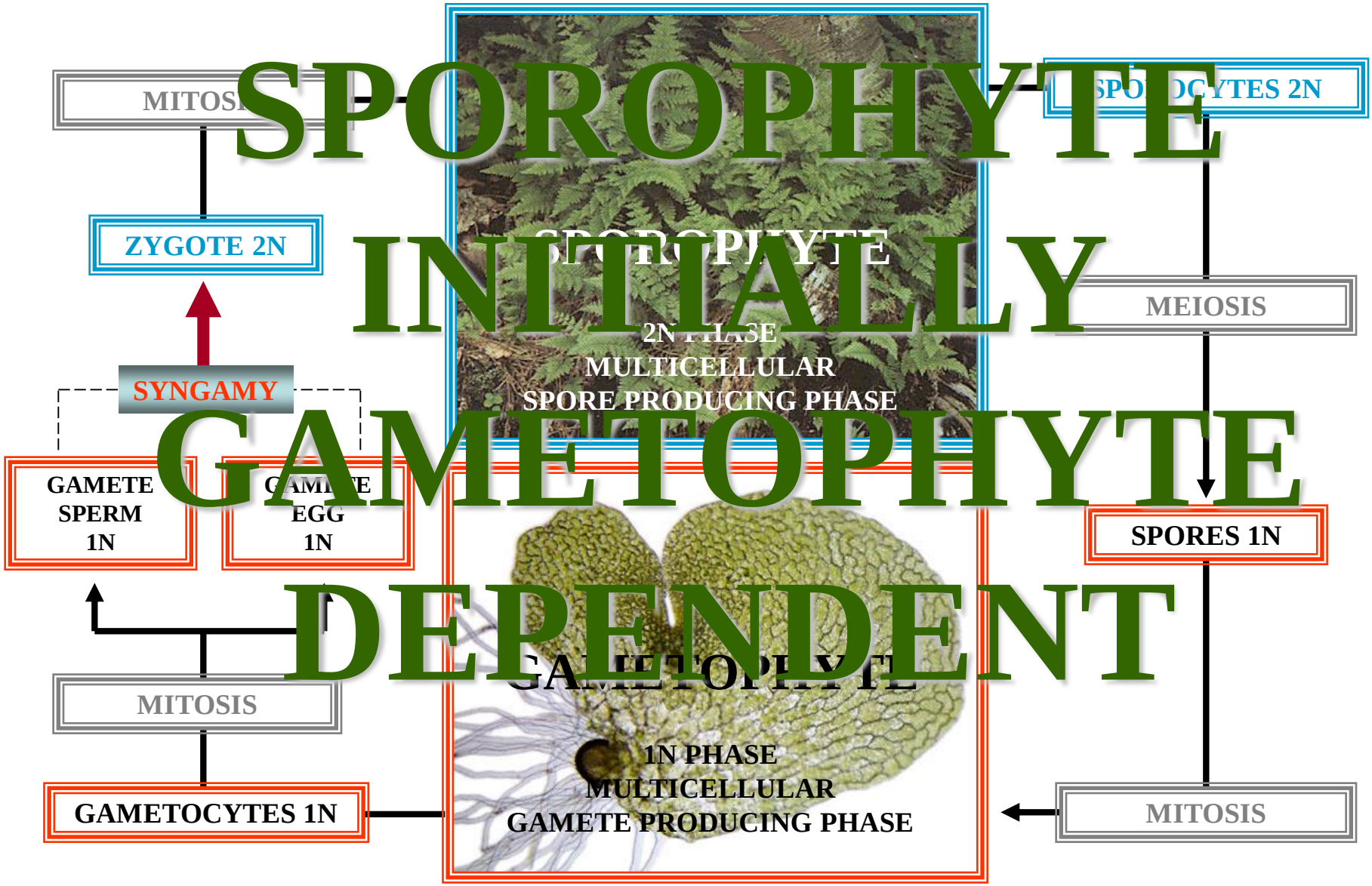



LEAF
P
GAMETOPHYTE
MATURE
SPOROPHYTE
SPOROPHYTE
ROOT


LEAF
GAMETOPHYTE
PHOTOSYNTHESIS
SPOROPHYTE
ROOT

EMBRYOPHYTE
HETEROMORPHIC SPORIC LIFE CYCLE



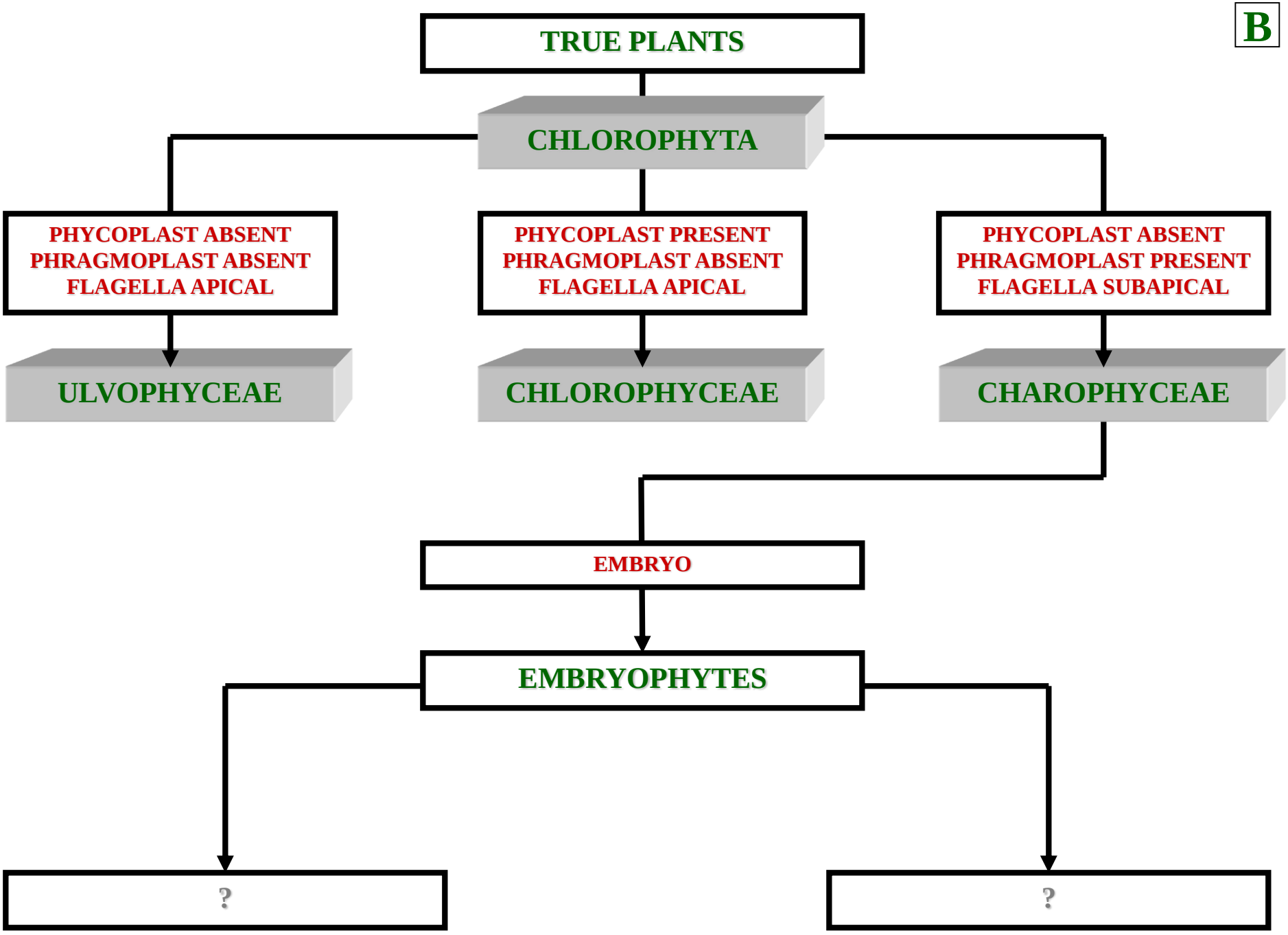
SPOROPHYTE INITIALLY GAMETOPHYTE DEPENDENT

VP

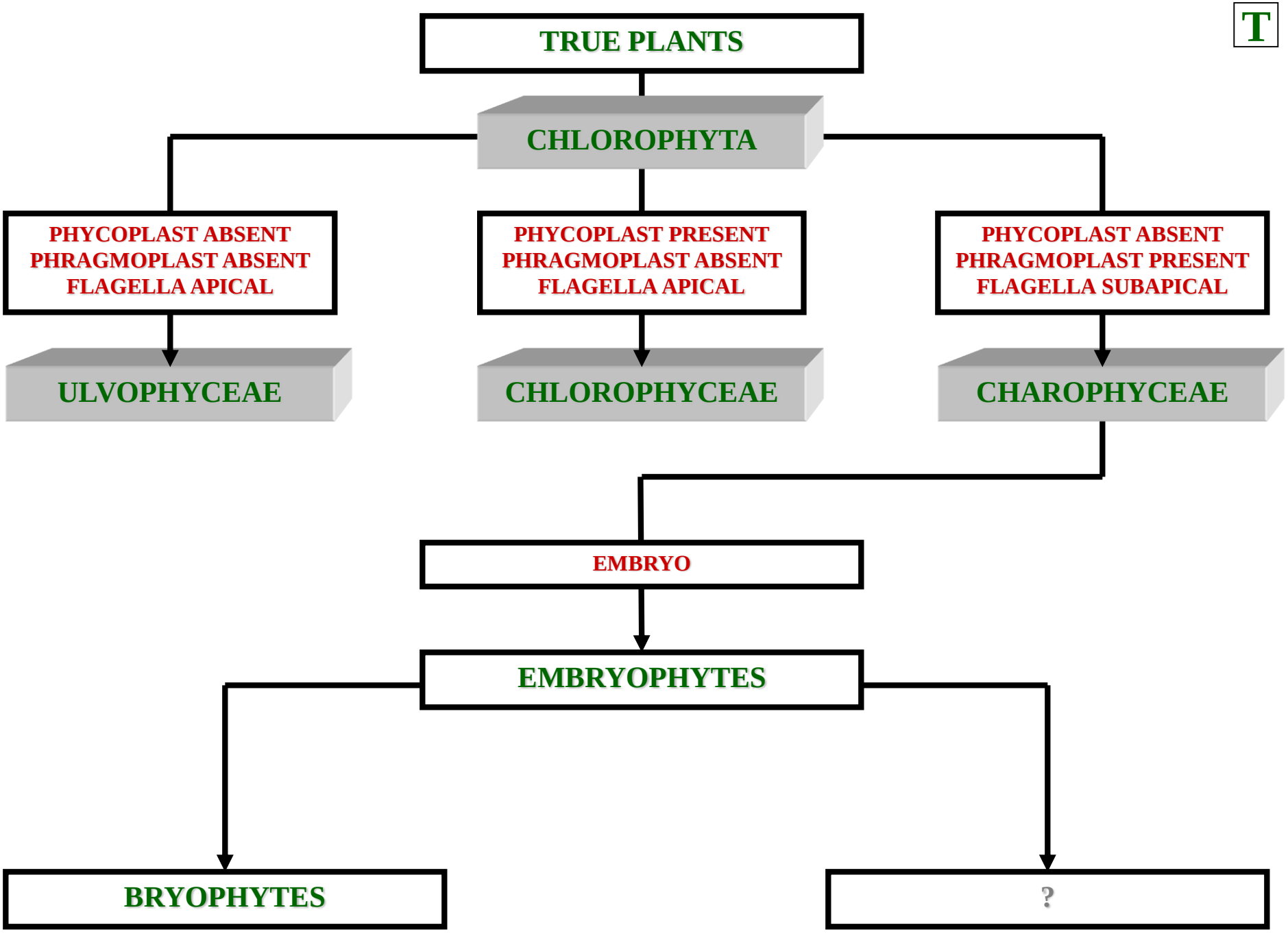
?

EMBRYOPHYTE GRADES

B


TRUE PLANTS
CHLOROPHYTA
PHYCOPLAST ABSENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL
PHYCOPLAST PRESENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL
PHYCOPLAST ABSENT
PHRAGMOPLAST PRESENT
FLAGELLA SUBAPICAL
ULVOPHYCEAE
CHLOROPHYCEAE
CHAROPHYCEAE
EMBRYO
EMBRYOPHYTES
?
?

T


TRUE PLANTS
CHLOROPHYTA
PHYCOPLAST ABSENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL
PHYCOPLAST PRESENT
PHRAGMOPLAST ABSENT
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PHYCOPLAST ABSENT
PHRAGMOPLAST PRESENT
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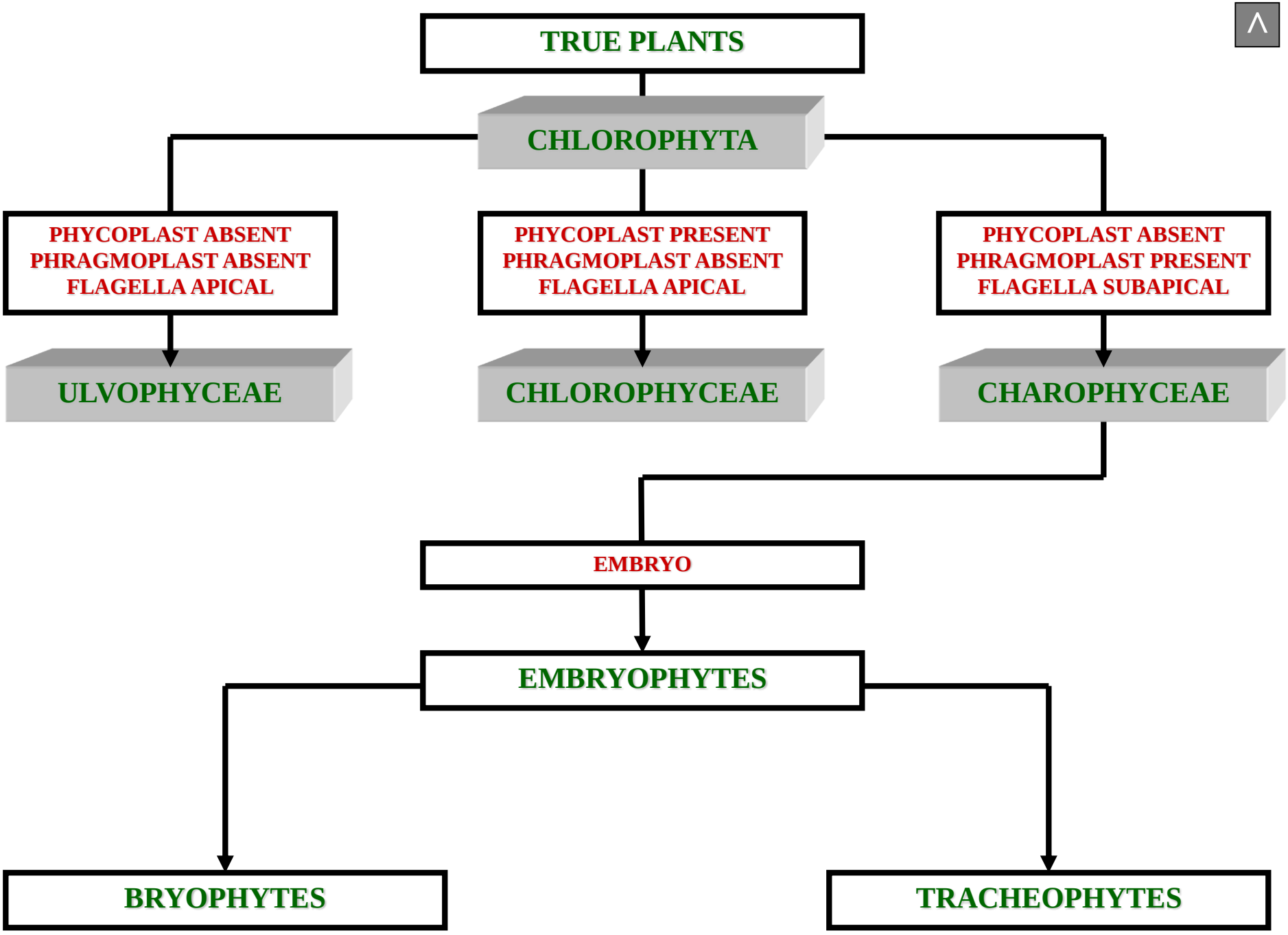
ULVOPHYCEAE
CHLOROPHYCEAE
CHAROPHYCEAE
EMBRYO
EMBRYOPHYTES
BRYOPHYTES
?


TRUE PLANTS
CHLOROPHYTA
PHYCOPLAST ABSENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL
PHYCOPLAST PRESENT
PHRAGMOPLAST ABSENT
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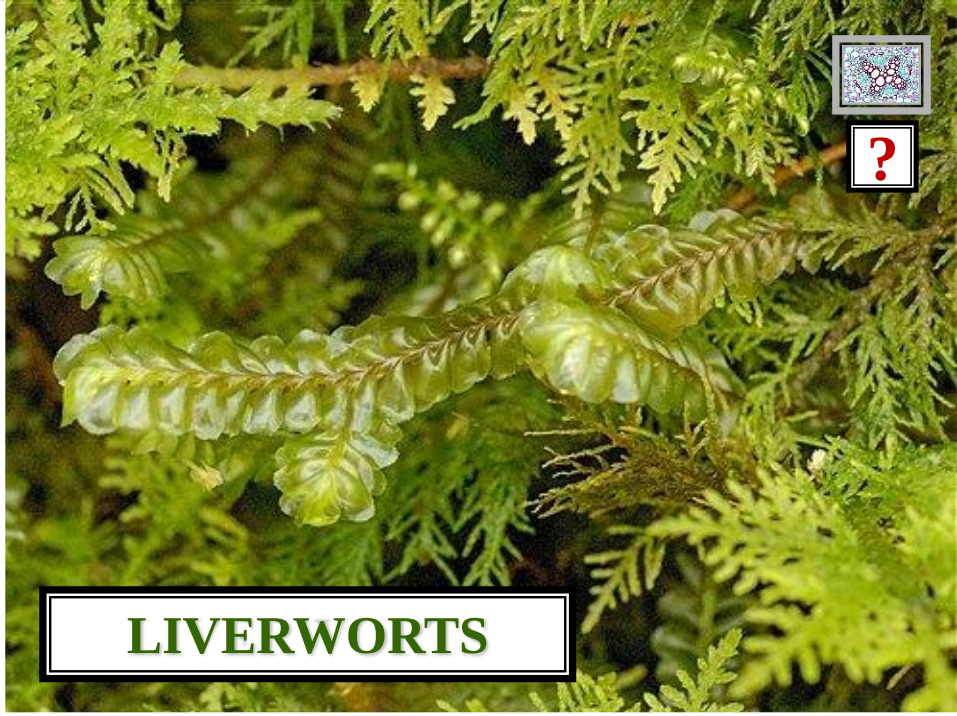
PHYCOPLAST ABSENT
PHRAGMOPLAST PRESENT
FLAGELLA SUBAPICAL
ULVOPHYCEAE
CHLOROPHYCEAE
CHAROPHYCEAE
EMBRYO
EMBRYOPHYTES
BRYOPHYTES
TRACHEOPHYTES

BRYOPHYTES

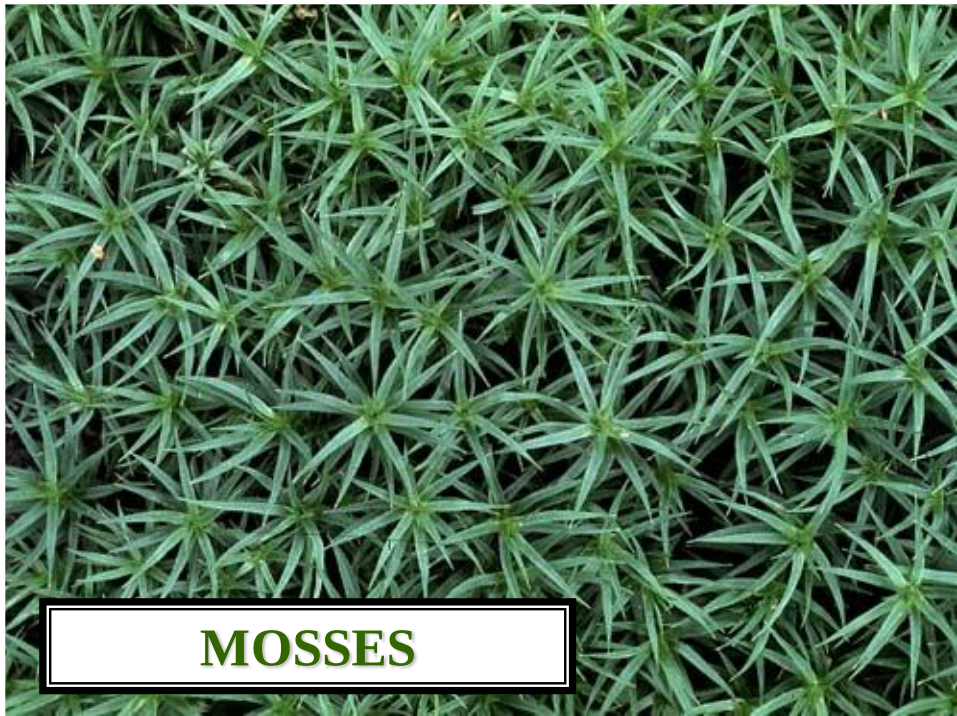
HORNWORTS



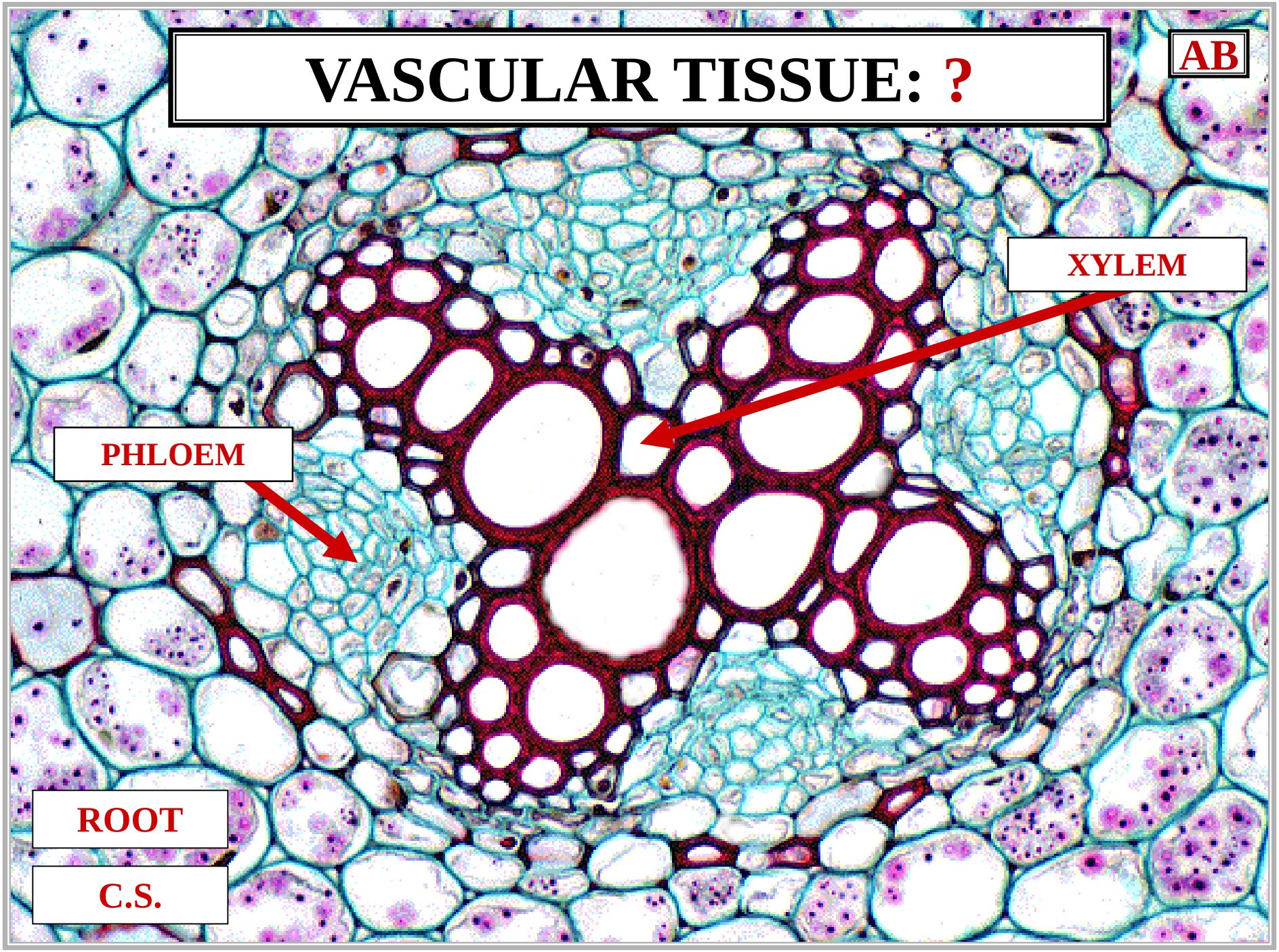
?

