

**CIRCINATE VERNATION
CROZIER**



**IMMATURE
FERN FROND**

“FIDDLEHEAD”

**CIRCINATE VERNATION
CROZIER**



CIRCINATE VERNATION

CROZIER

“FIDDLEHEAD”



MATURE FERN FROND





FROND MORPHOLOGY

FROND MORPHOLOGY TYPES

FROND MORPHOLOGY TYPES

COMPOUND FROND

FROND MORPHOLOGY TYPES

FROND MORPHOLOGY TYPES



COMPOUND FROND
SIMPLE FROND

FROND MORPHOLOGY
TYPES

COMPOUND FROND

**COMPOUND
FROND**

FROND MORPHOLOGY

COMPOUND FROND



PINNAE PRESENT

FROND MORPHOLOGY

COMPOUND FROND

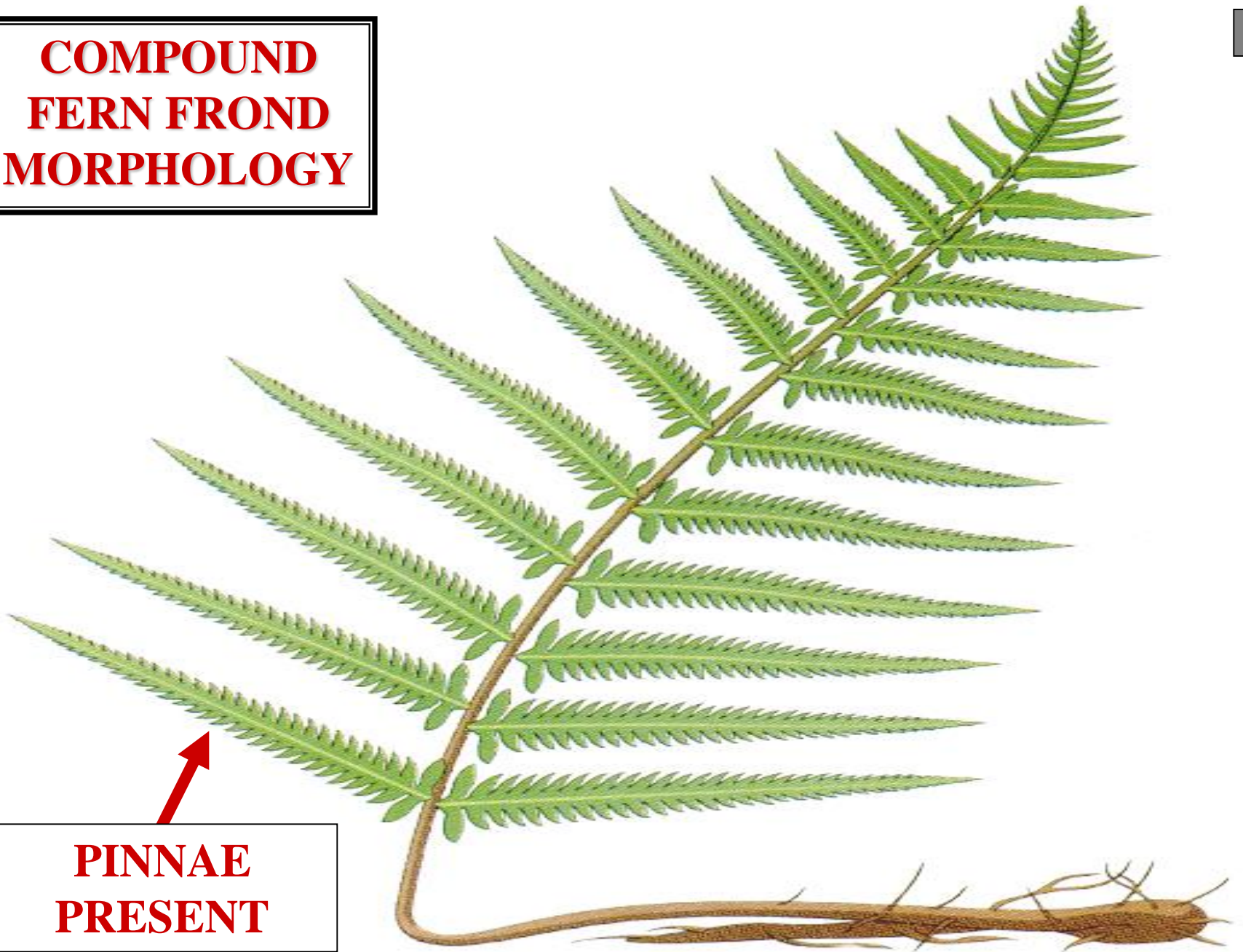
**COMPOUND
FERN FROND
MORPHOLOGY**

+

PR



**COMPOUND
FERN FROND
MORPHOLOGY**



**PINNAE
PRESENT**