LIVERWORTS

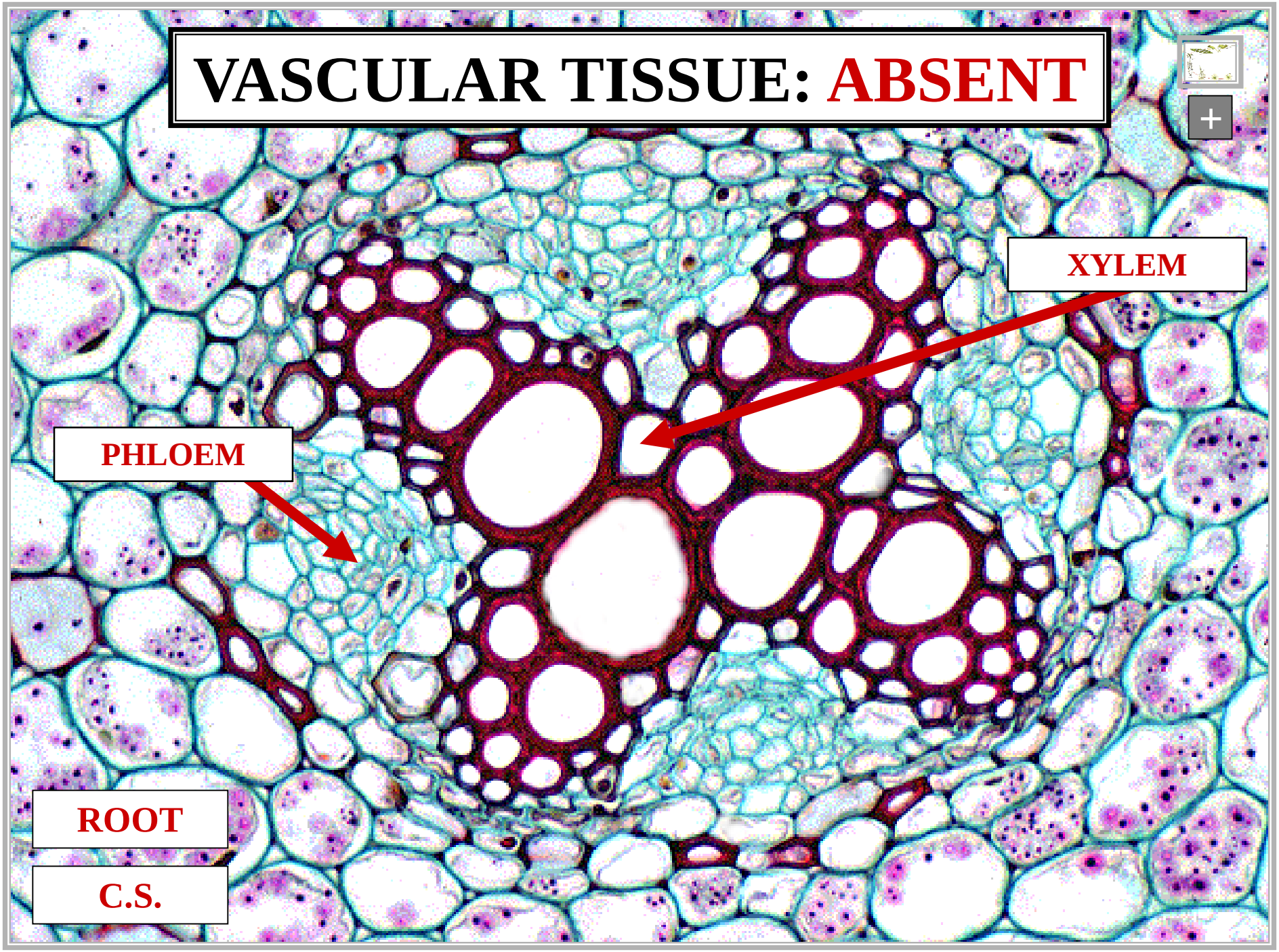
LIVERWORTS

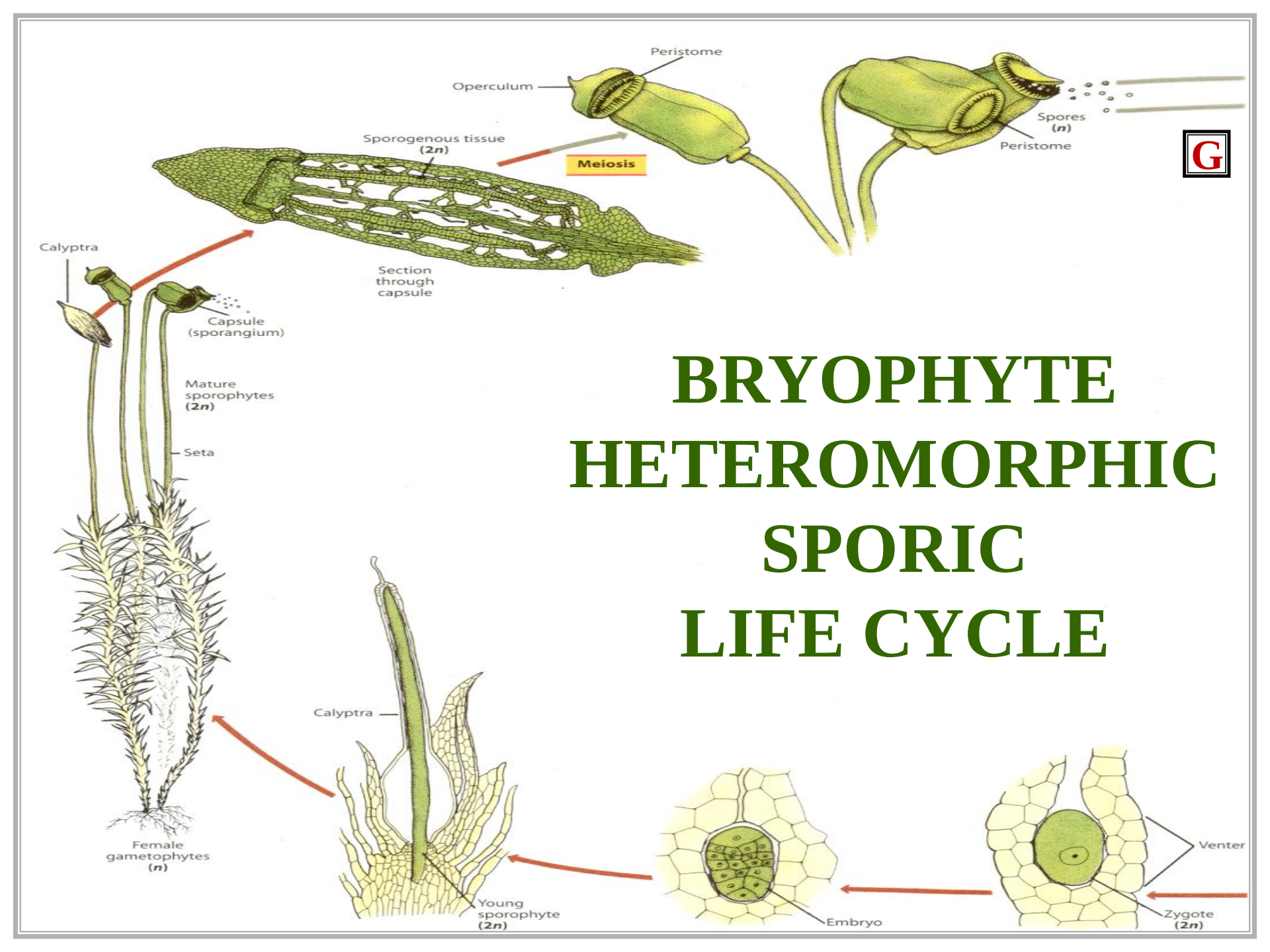


MOSSES

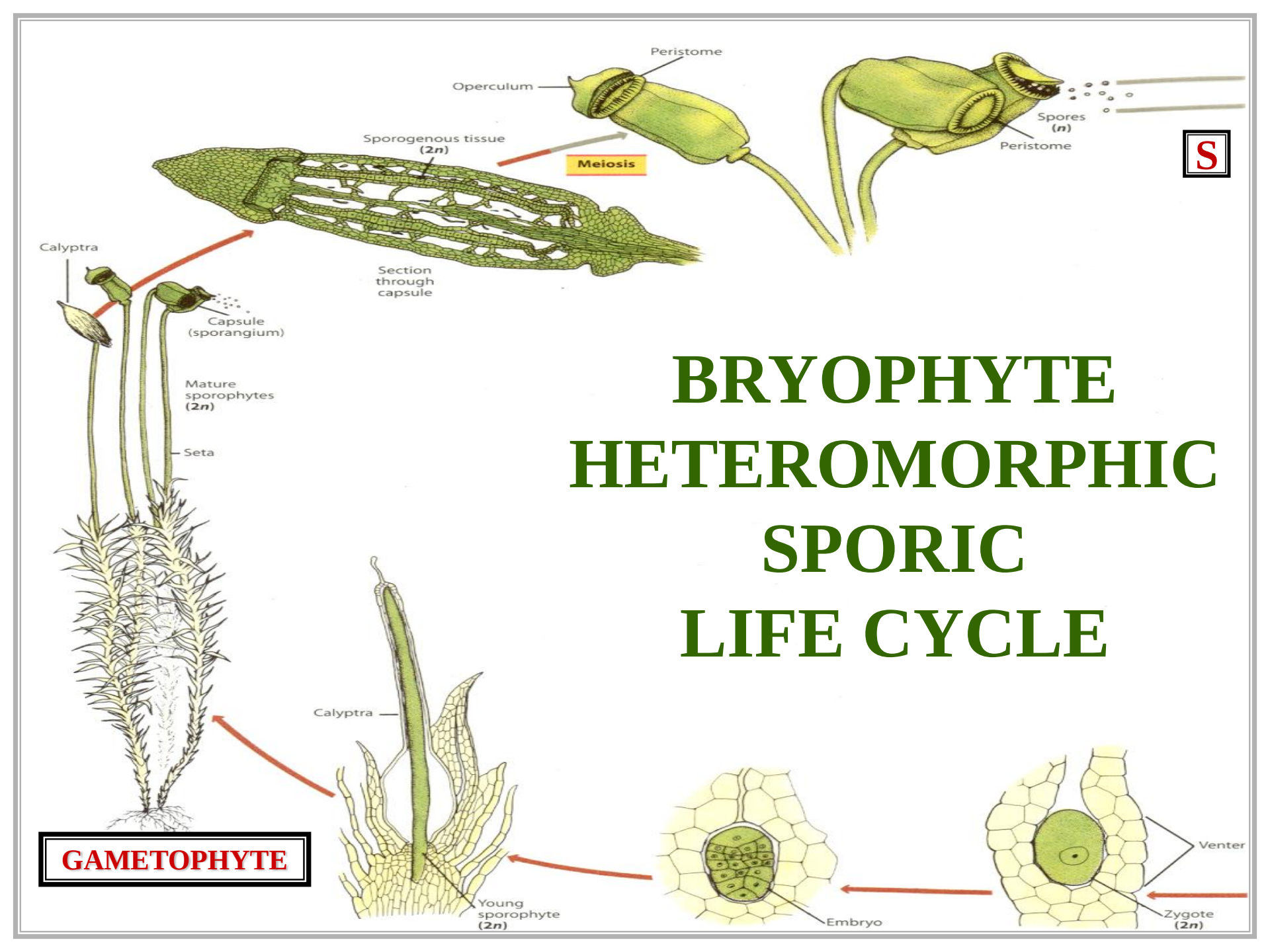

VASCULAR TISSUE: ?
AB
XYLEM
PHLOEM
ROOT
C.S.

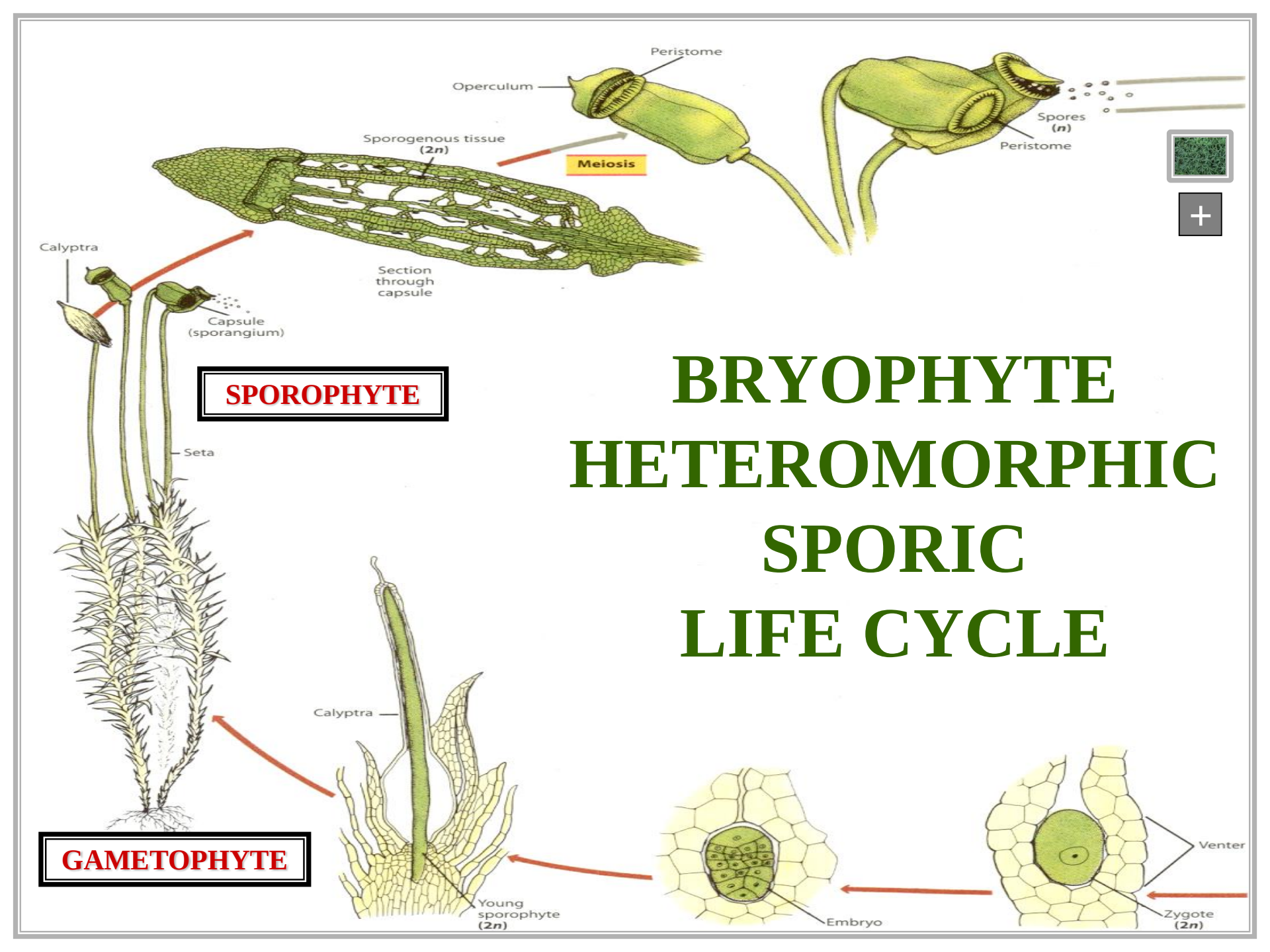
VASCULAR TISSUE: ABSENT





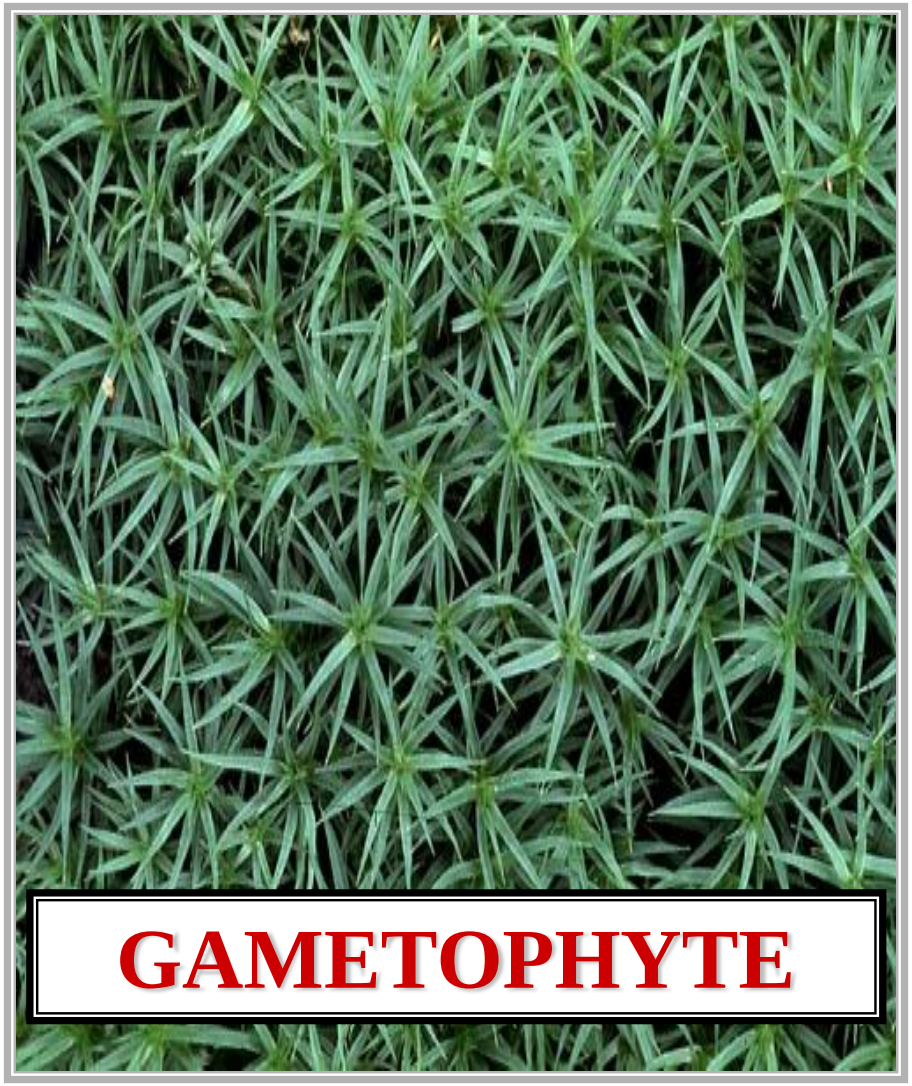
BRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE

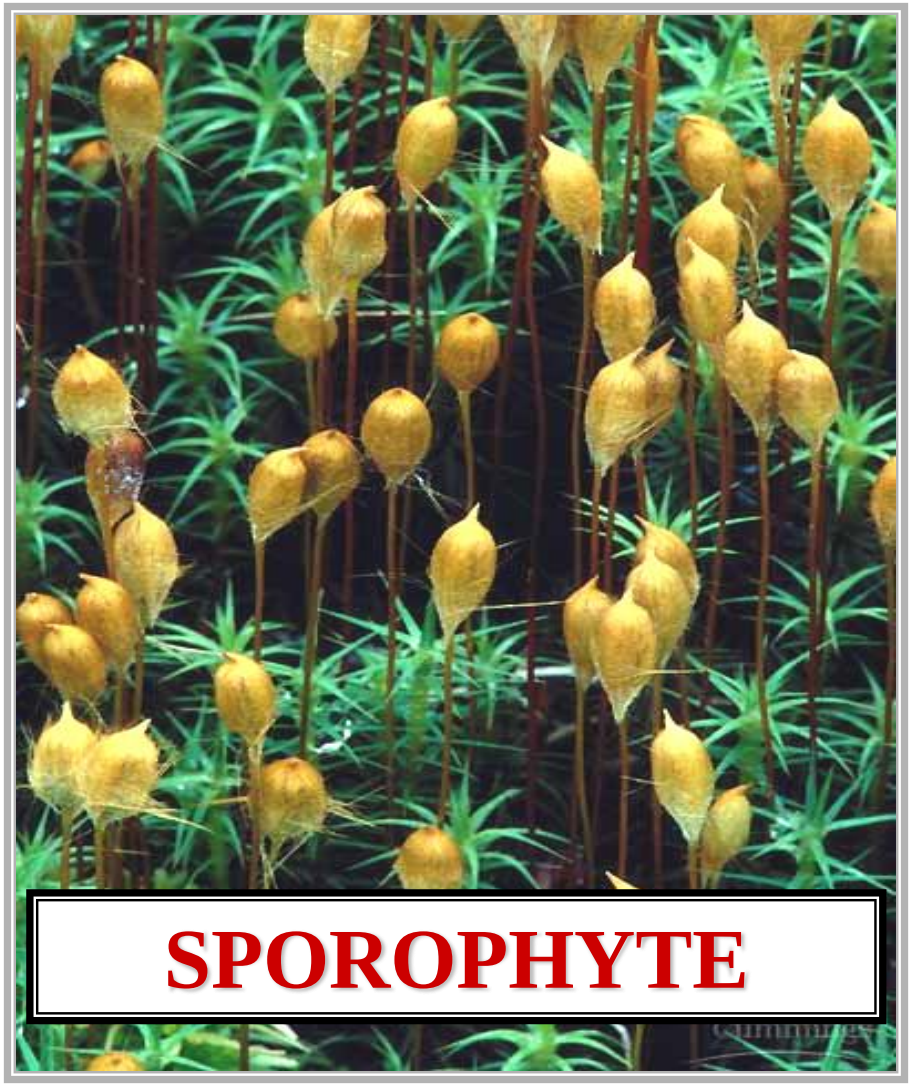

Peristome
Operculum
Sporogenous tissue
(2n)
Meiosis
Spores
(n)
Peristome
S
Calyptra
Capsule
(sporangium)
Section
through
capsule
Mature
sporophytes
(2n)
Seta
BRYOPHYTE
HETEROMORPHIC
SPORIC
LIFE CYCLE
Calyptra
GAMETOPHYTE
Young
sporophyte
(2n)
Embryo
Venter
Zygote
(2n)


Peristome
Operculum
Sporogenous tissue
(2n)
Meiosis
Spores
(n)
Peristome
Calyptra
Capsule
(sporangium)
Section
through
capsule
SPOROPHYTE
Seta
BRYOPHYTE
HETEROMORPHIC
SPORIC
LIFE CYCLE
Calyptra
Young
sporophyte
(2n)
Embryo
Venter
Zygote
(2n)
GAMETOPHYTE

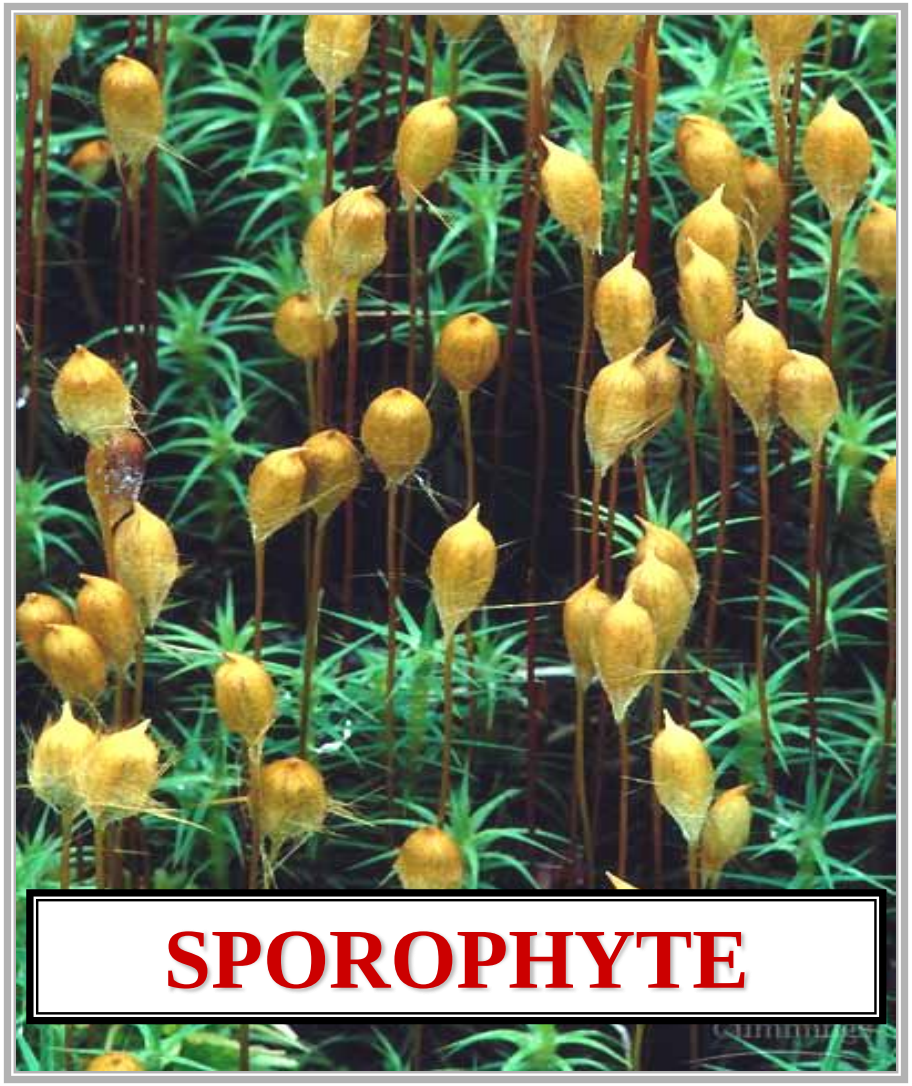
D

BRYOPHYTE
GAMETOPHYTE VS SPOROPHYTE

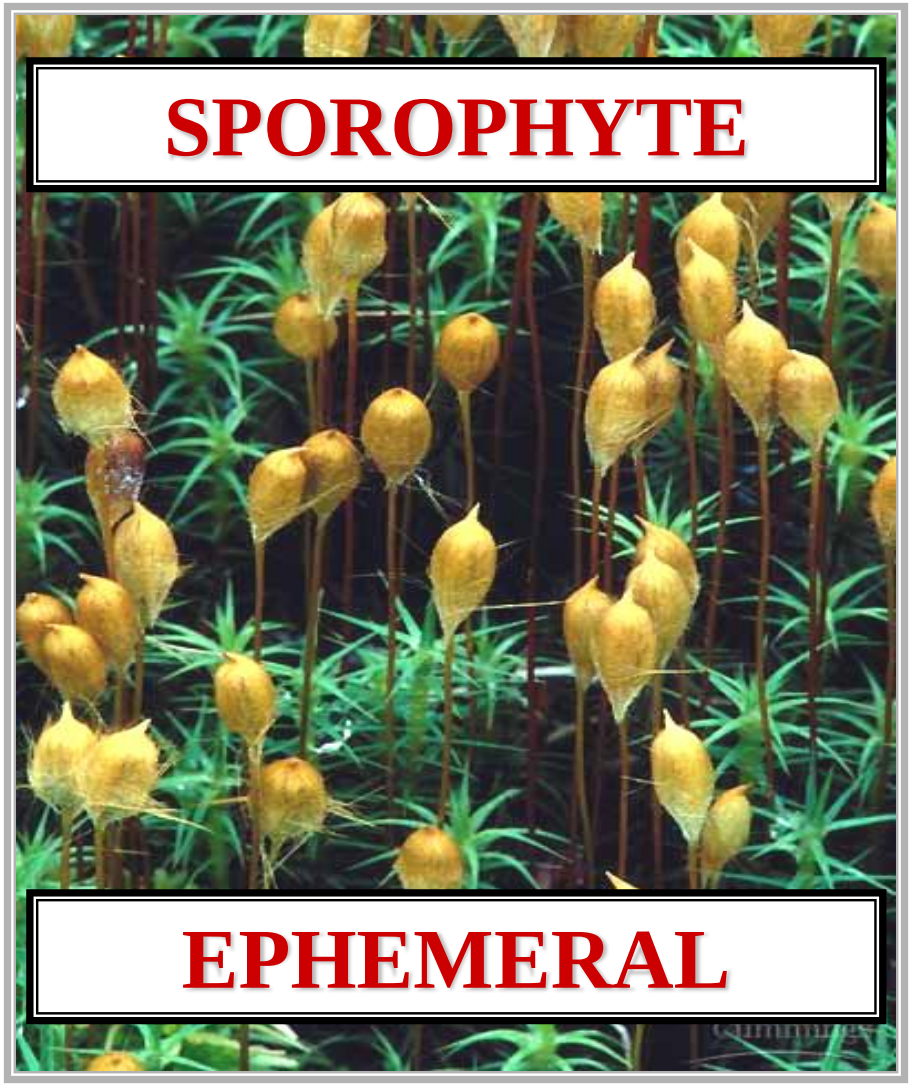




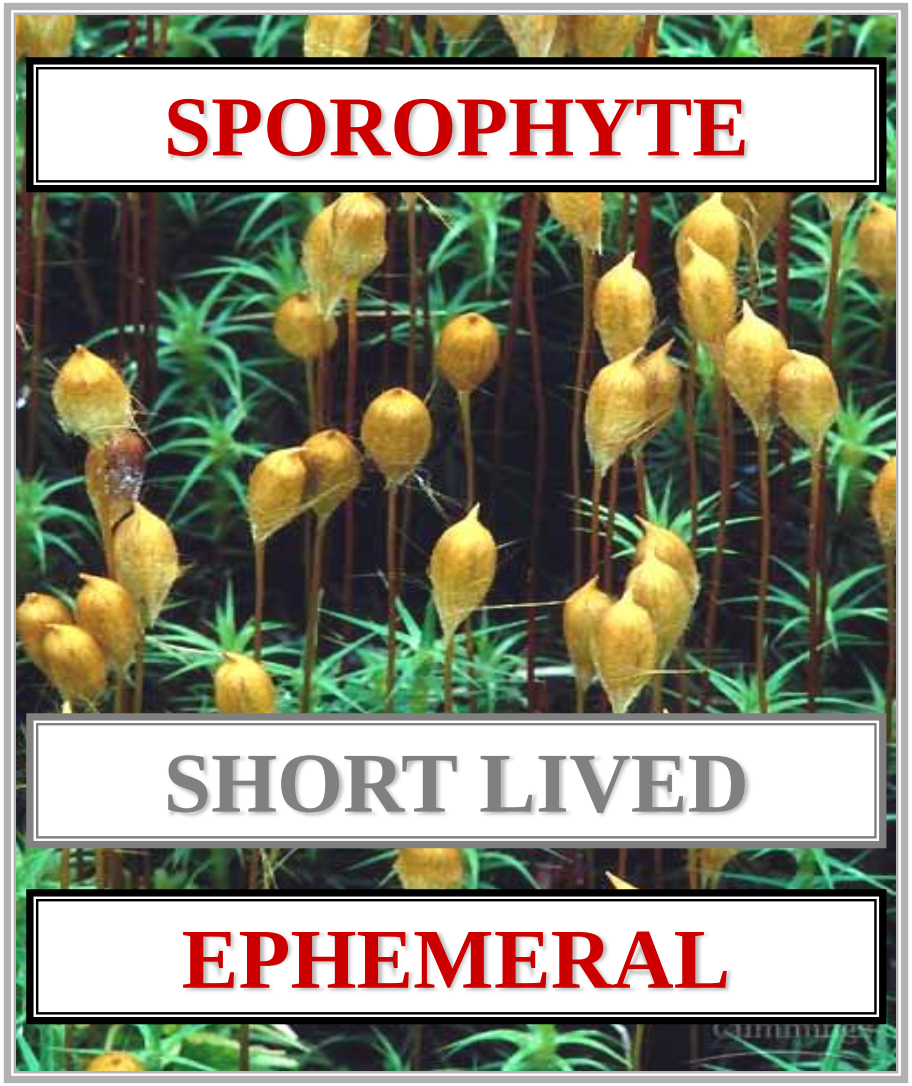
BRYOPHYTE
GAMETOPHYTE VS SPOROPHYTE



BRYOPHYTE
GAMETOPHYTE VS SPOROPHYTE



BRYOPHYTE
GAMETOPHYTE VS SPOROPHYTE



TRACHEOPHYTES

LYCOPHYTES

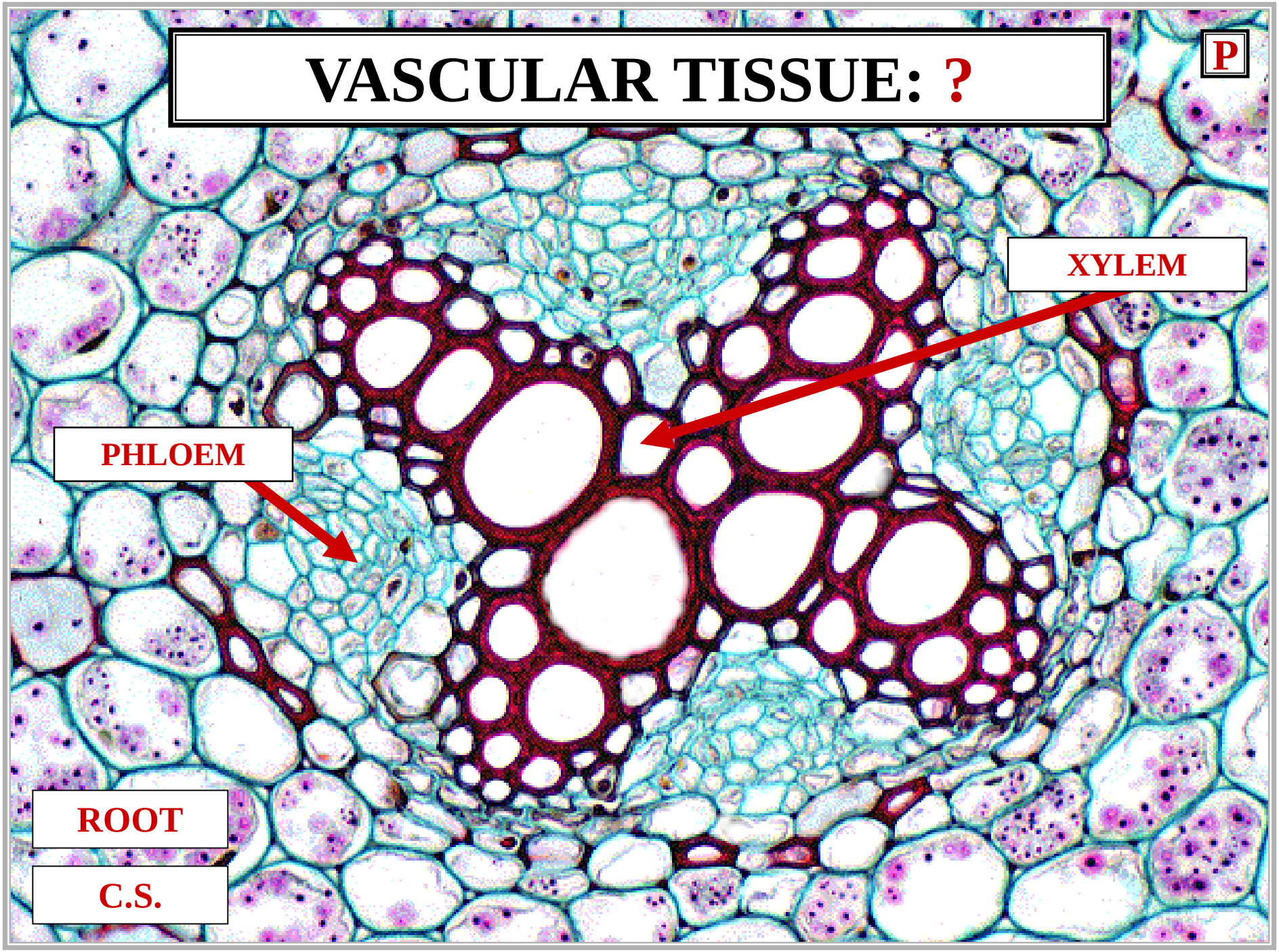
?
PTERIDOPHYTES

GYMNOSPERMS

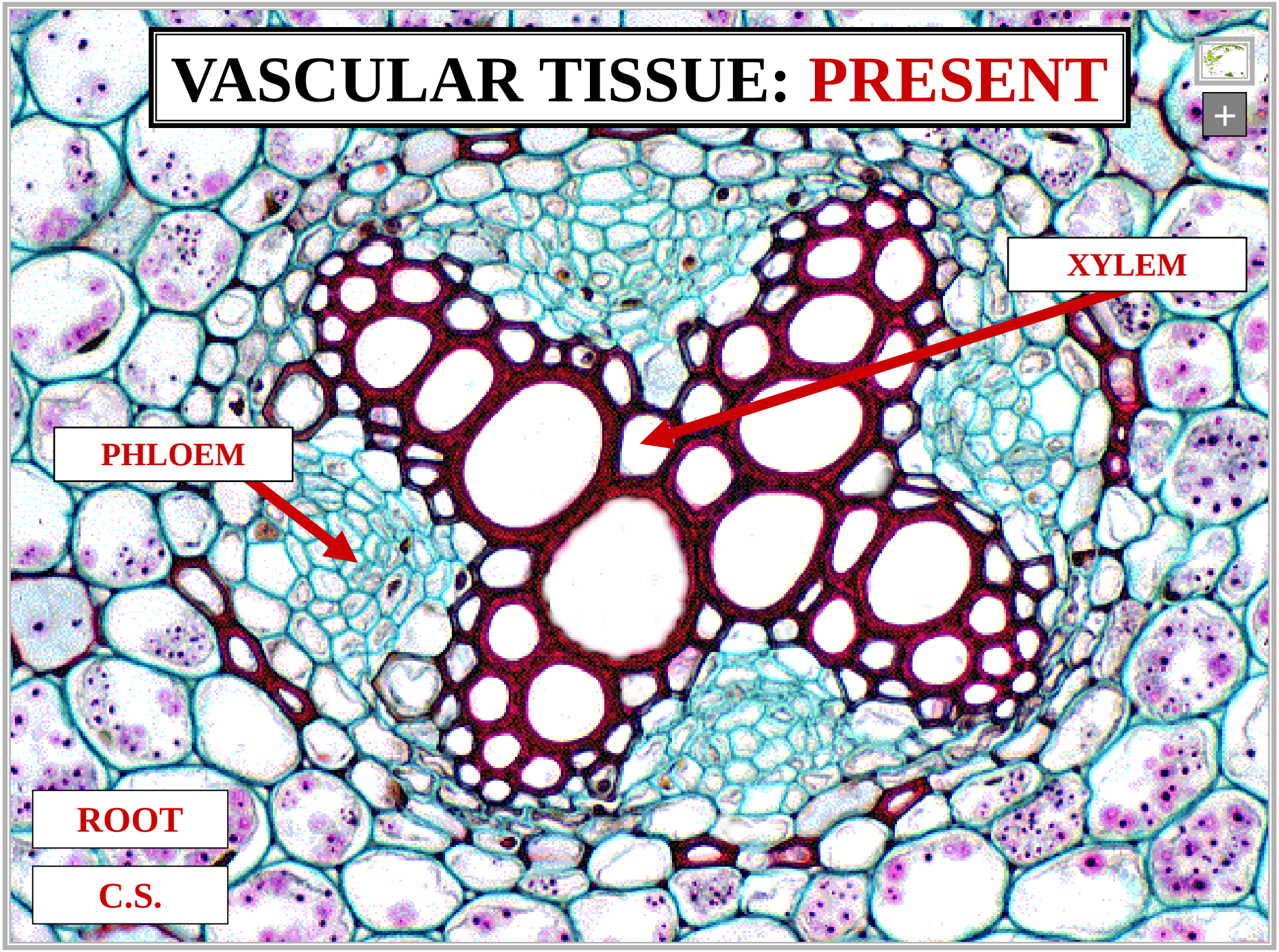
ANGIOSPERMS

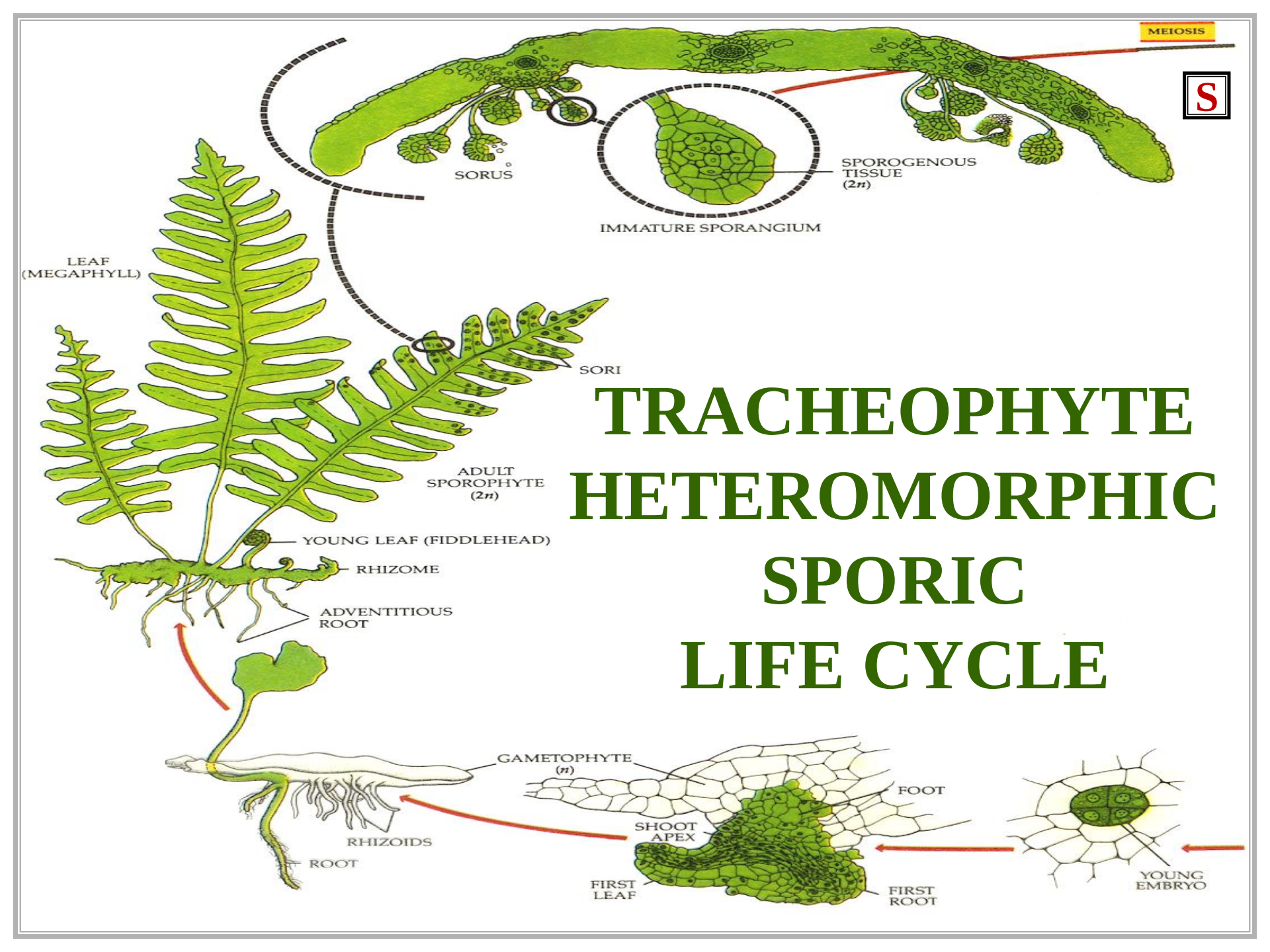
VASCULAR TISSUE: ?

P

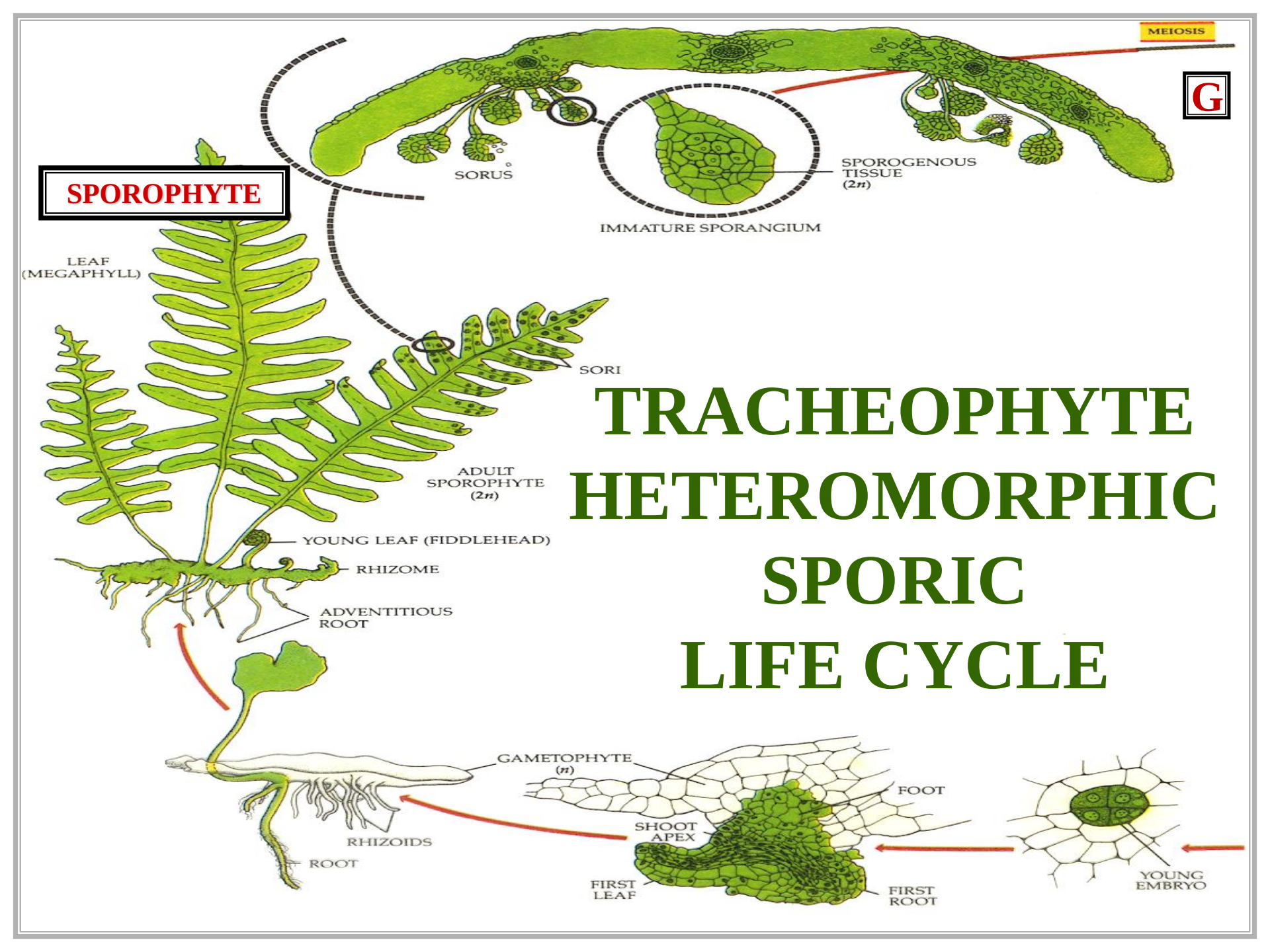


VASCULAR TISSUE: PRESENT

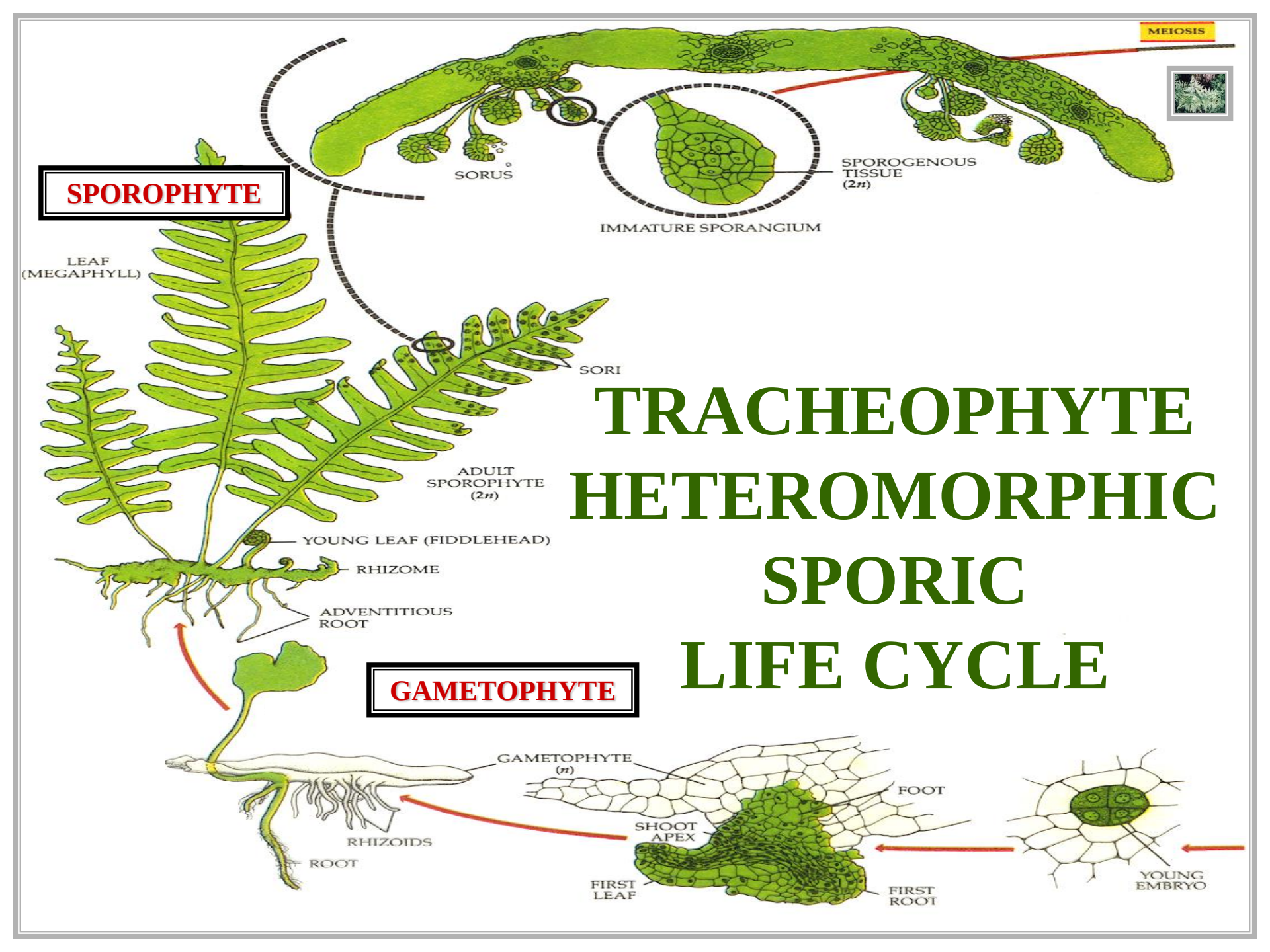




TRACHEOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



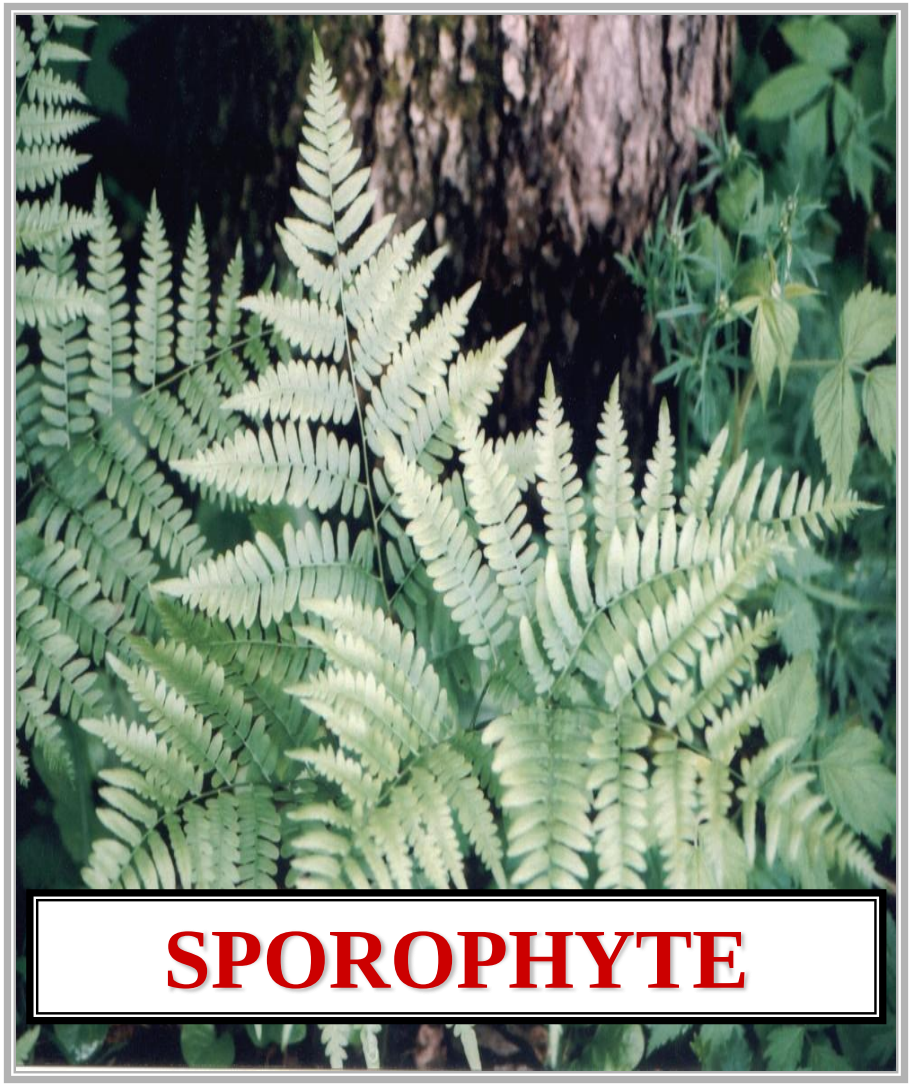
TRACHEOPHYTE
HETEROMORPHIC
SPORIC
LIFE CYCLE