COMPOUND FROND MORPHOLOGY

**COMPOUND
FERN FROND
MORPHOLOGY**

S



STIPE

COMPOUND FROND STIPE

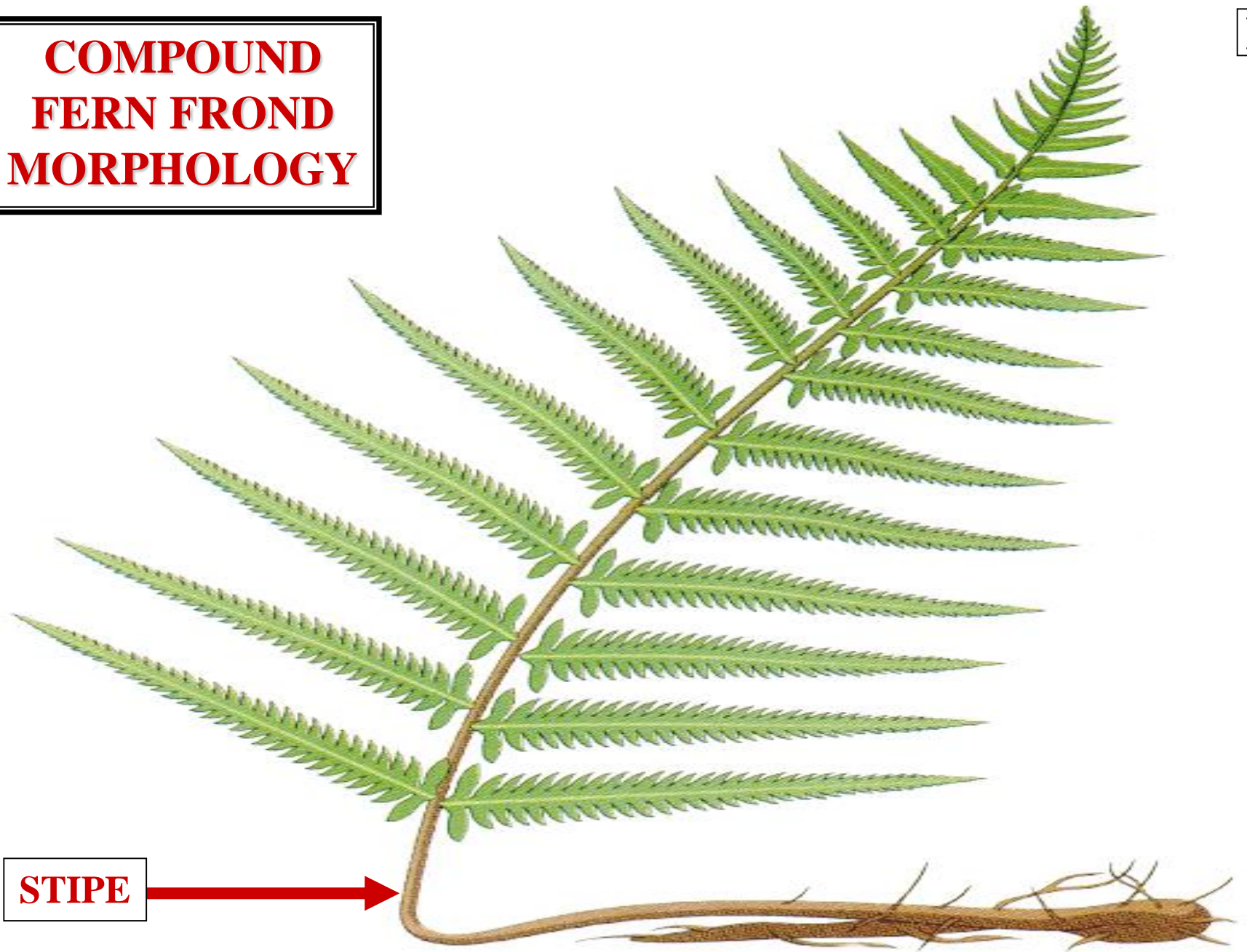


FROND STALK

COMPOUND FROND STIPE

**COMPOUND
FERN FROND
MORPHOLOGY**

L



STIPE

LAMINA

**COMPOUND FROND
LAMINA**

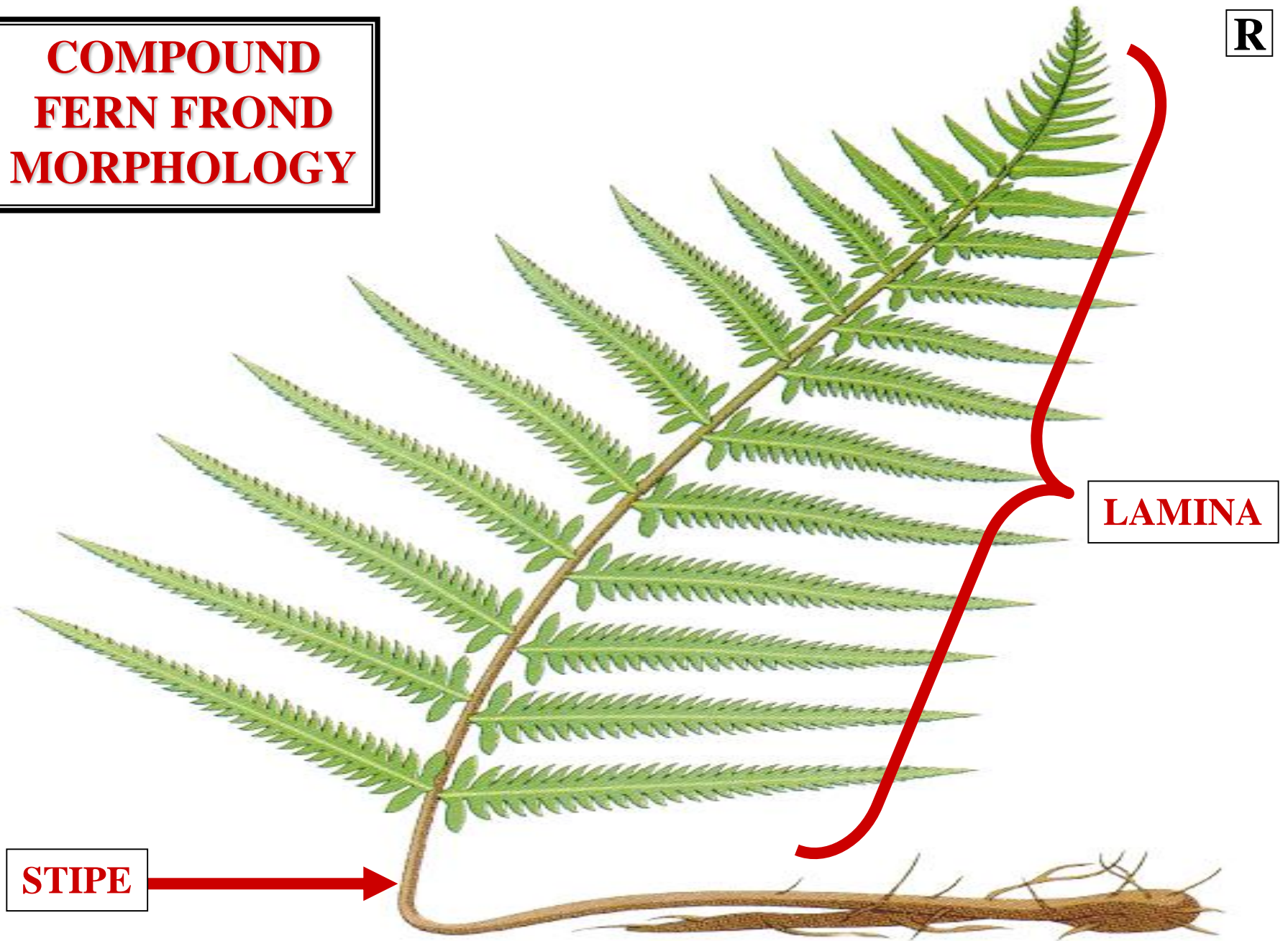