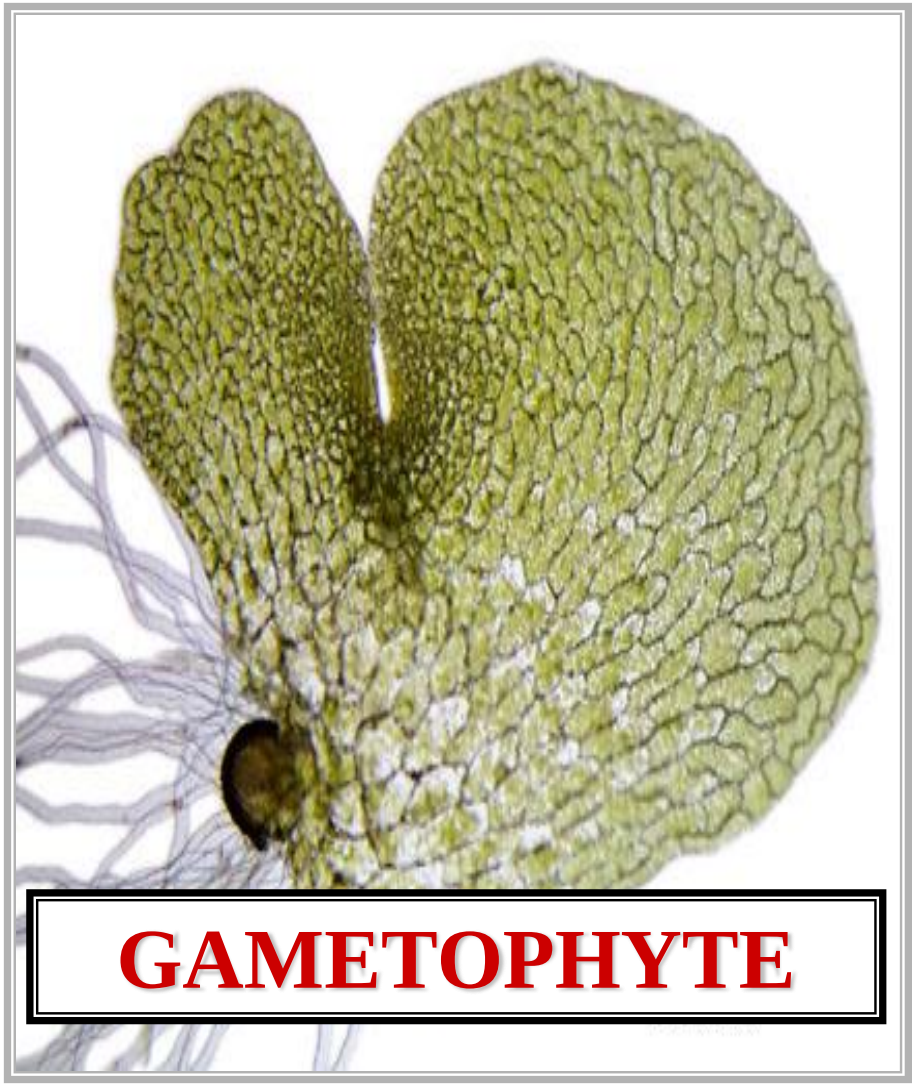
TRACHEOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE

D

TRACHEOPHYTE
SPOROPHYTE VS GAMETOPHYTE



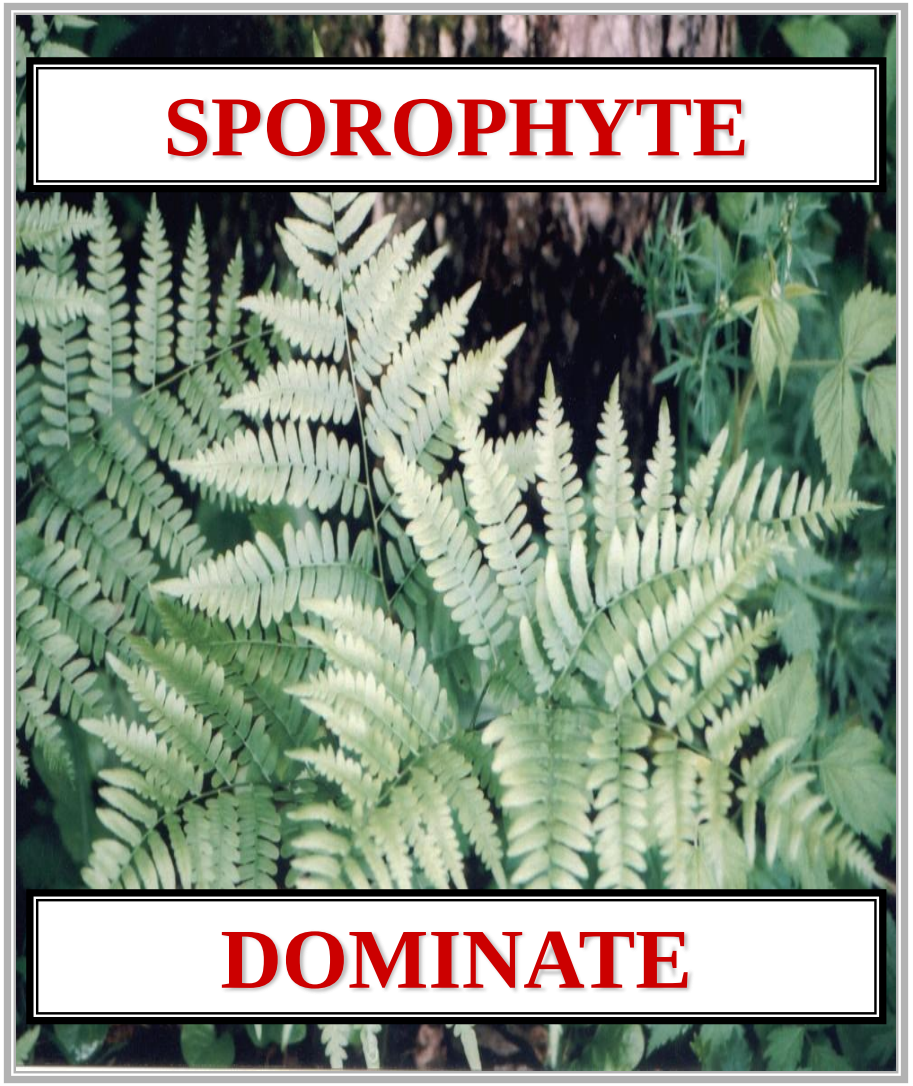
SPOROPHYTE

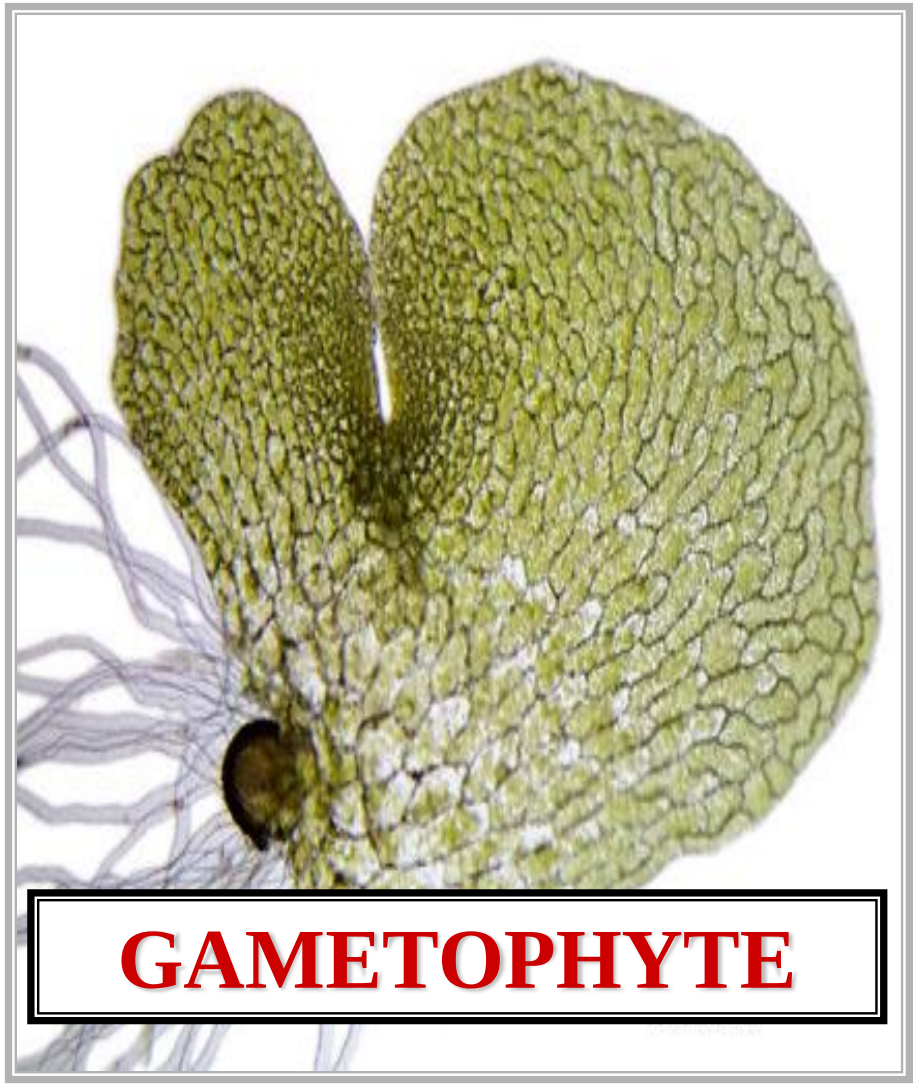


GAMETOPHYTE

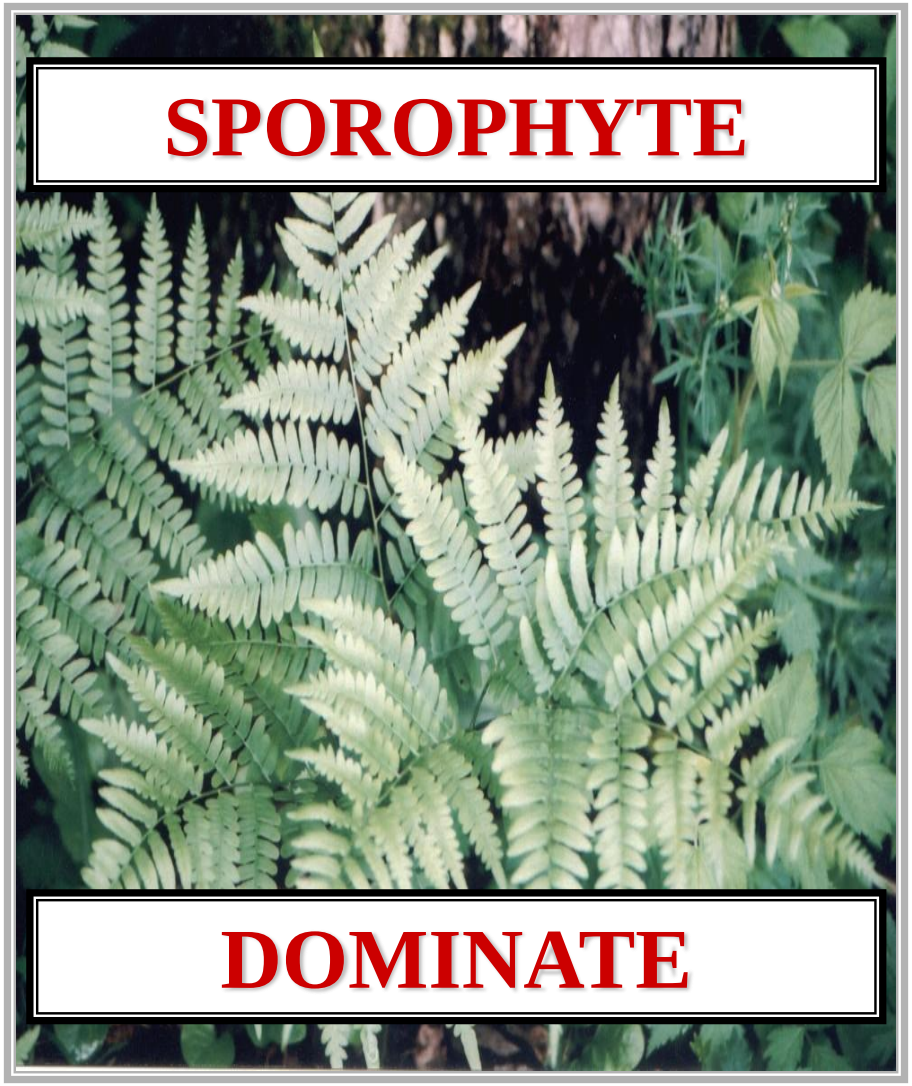
E

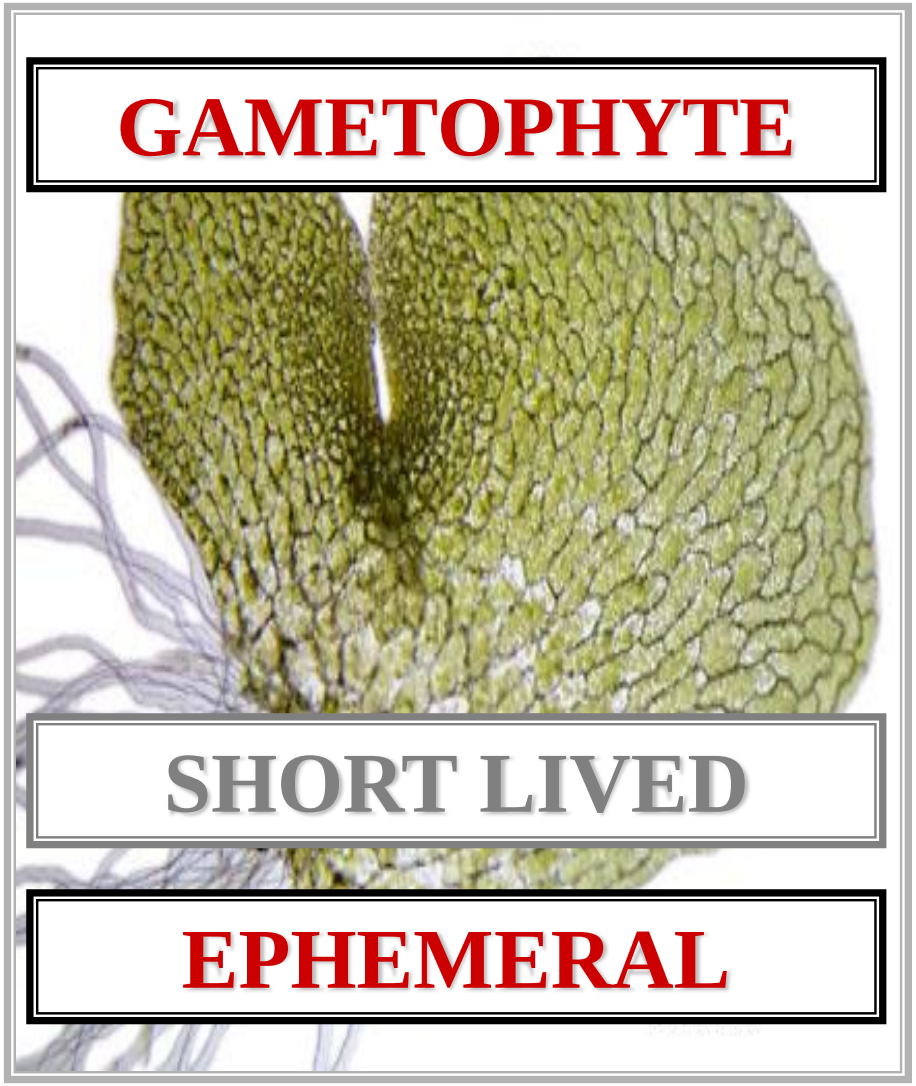
TRACHEOPHYTE
SPOROPHYTE VS GAMETOPHYTE





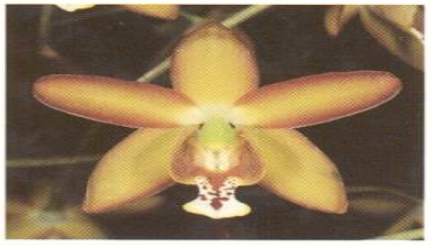
TRACHEOPHYTE
SPOROPHYTE VS GAMETOPHYTE



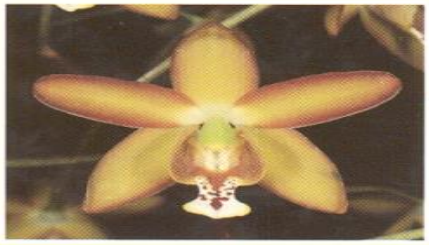


TRACHEOPHYTE EVOLUTION

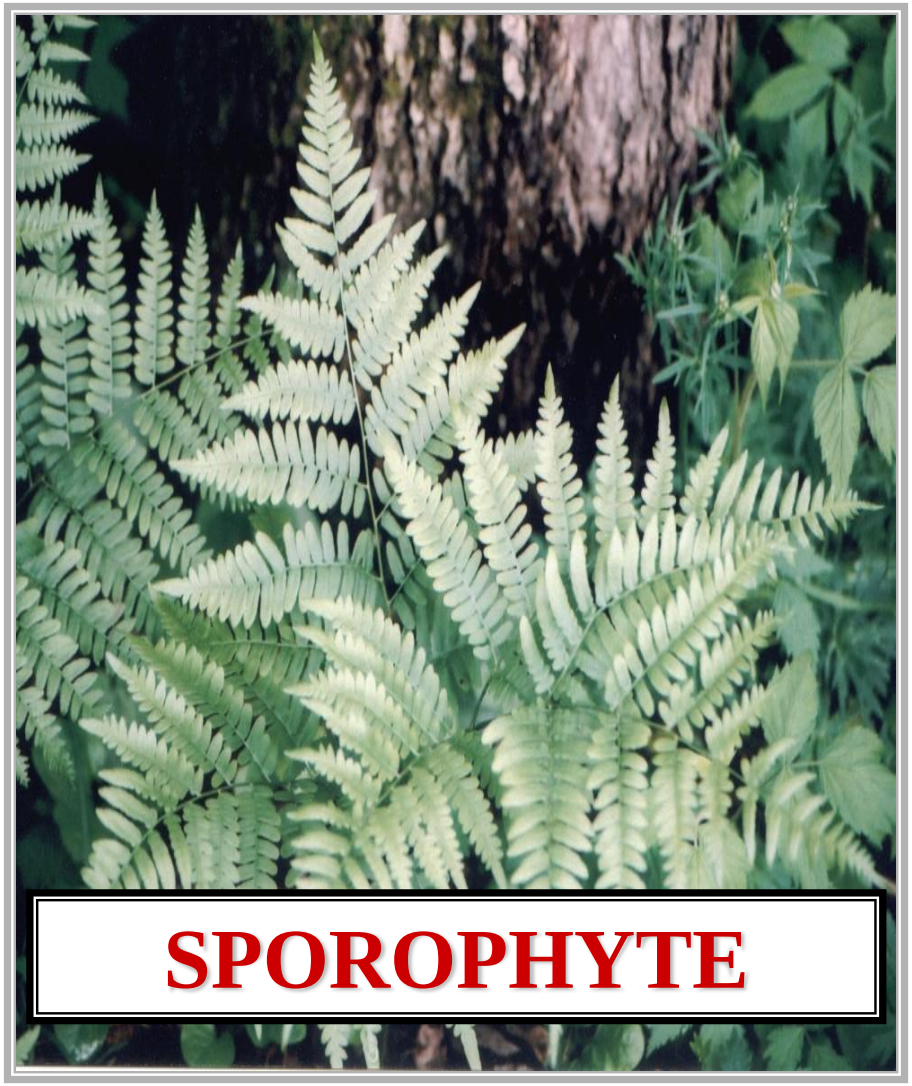
V



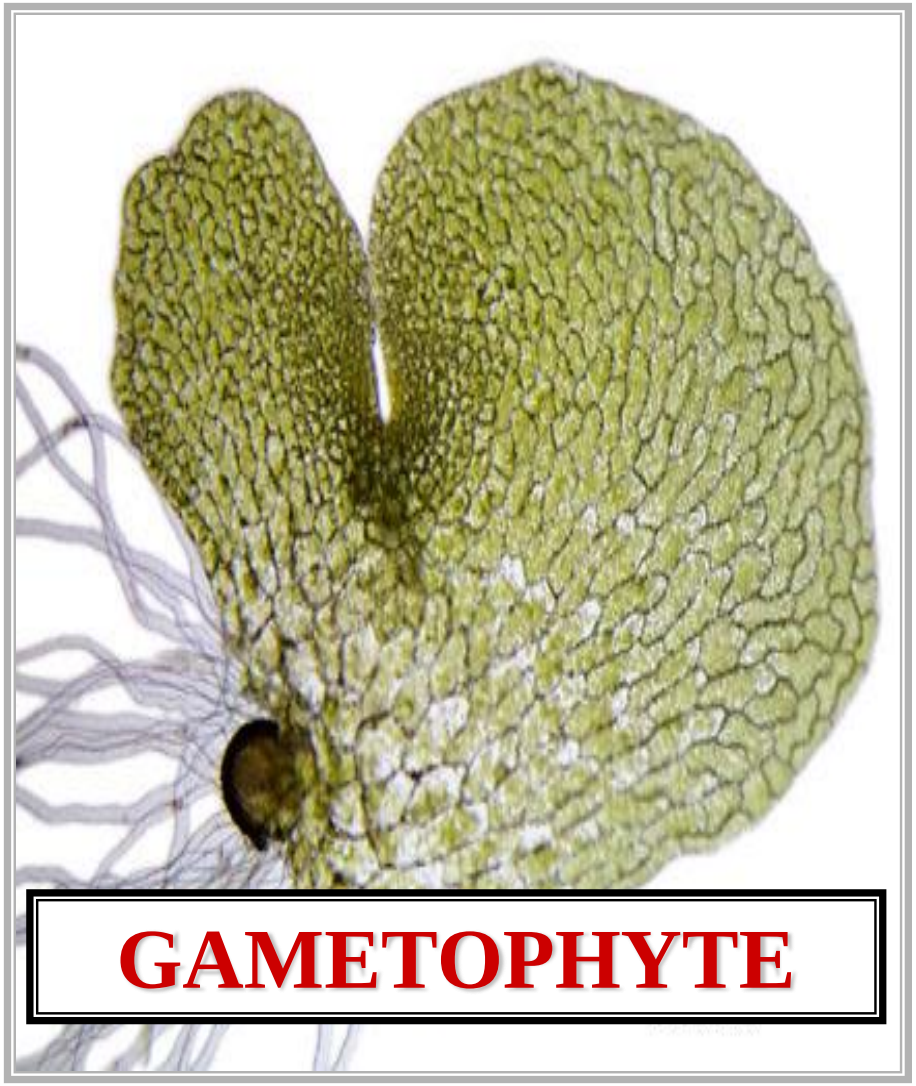
VASCULAR PLANT EVOLUTION



TRACHEOPHYTE EVOLUTION
SPOROPHYTE VS GAMETOPHYTE

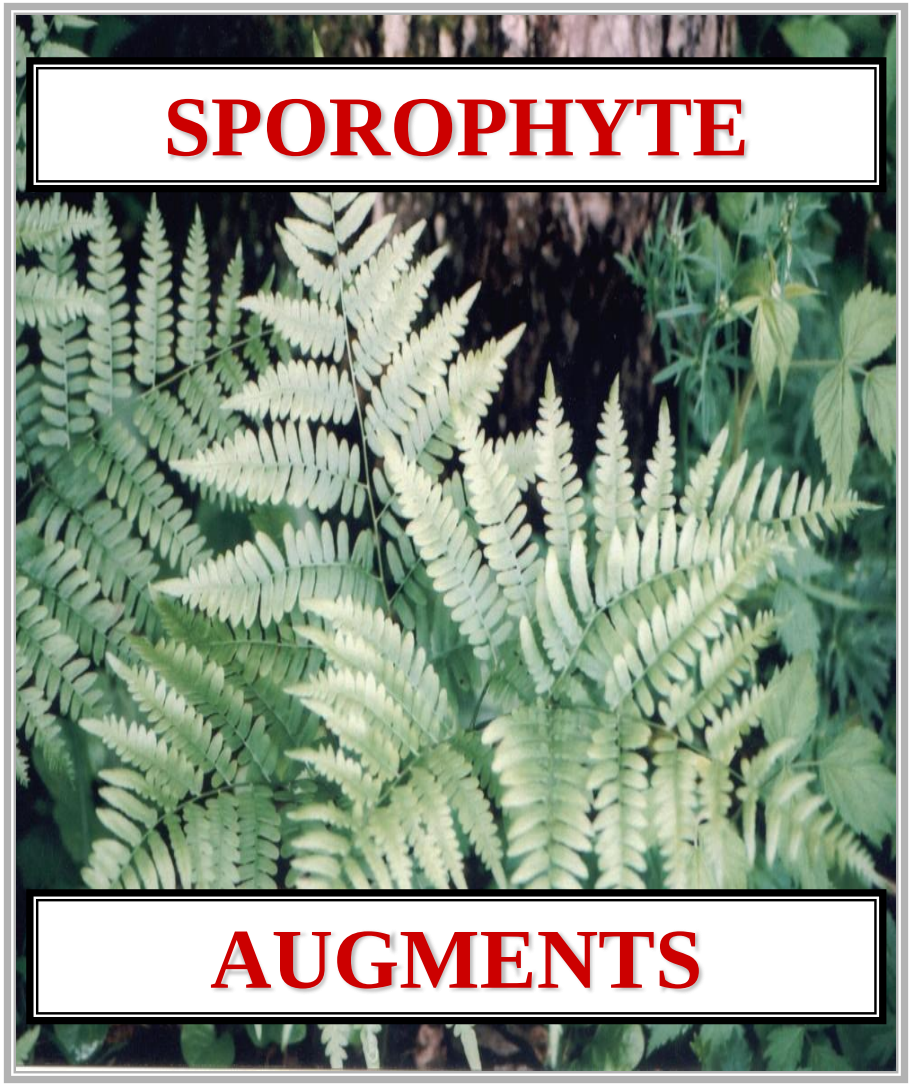


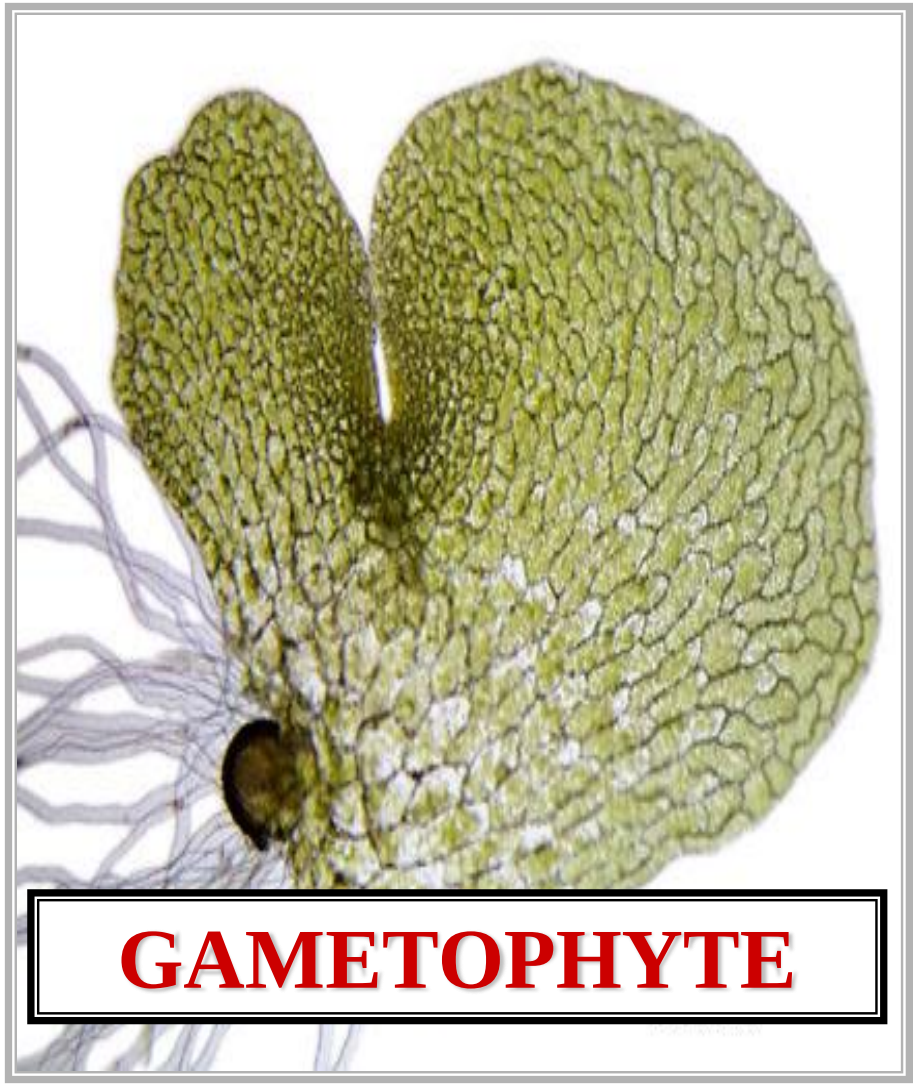
SPOROPHYTE



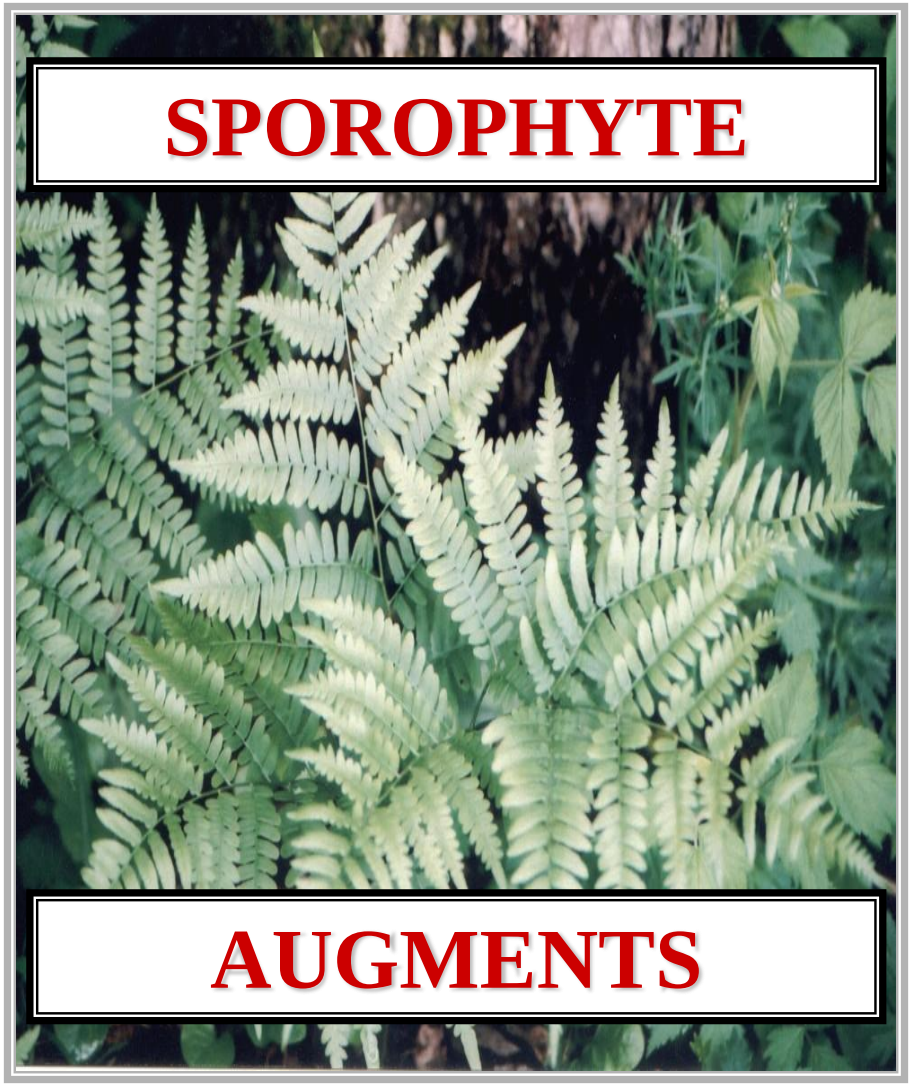
GAMETOPHYTE

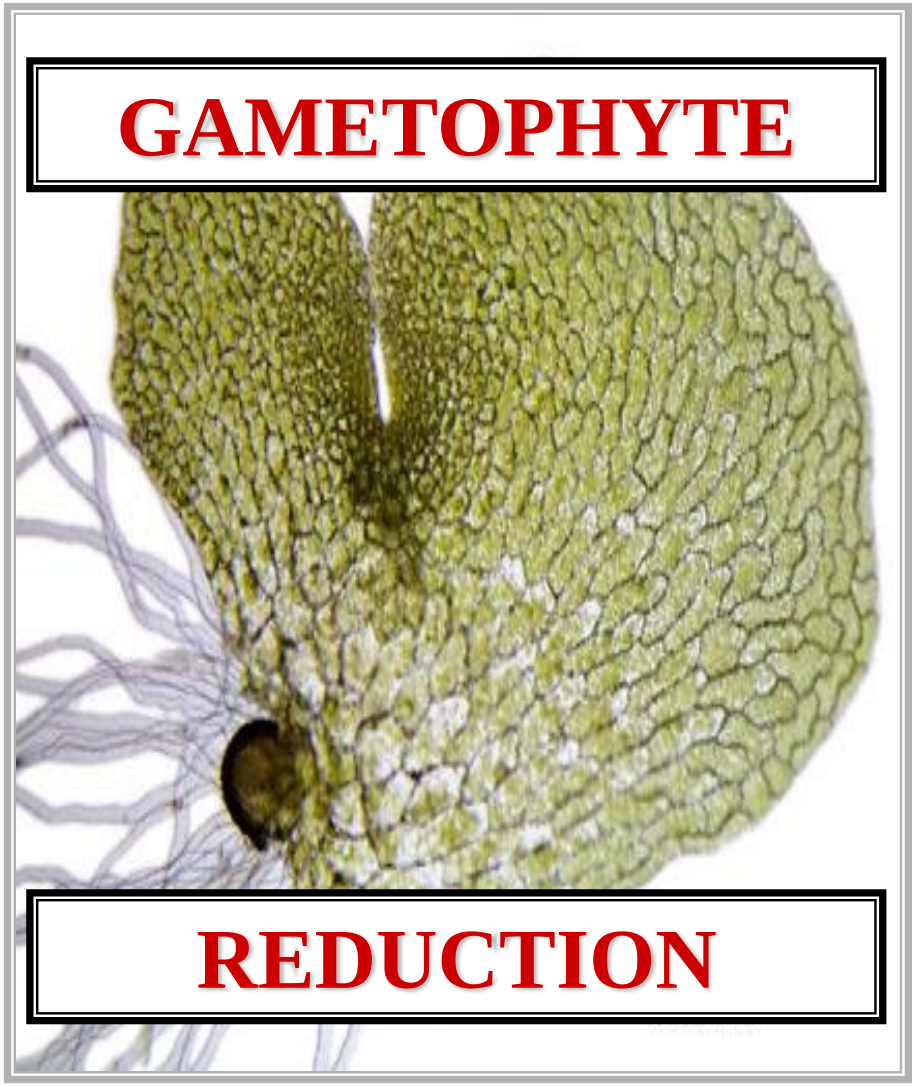
TRACHEOPHYTE EVOLUTION
SPOROPHYTE VS GAMETOPHYTE





TRACHEOPHYTE EVOLUTION
SPOROPHYTE VS GAMETOPHYTE





VASCULAR PLANT EVOLUTION

~420
MILLION YEARS

~420 MILLION YEARS AGO
TRACHEOPHYTES EVOLVE

C

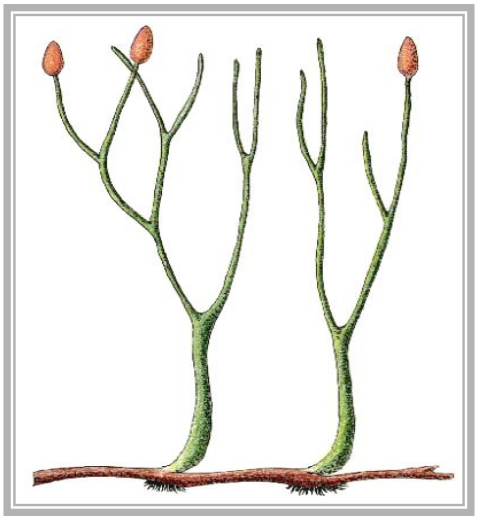
TRACHEOPHYTE EVOLUTION

***PARKA*-LIKE**

TRACHEOPHYTE EVOLUTION

CHAROPHYCEAE

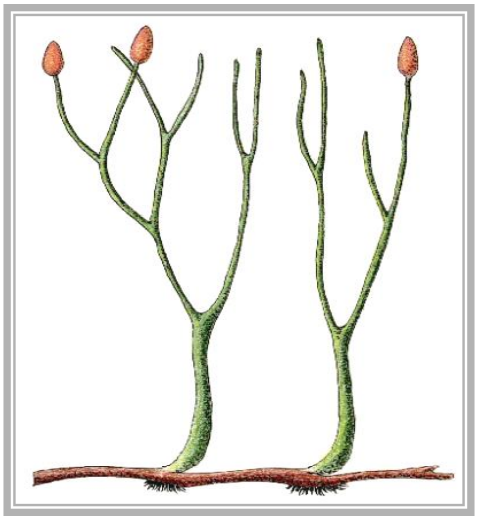
TRACHEOPHYTE EVOLUTION



CHAROPHYCEAE

AGLAOPHYTON

TRACHEOPHYTE EVOLUTION

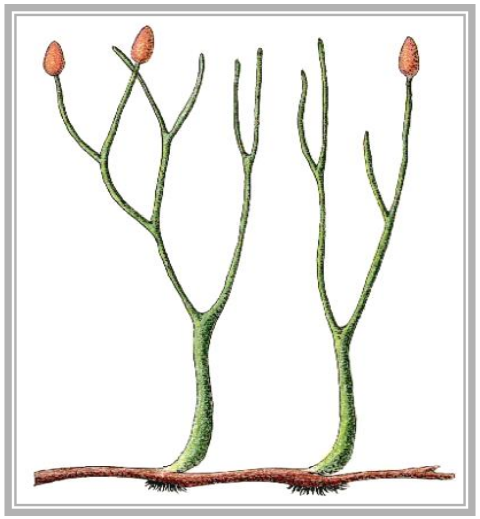


CHAROPHYCEAE

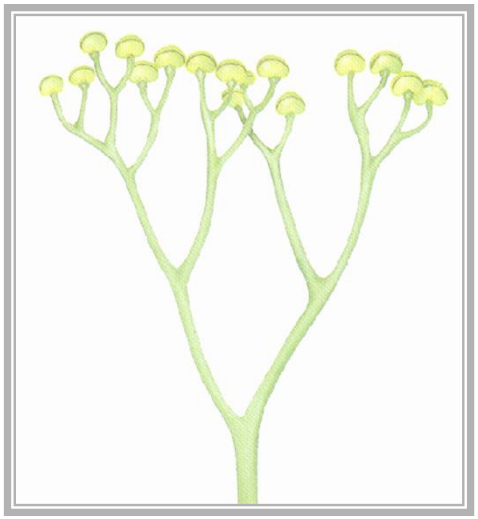
PROEMBRYOPHYTE

TRACHEOPHYTE EVOLUTION

CHAROPHYCEAE



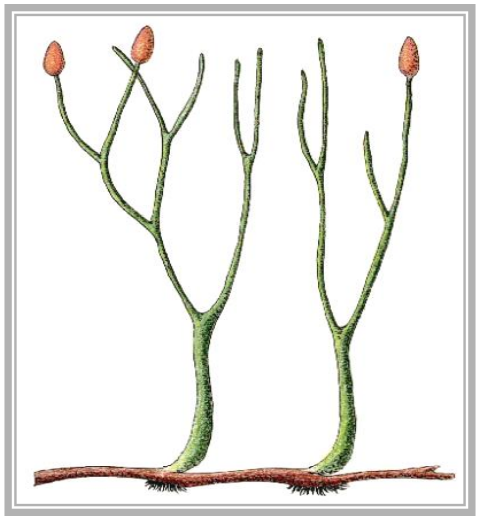
PROEMBRYOPHYTE



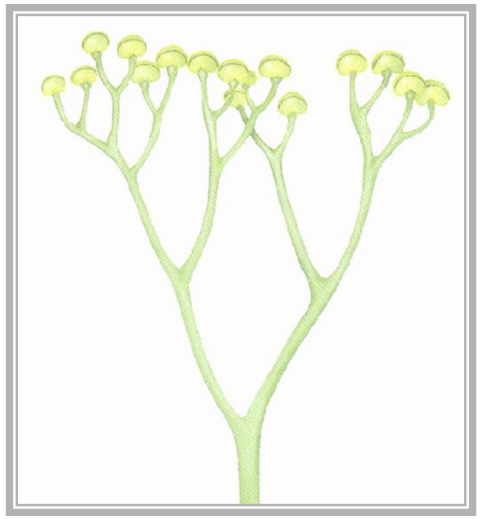
EMBRYOPHYTE

TRACHEOPHYTE EVOLUTION

CHAROPHYCEAE



PROEMBRYOPHYTE



TRACHEOPHYTE

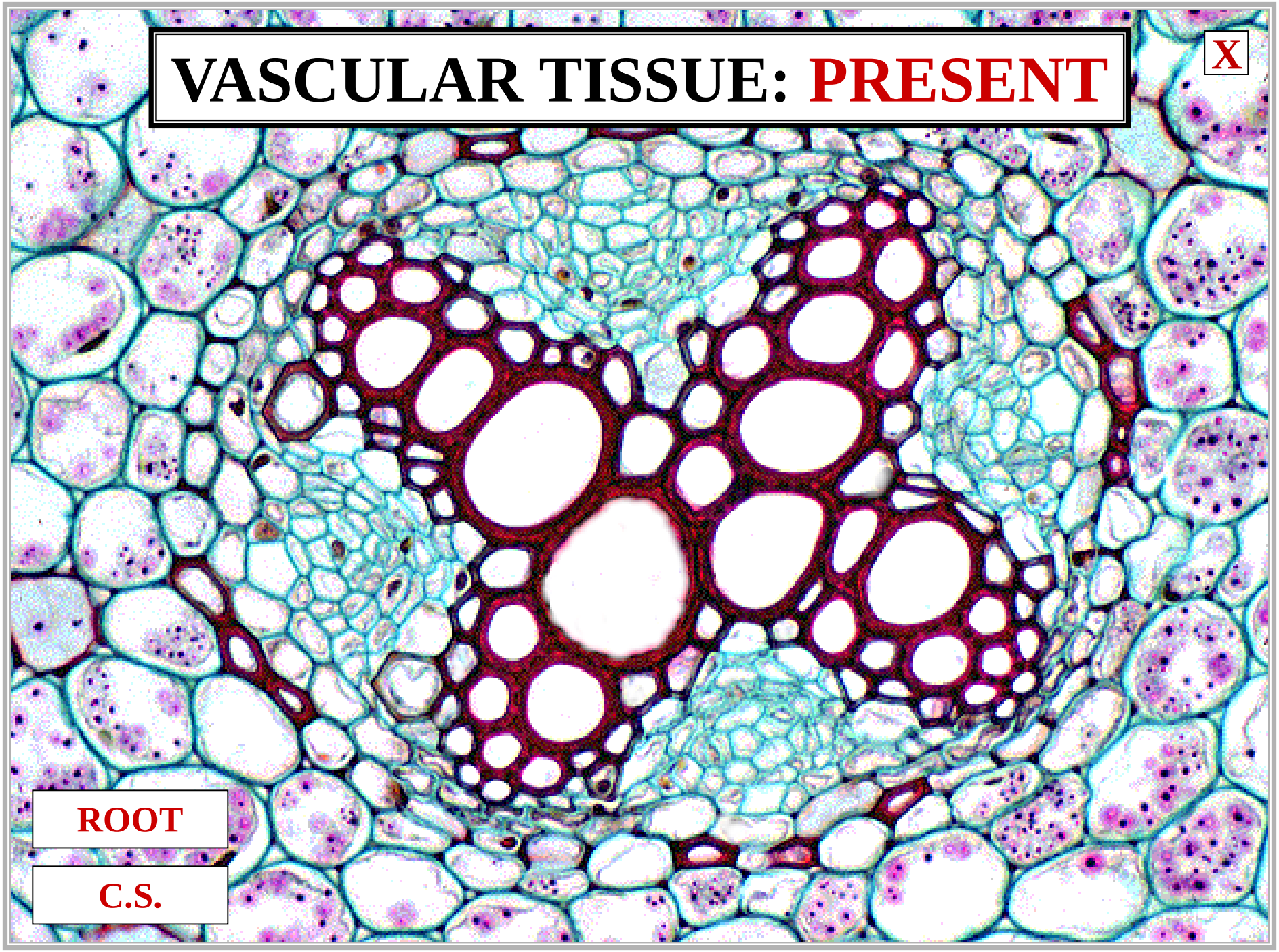
TRACHEOPHYTES

COMMON NAME

VASCULAR PLANTS

VASCULAR TISSUE: PRESENT

X

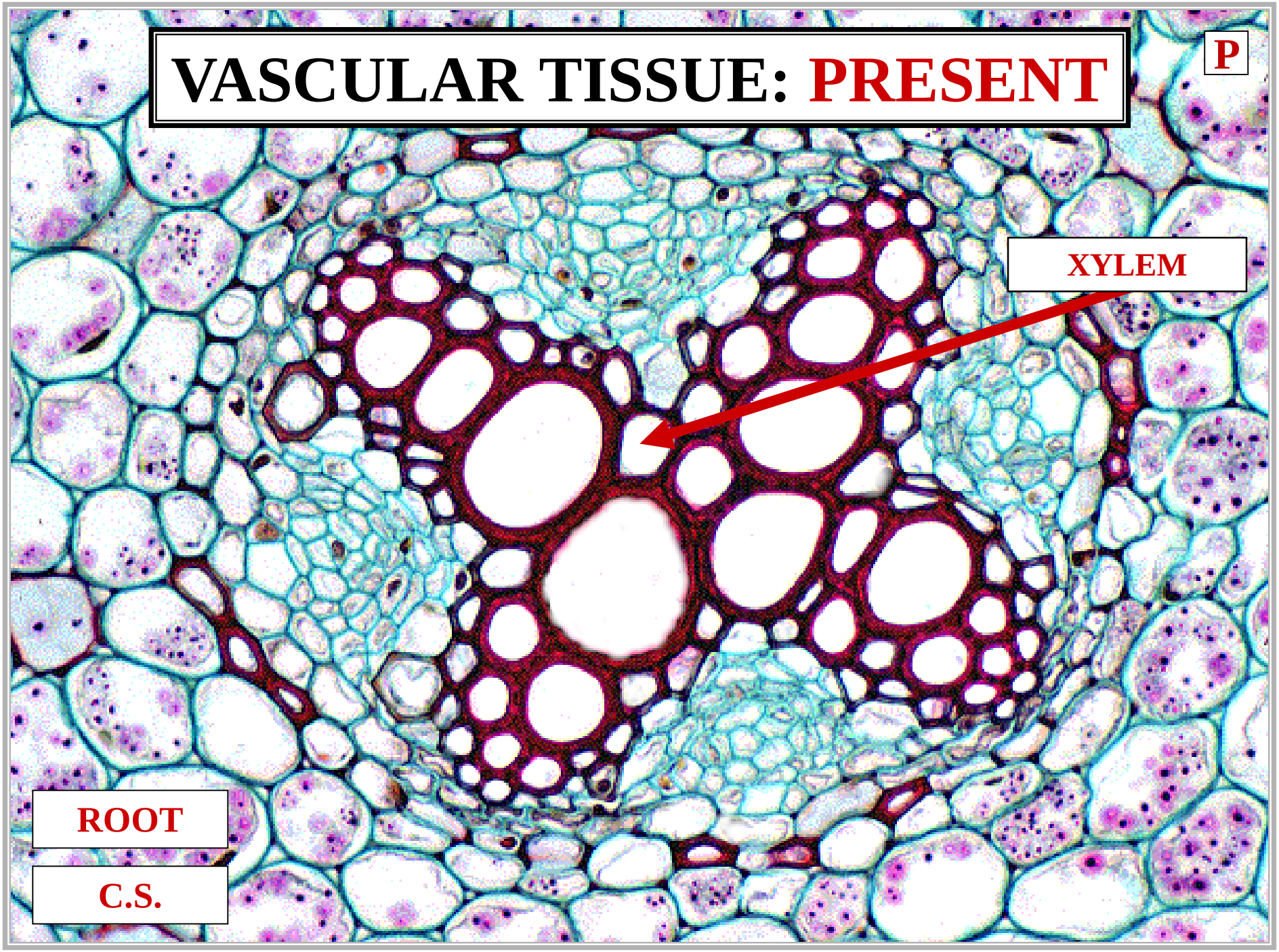


ROOT

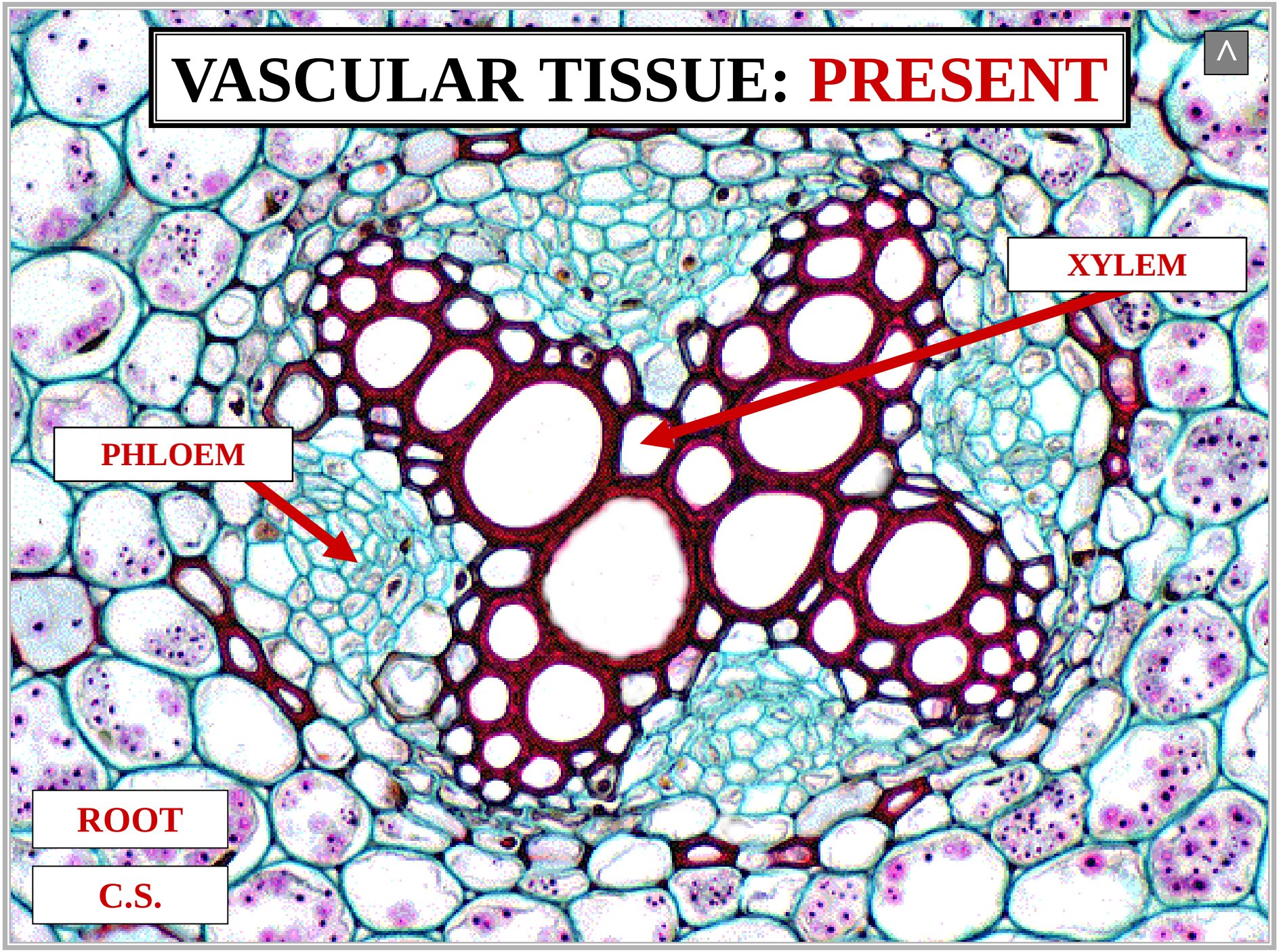
C.S.

VASCULAR TISSUE: PRESENT

P



VASCULAR TISSUE: PRESENT

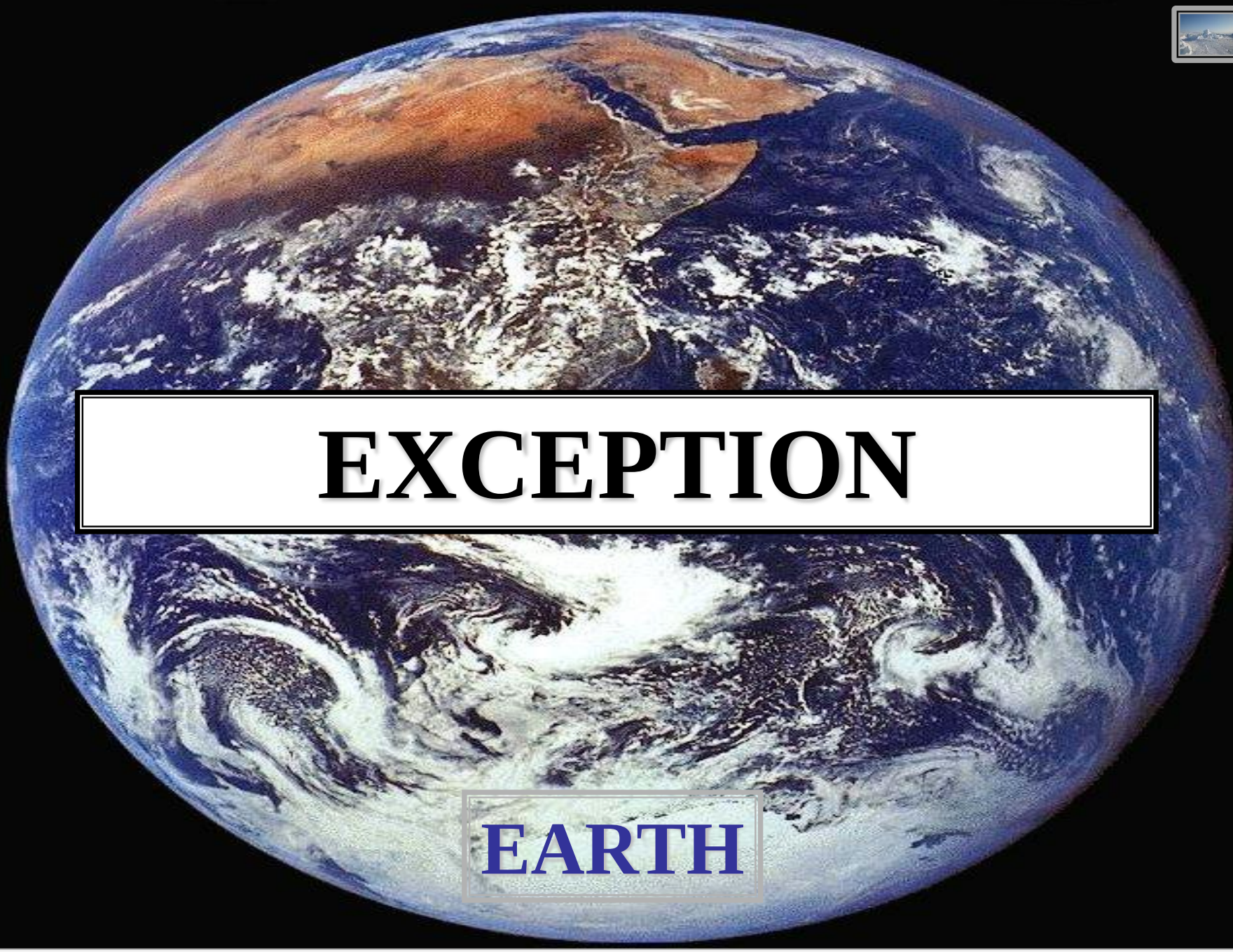


DIVERSITY

~300,000 SPECIES
EARTH

DISTRIBUTION

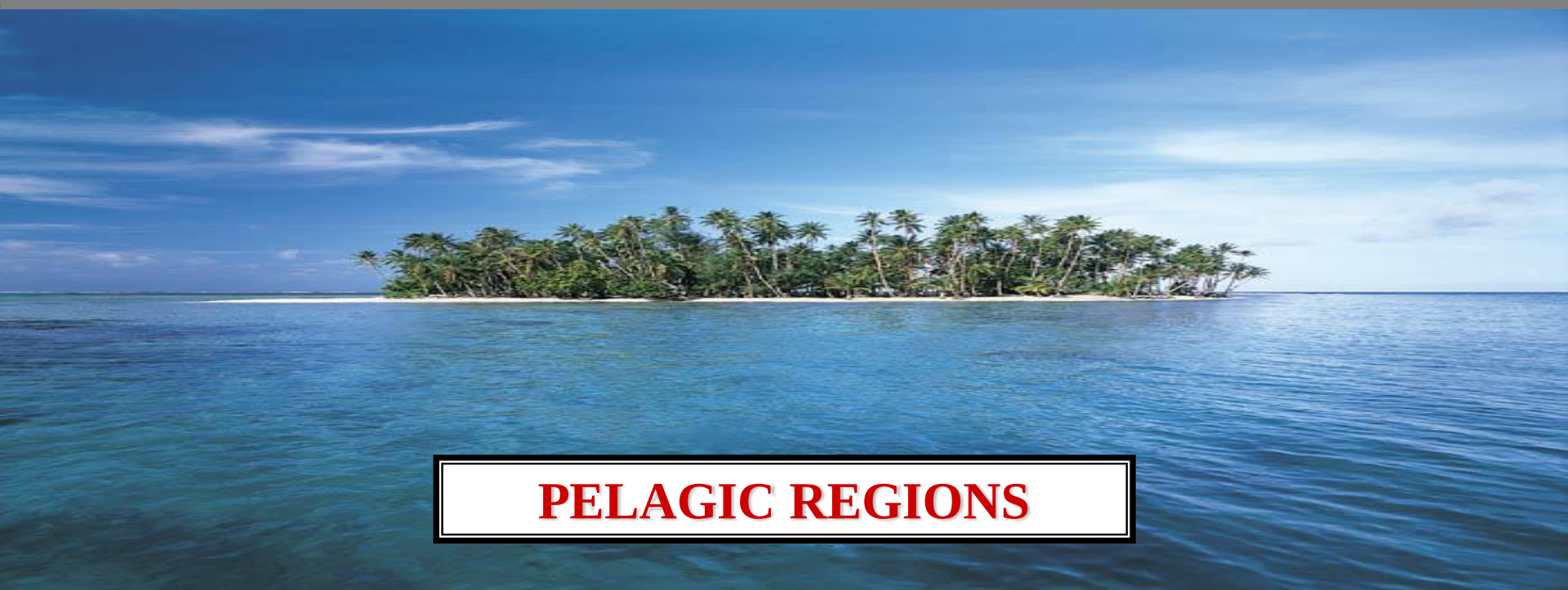
EX
COSMOPOLITAN
EARTH



EXCEPTION

EARTH

POLAR REGIONS



PELAGIC REGIONS

GENERAL CHARACTERS

M

MERISTEM

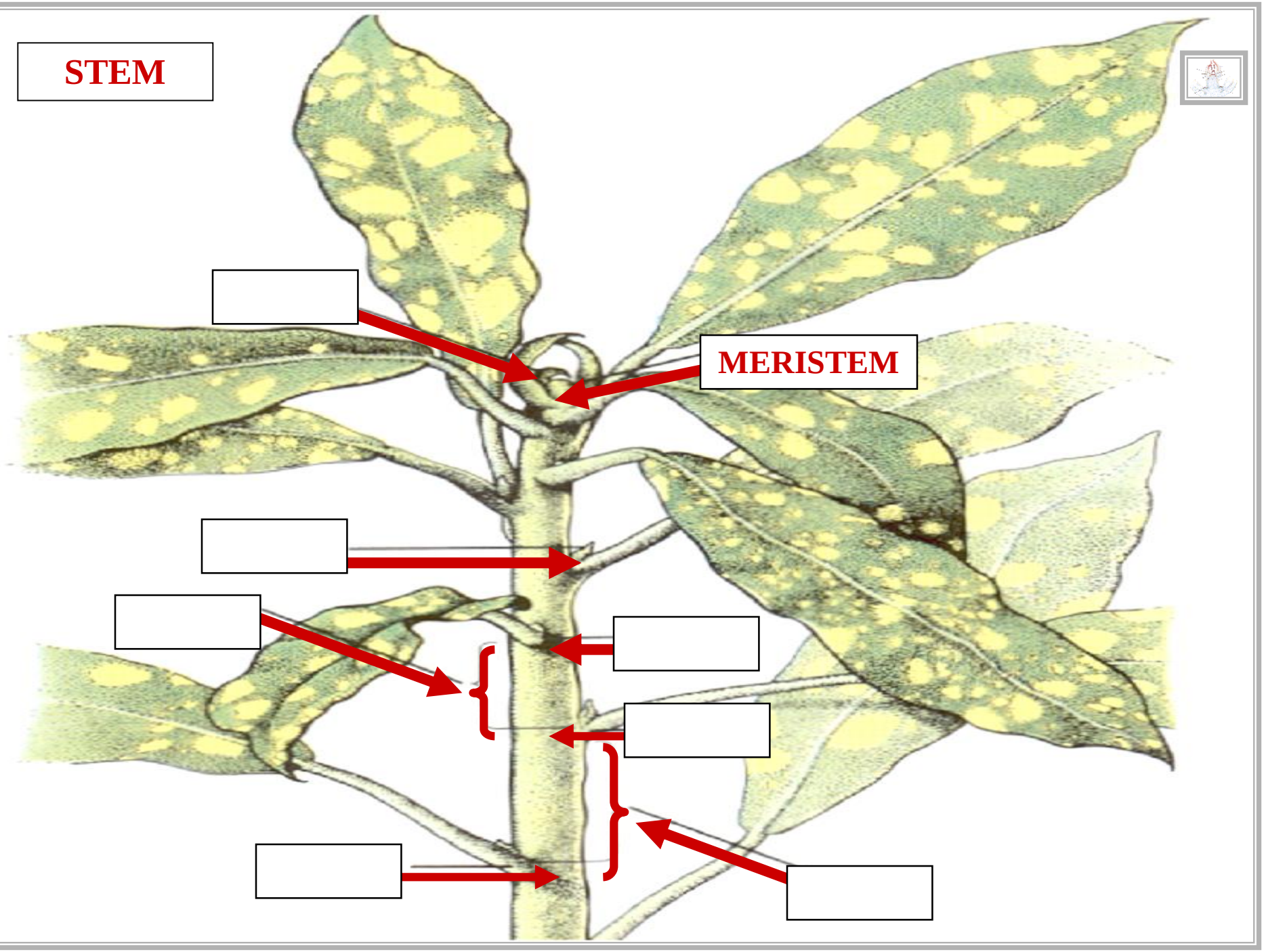
MERISTEM

MERISTEM

GROWTH REGION

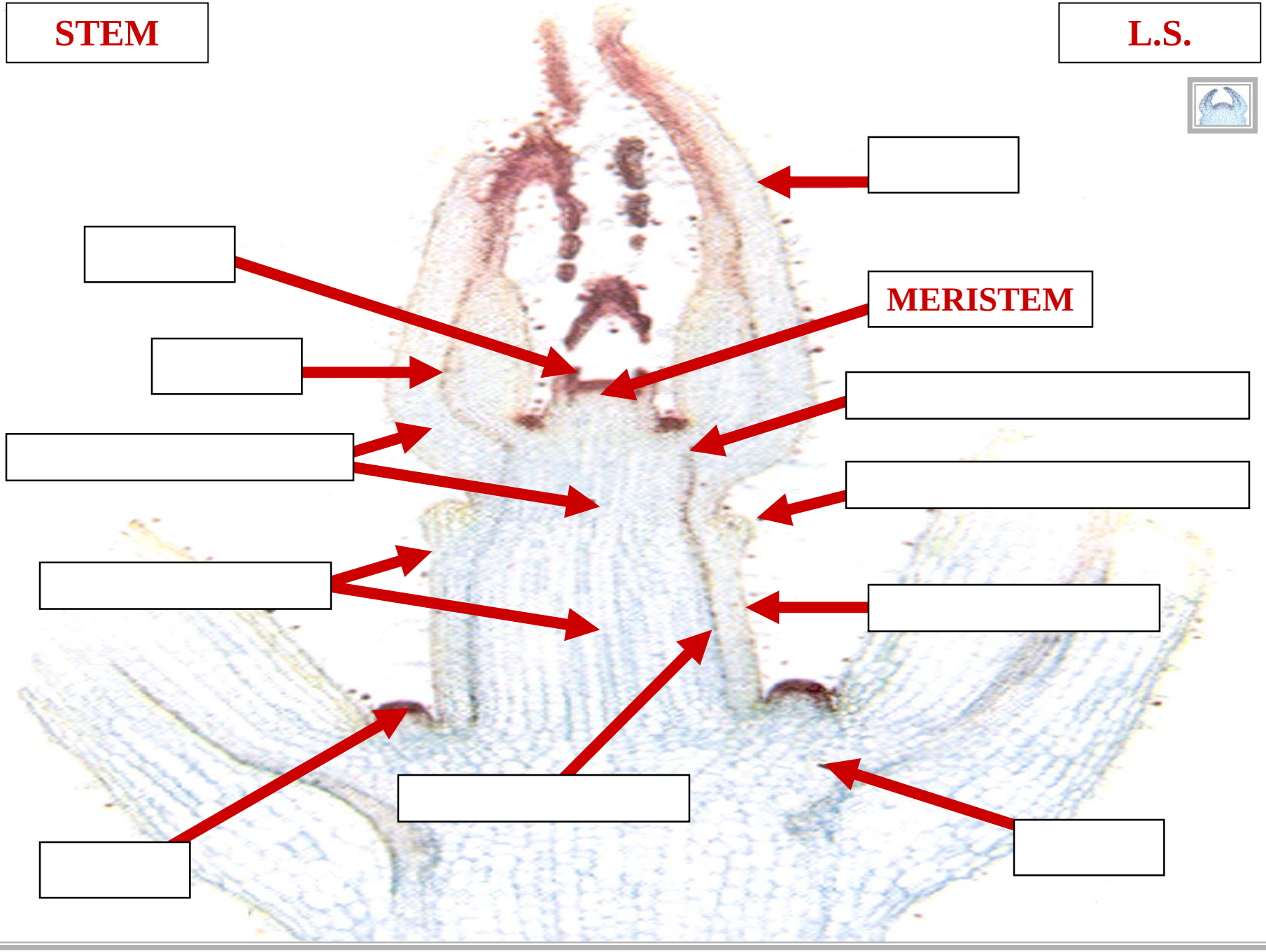
MERISTEM

STEM



STEM

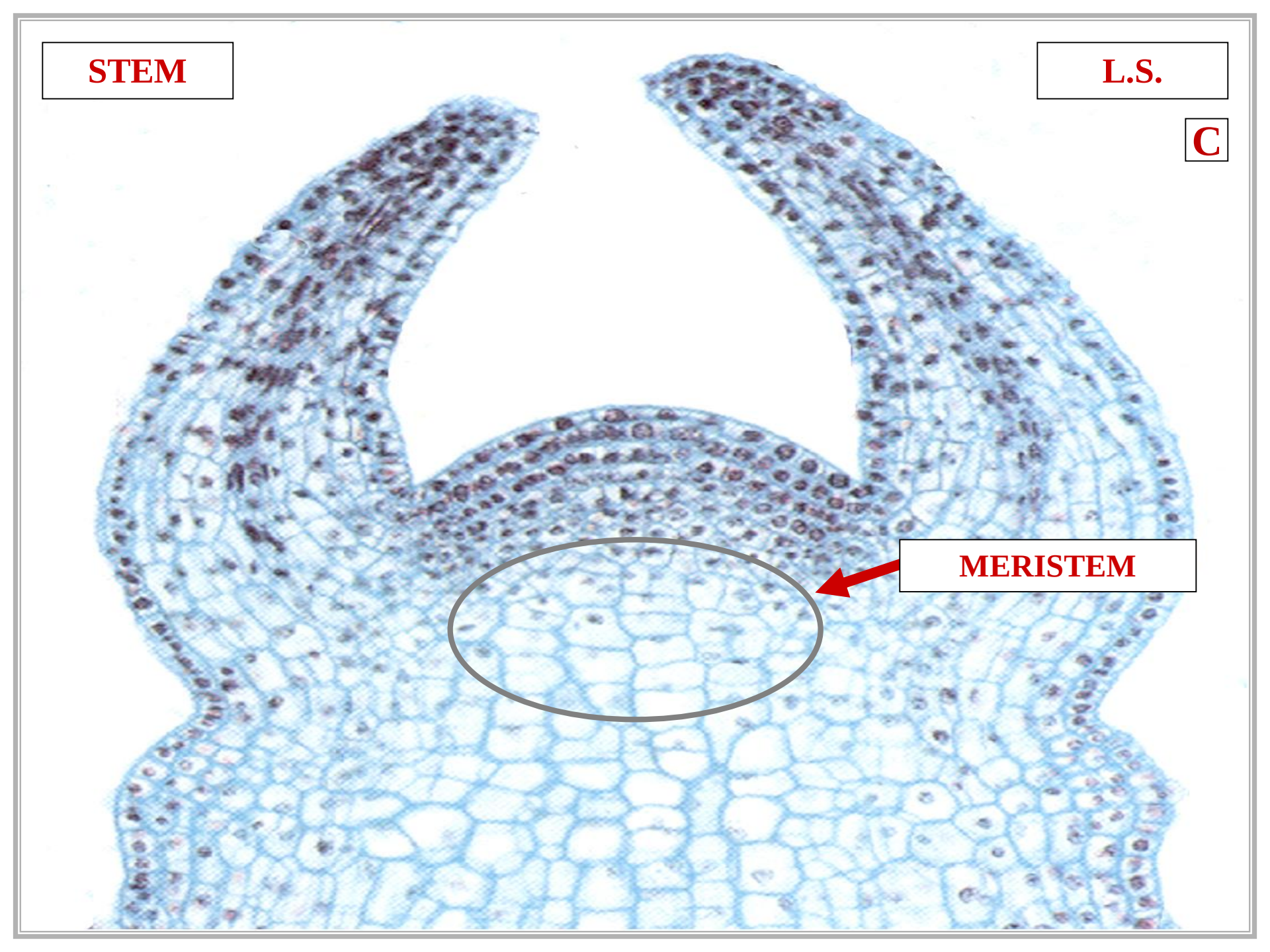
L.S.

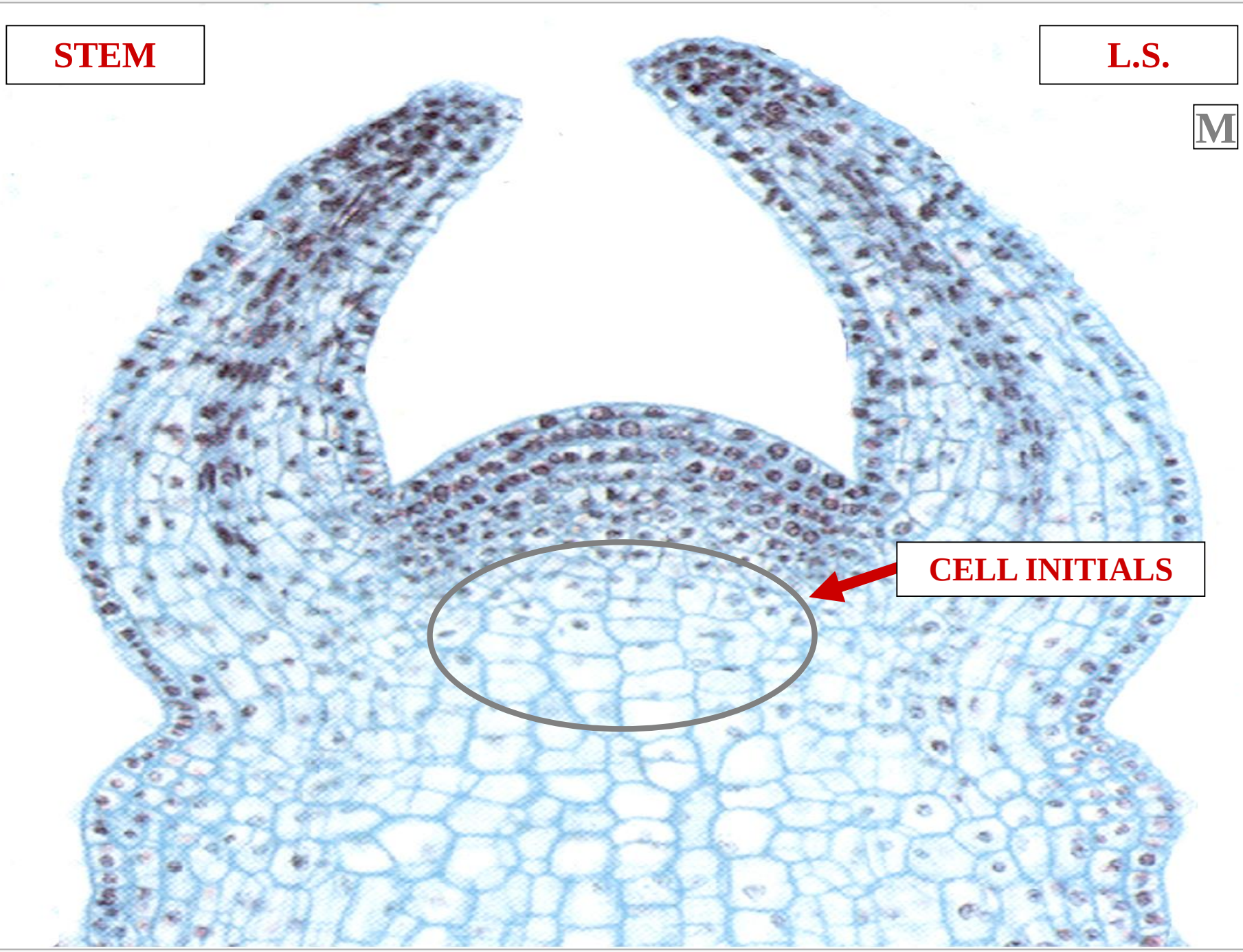


STEM

L.S.

C

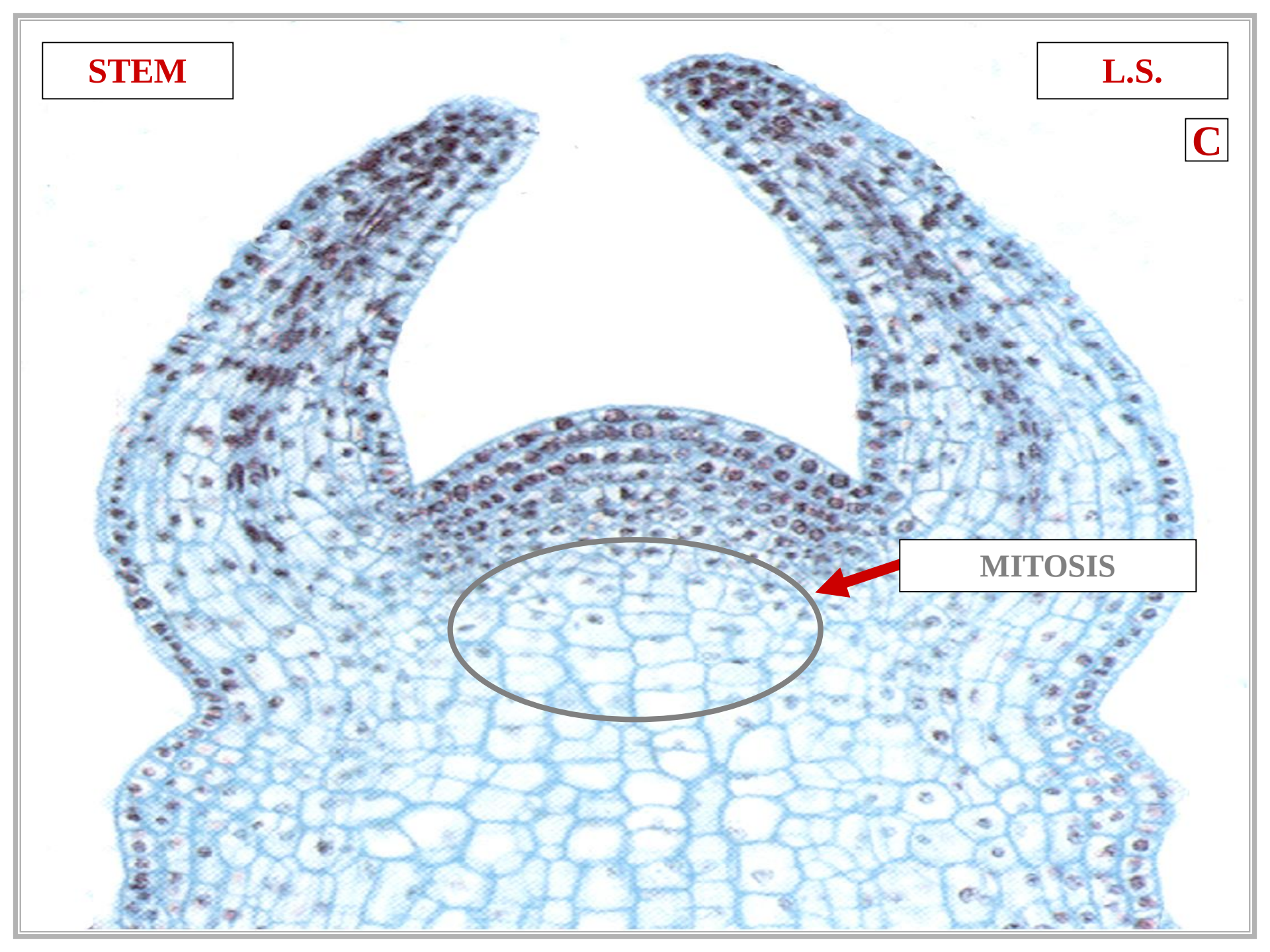



STEM
L.S.
M
CELL INITIALS

STEM

L.S.

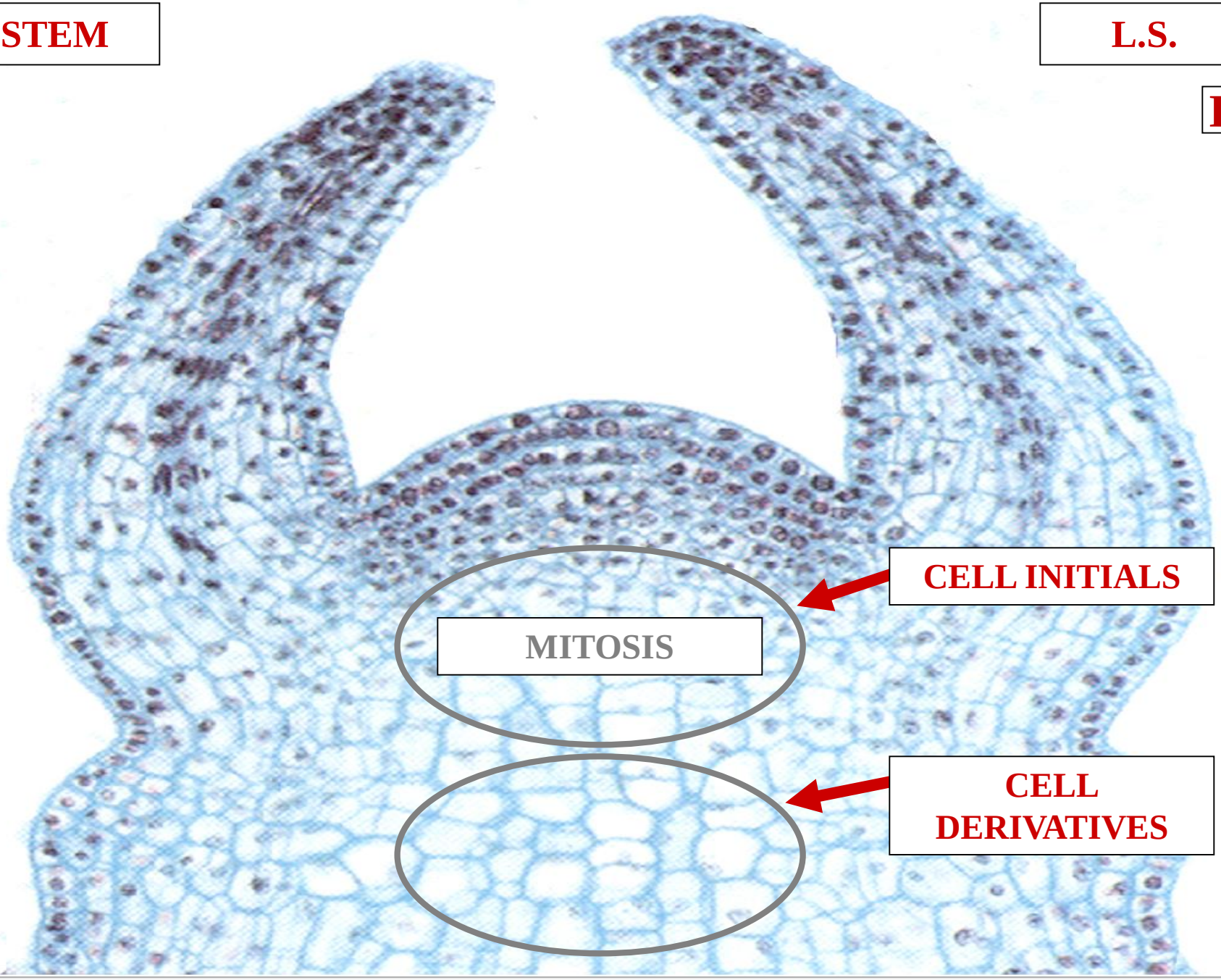
C

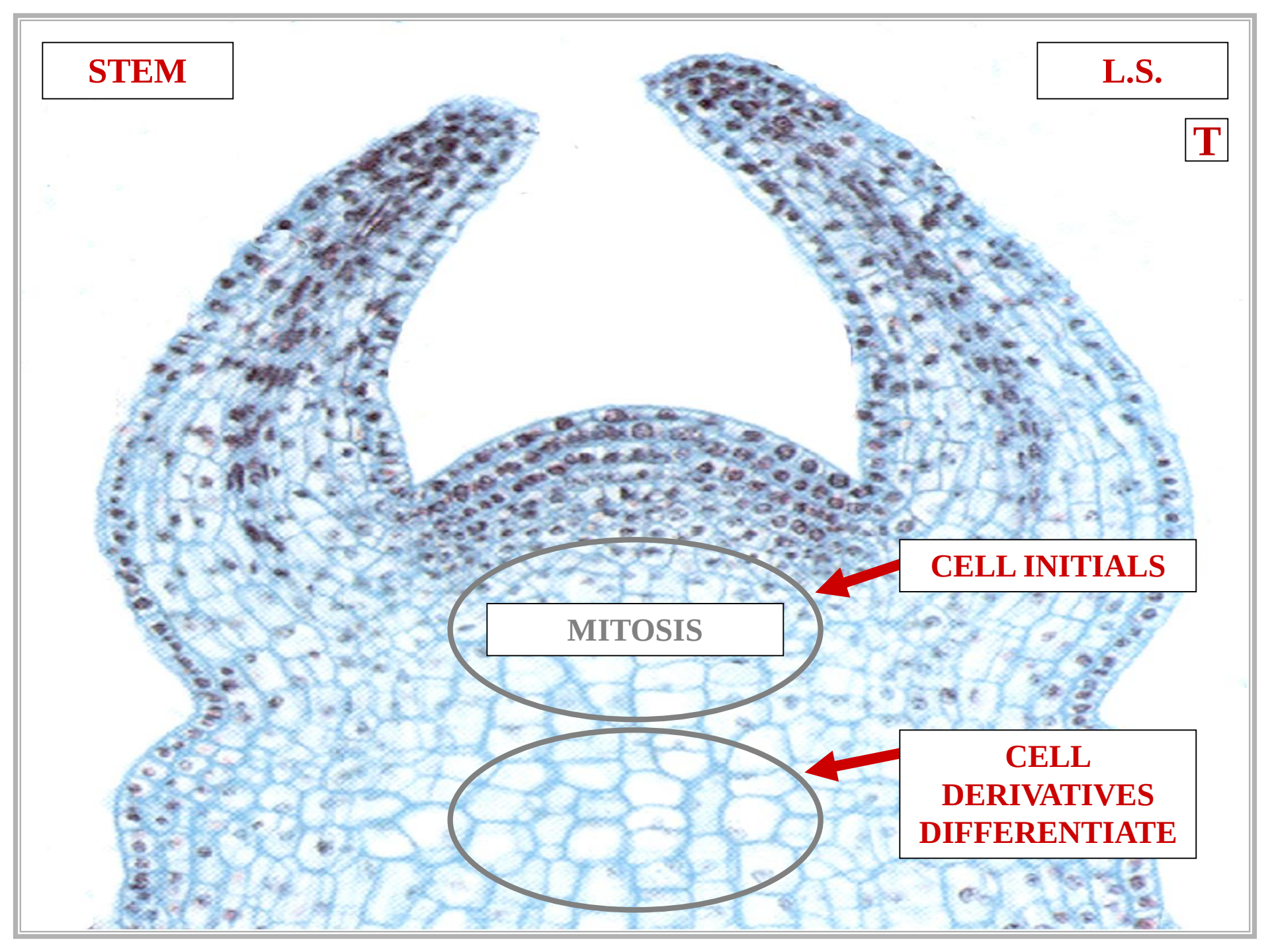


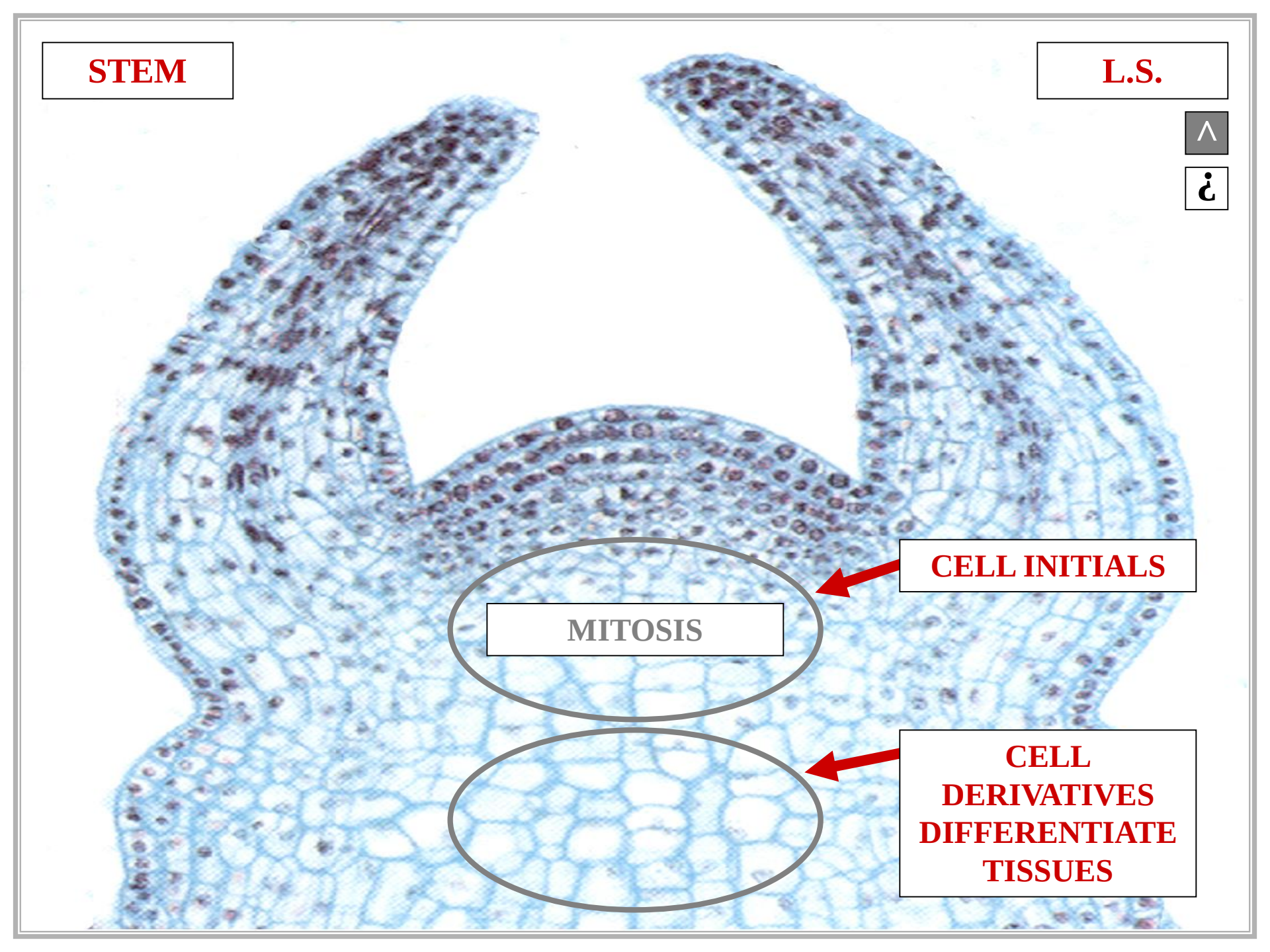
STEM

L.S.

D

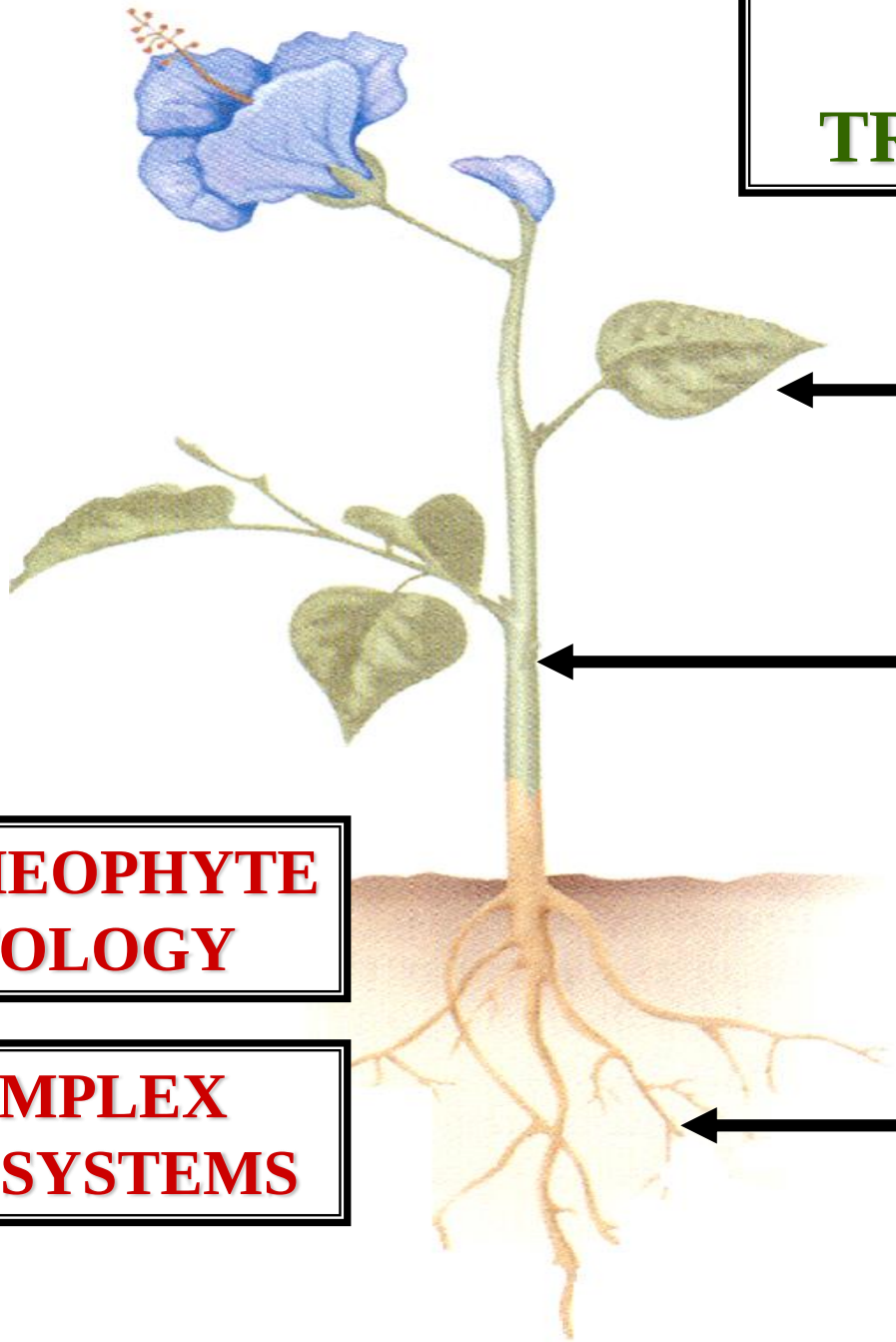



STEM
L.S.
T
CELL INITIALS
MITOSIS
CELL DERIVATIVES DIFFERENTIATE


STEM
L.S.
CELL INITIALS
MITOSIS
CELL DERIVATIVES DIFFERENTIATE TISSUES

TRACHEOPHYTE HISTOLOGY

TYPICAL TRACHEOPHYTE



LEAF

STEM

ROOT

TRACHEOPHYTE HISTOLOGY

3 COMPLEX TISSUE SYSTEMS

TRACHEOPHYTE COMPLEX TISSUES

TRACHEOPHYTE COMPLEX TISSUES

GROUND TISSUE

TRACHEOPHYTE COMPLEX TISSUES

TRACHEOPHYTE
COMPLEX TISSUES

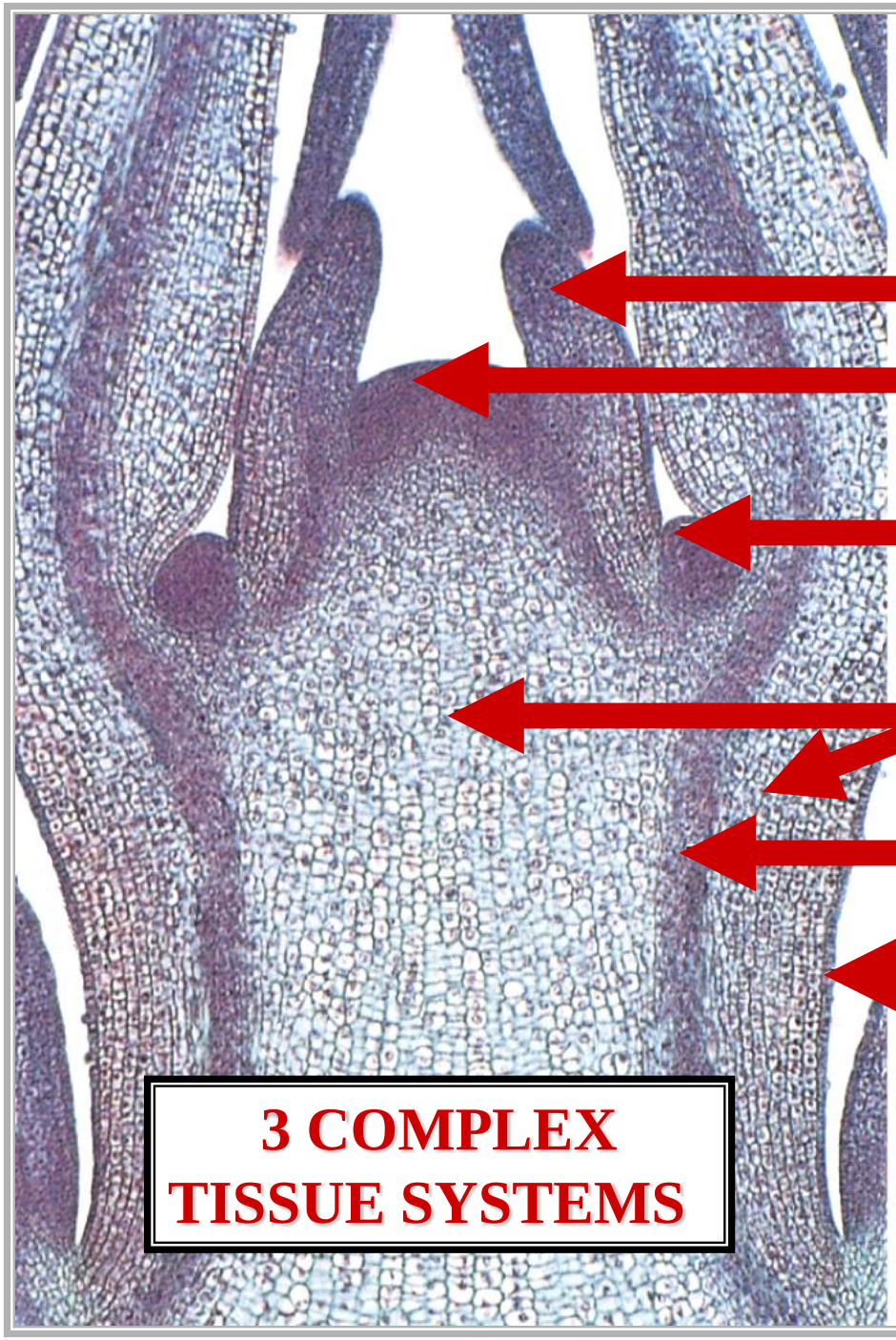
GROUND TISSUE
VASCULAR TISSUE

TRACHEOPHYTE
COMPLEX TISSUES

TRACHEOPHYTE COMPLEX TISSUES

GROUND TISSUE
VASCULAR TISSUE
DERMAL TISSUE

TRACHEOPHYTE COMPLEX TISSUES



TRACHEOPHYTE COMPLEX TISSUES

+

G

APICAL MERISTEM

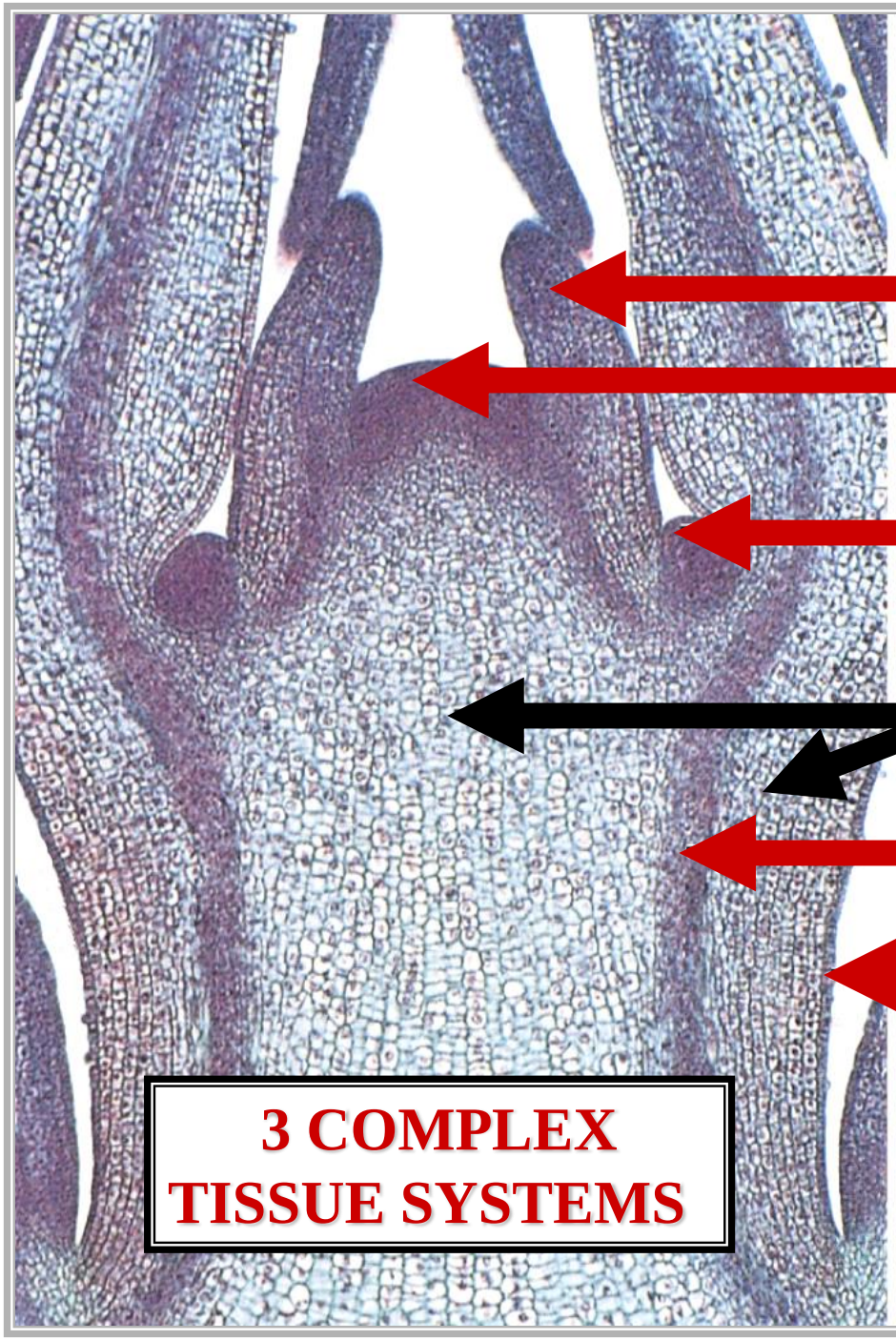
3 COMPLEX TISSUE SYSTEMS

STEM

L.S.

TRACHEOPHYTE COMPLEX TISSUES

V



APICAL MERISTEM

GROUND TISSUE

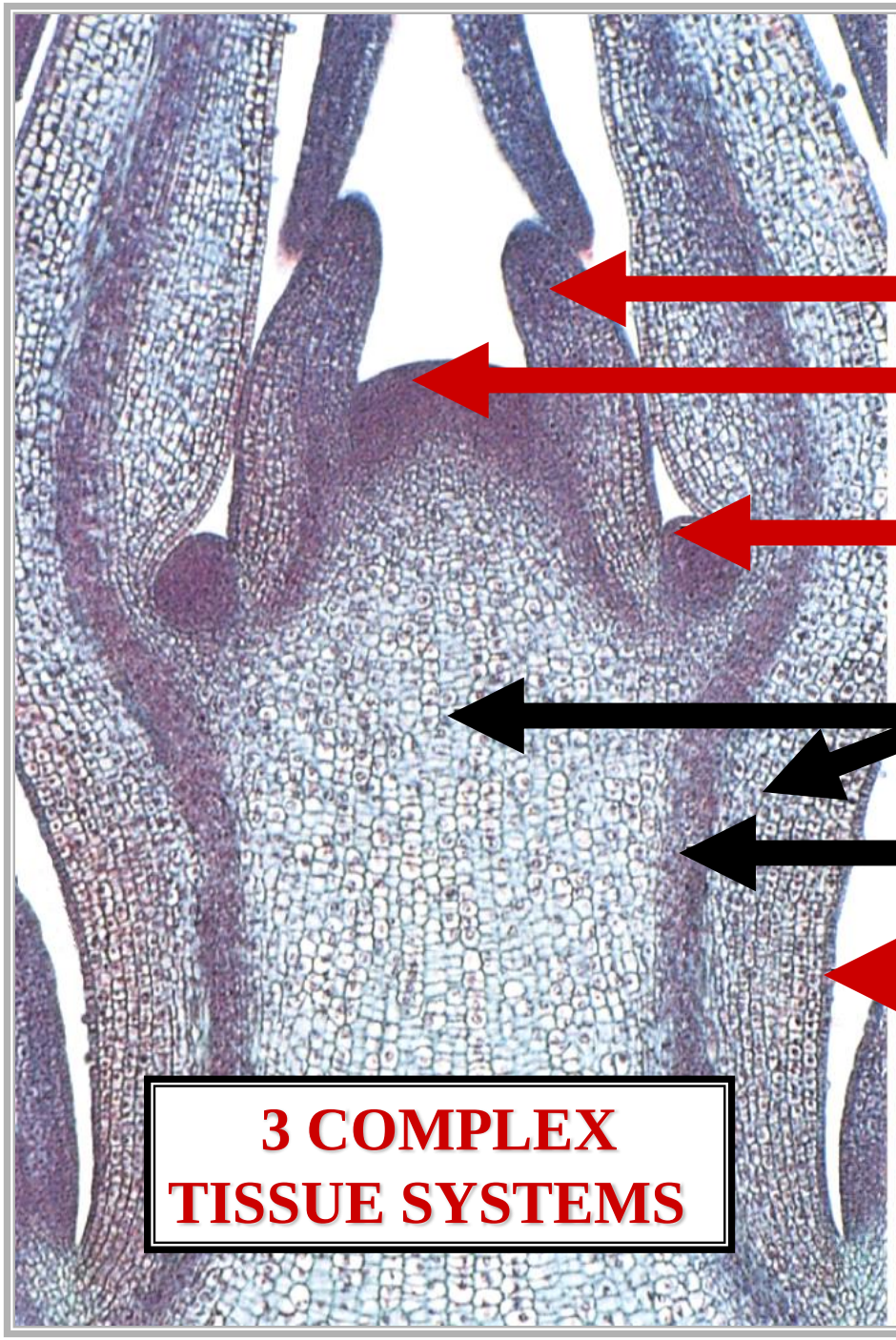
3 COMPLEX TISSUE SYSTEMS

STEM

L.S.

TRACHEOPHYTE COMPLEX TISSUES

D



APICAL MERISTEM

GROUND TISSUE

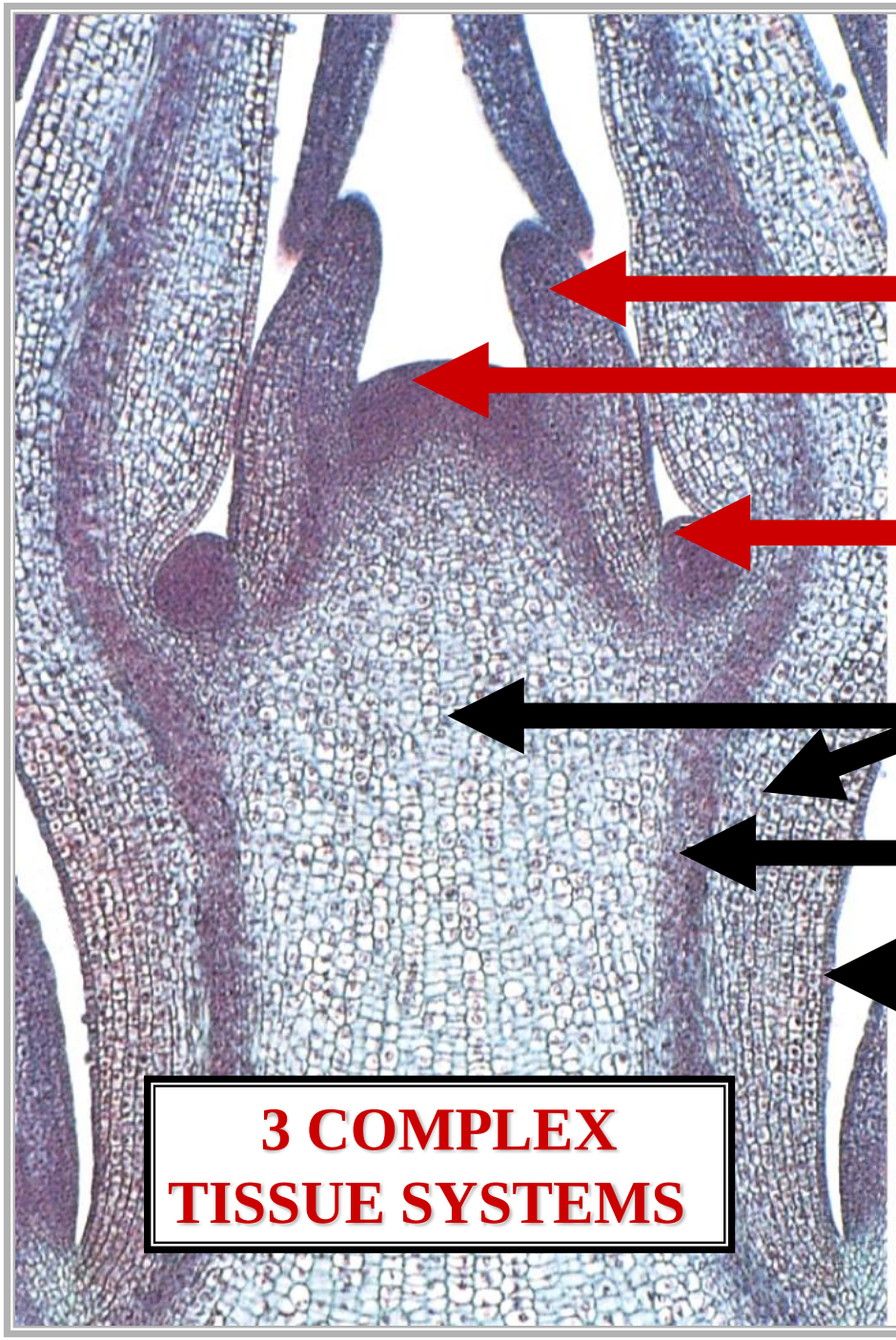
VASCULAR TISSUE

3 COMPLEX TISSUE SYSTEMS

STEM

L.S.

TRACHEOPHYTE COMPLEX TISSUES



APICAL MERISTEM

GROUND TISSUE

VASCULAR TISSUE

DERMAL TISSUE

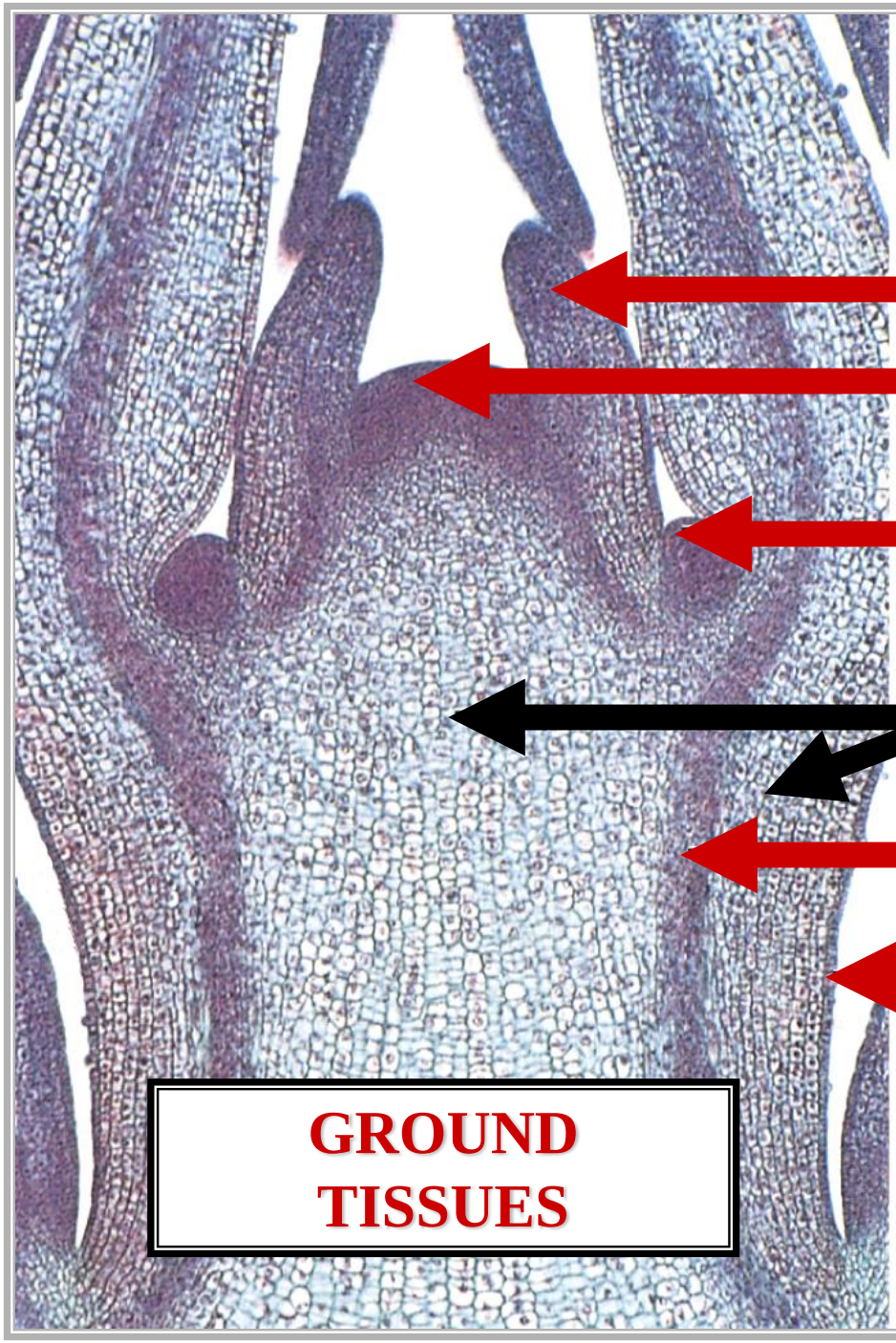
3 COMPLEX TISSUE SYSTEMS

STEM

L.S.

GROUND TISSUE

TRACHEOPHYTE COMPLEX TISSUES



APICAL MERISTEM

GROUND TISSUE

GROUND TISSUES

STEM

L.S.

GROUND TISSUE TYPES

GROUND TISSUE TYPES

PARENCHYMA TISSUE

GROUND TISSUE TYPES

GROUND TISSUE TYPES

PARENCHYMA TISSUE
COLLENCHYMA TISSUE

GROUND TISSUE TYPES

GROUND TISSUE TYPES

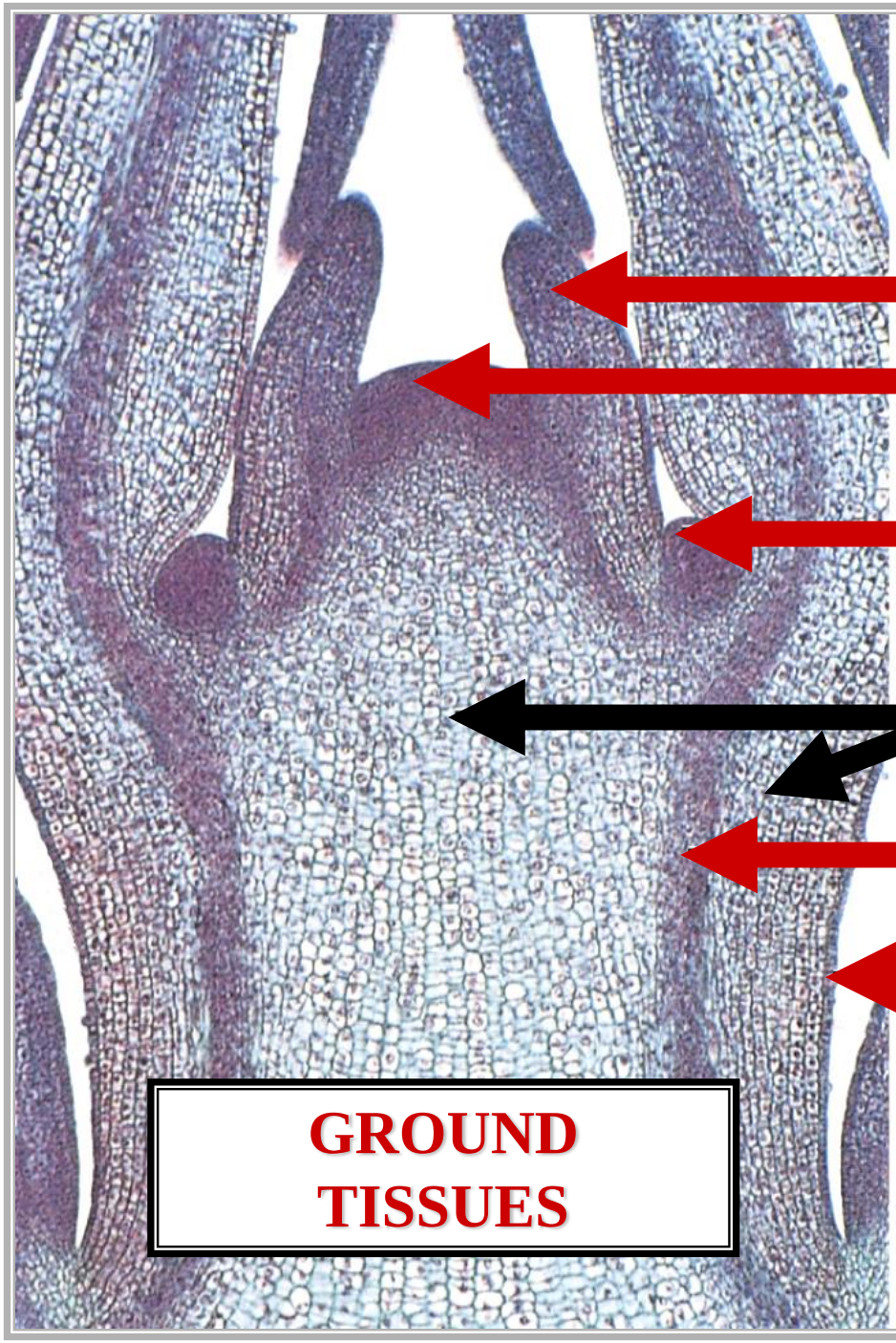
PARENCHYMA TISSUE
COLLENCHYMA TISSUE
SCLERENCHYMA TISSUE

GROUND TISSUE TYPES

TRACHEOPHYTE GROUND TISSUES

T

P



APICAL MERISTEM

GROUND TISSUE

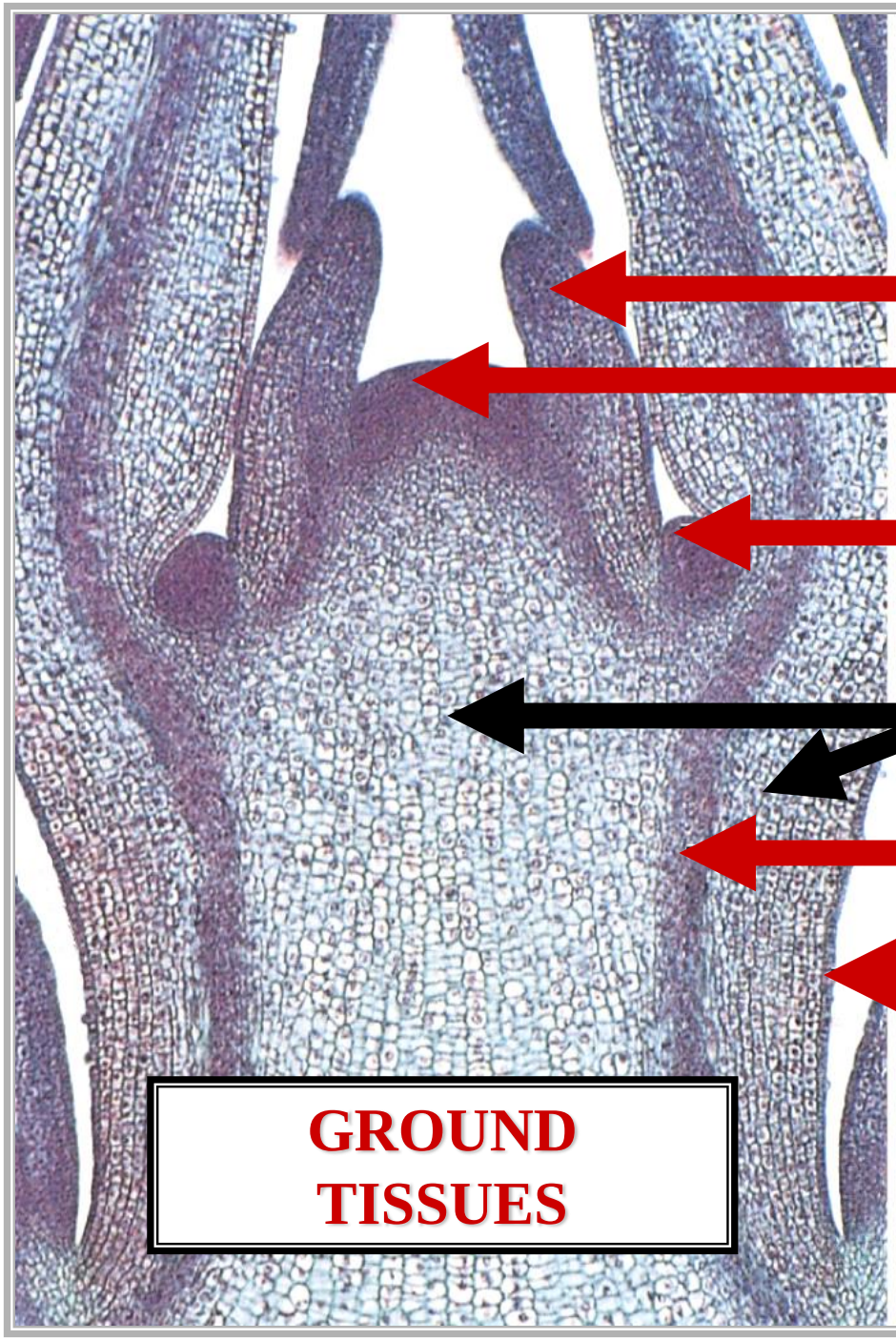
GROUND TISSUES

STEM

L.S.

TRACHEOPHYTE GROUND TISSUES

C



APICAL MERISTEM

PARENCHYMA TISSUE

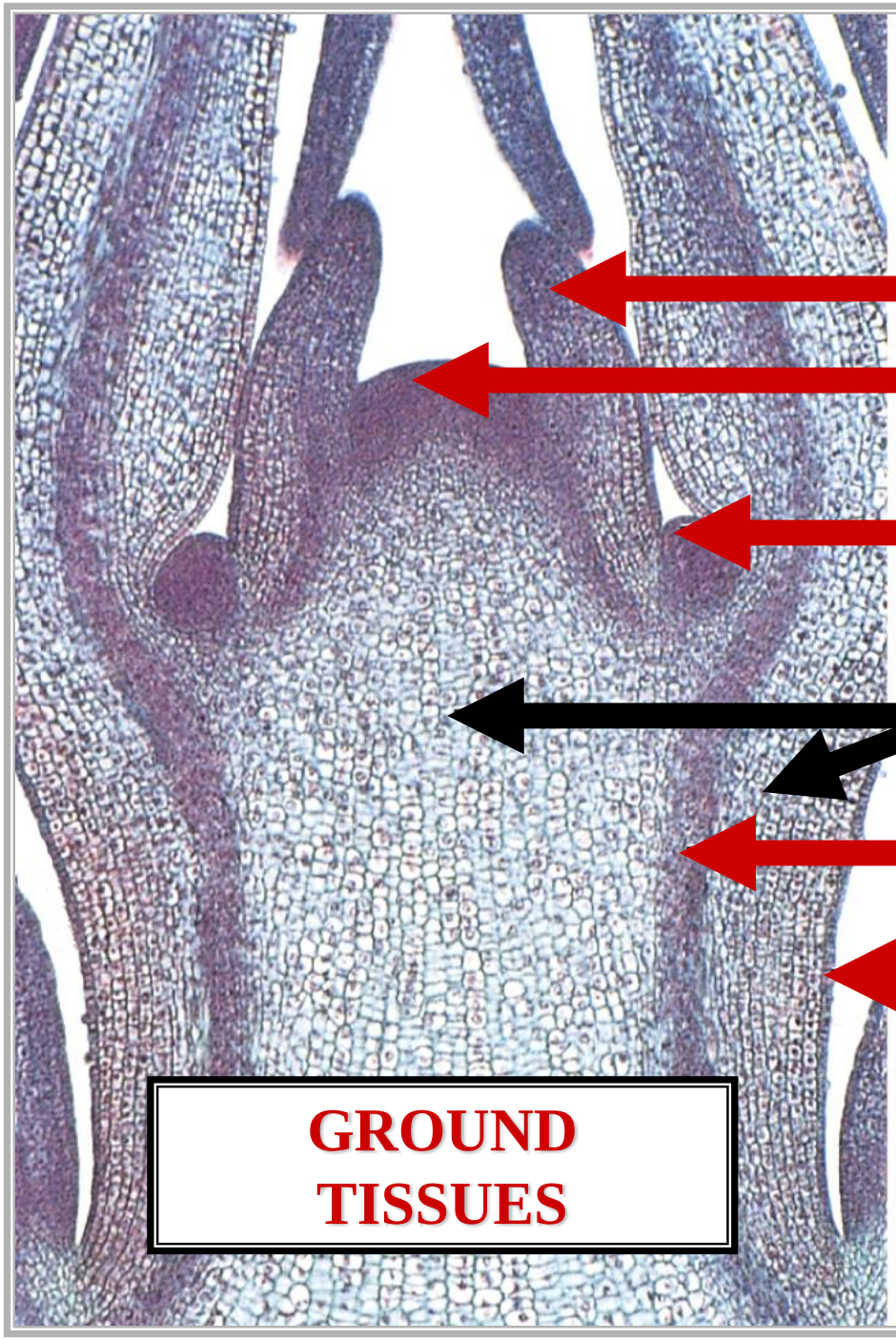
GROUND TISSUES

STEM

L.S.

TRACHEOPHYTE GROUND TISSUES

S



APICAL MERISTEM

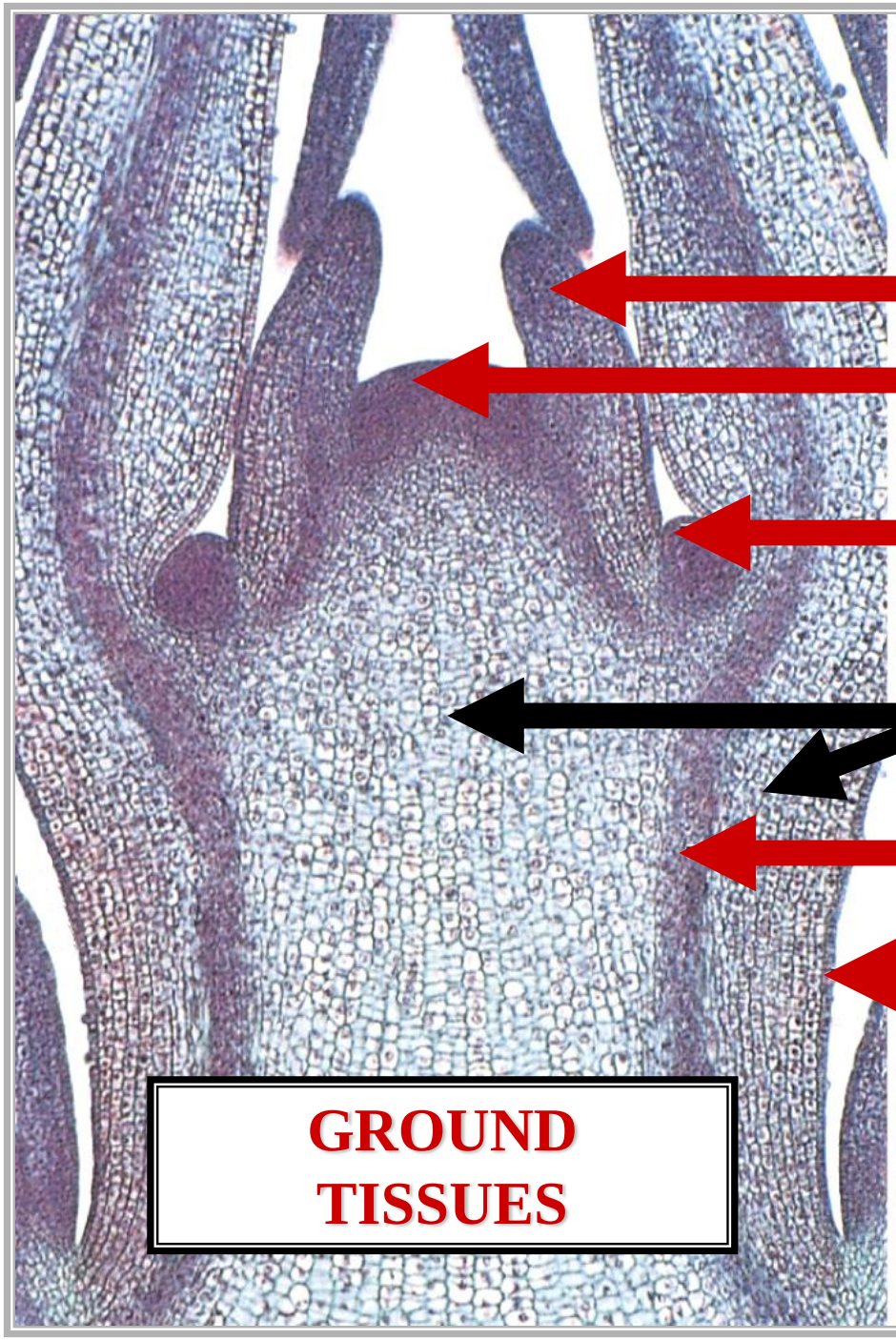
COLLENCHYMA TISSUE

GROUND TISSUES

STEM

L.S.

TRACHEOPHYTE GROUND TISSUES



APICAL MERISTEM

SCLERENCHYMA TISSUE

GROUND TISSUES

STEM

L.S.

PARENCHYMA TISSUE

P

PARENCHYMA CELLS

PARENCHYMA CELL

PARENCHYMA CELL

BASIC PLANT CELL

PARENCHYMA CELL

PARENCHYMA CELL

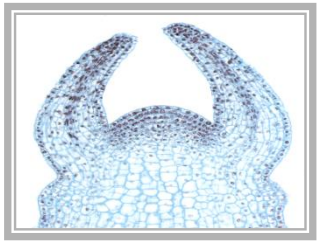
BASIC PLANT CELL

ALL PLANT CELLS INITIALLY PARENCHYMA CELLS

PARENCHYMA CELL

STEM MERISTEM

C



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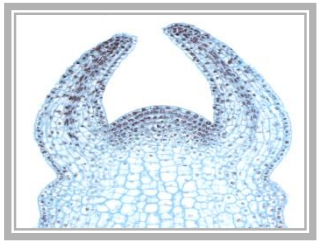
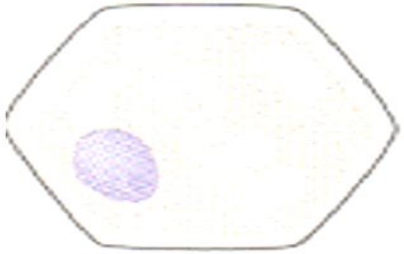
STEM MERISTEM

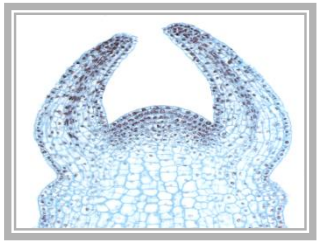


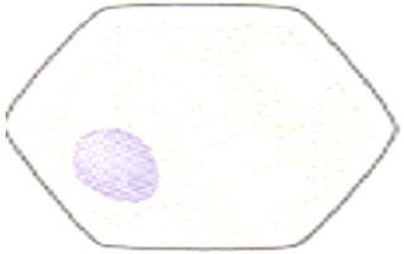


CELL INITIAL

PARENCHYMA BASIC PLANT CELL

STEM MERISTEM





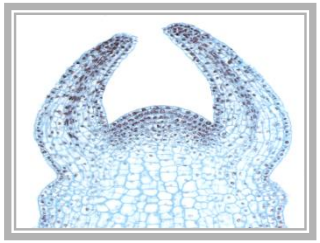
CELL INITIAL

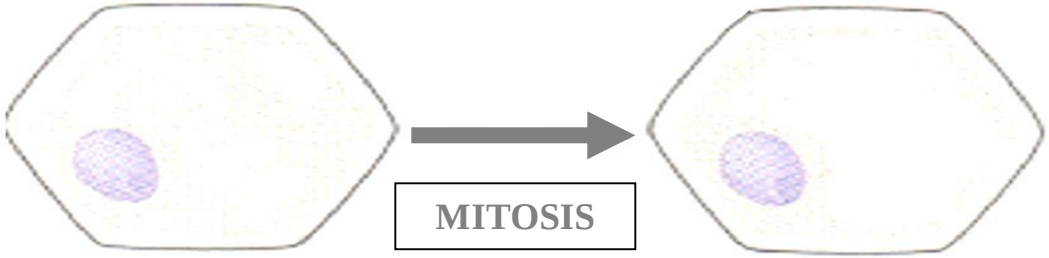
PARENCHYMA CELL

PARENCHYMA BASIC PLANT CELL

D

STEM MERISTEM





CELL INITIAL

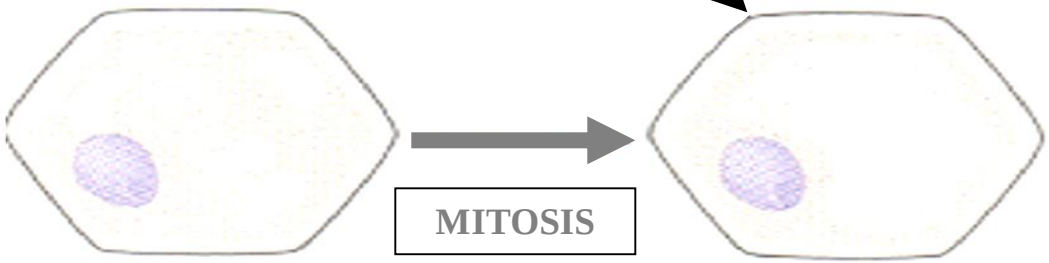
PARENCHYMA CELL

PARENCHYMA BASIC PLANT CELL

P

STEM MERISTEM

DERIVATIVE CELL



MITOSIS

CELL INITIAL

PARENCHYMA CELL

PARENCHYMA BASIC PLANT CELL