**PHOTOSYNTHETIC
BLADE**

**COMPOUND FROND
LAMINA**

**COMPOUND
FERN FROND
MORPHOLOGY**

R



RACHIS

COMPOUND FROND RACHIS



BEARS PINNAE

COMPOUND FROND RACHIS

COMPOUND FERN FROND MORPHOLOGY

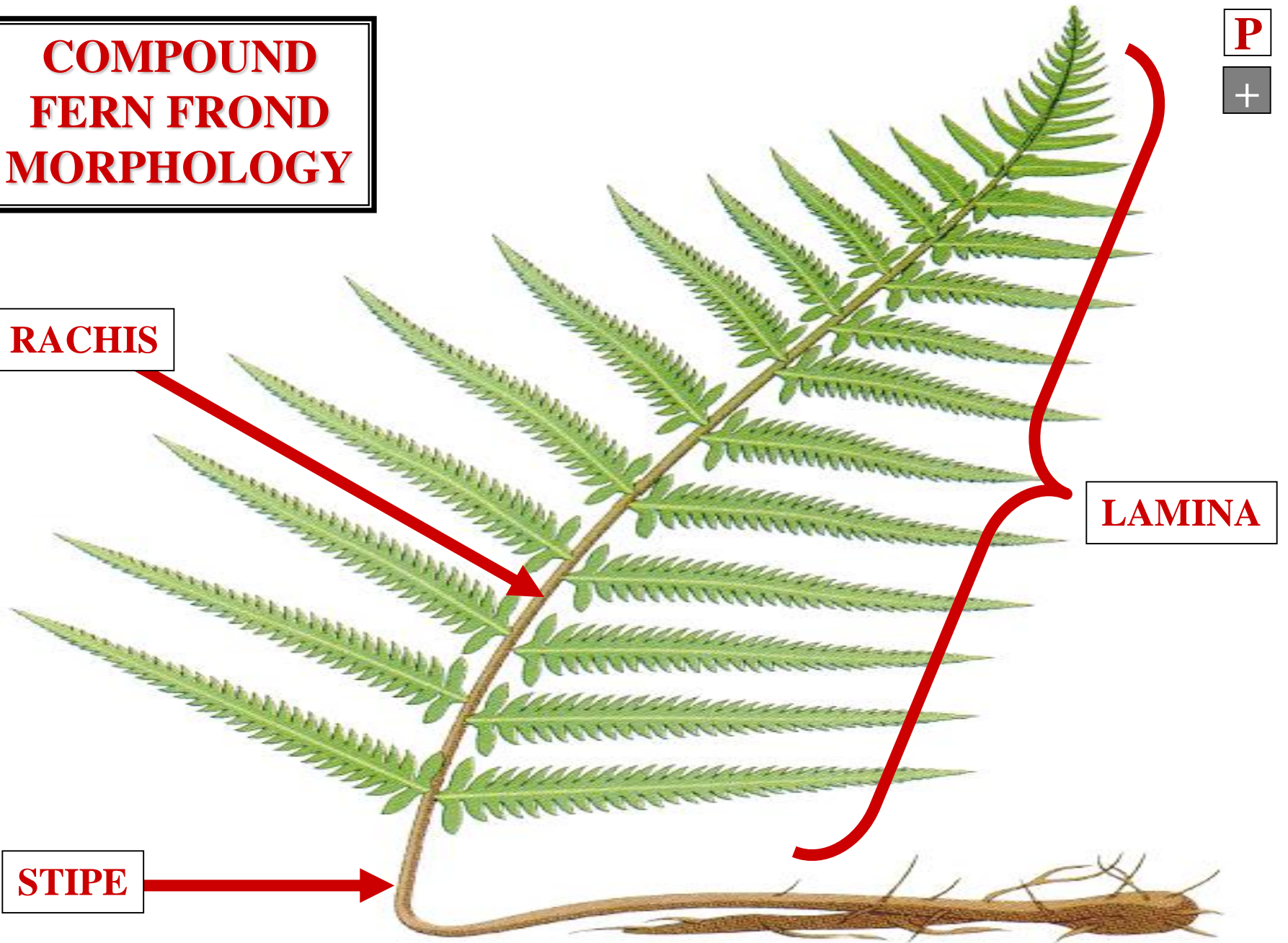
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+

RACHIS

LAMINA

STIPE



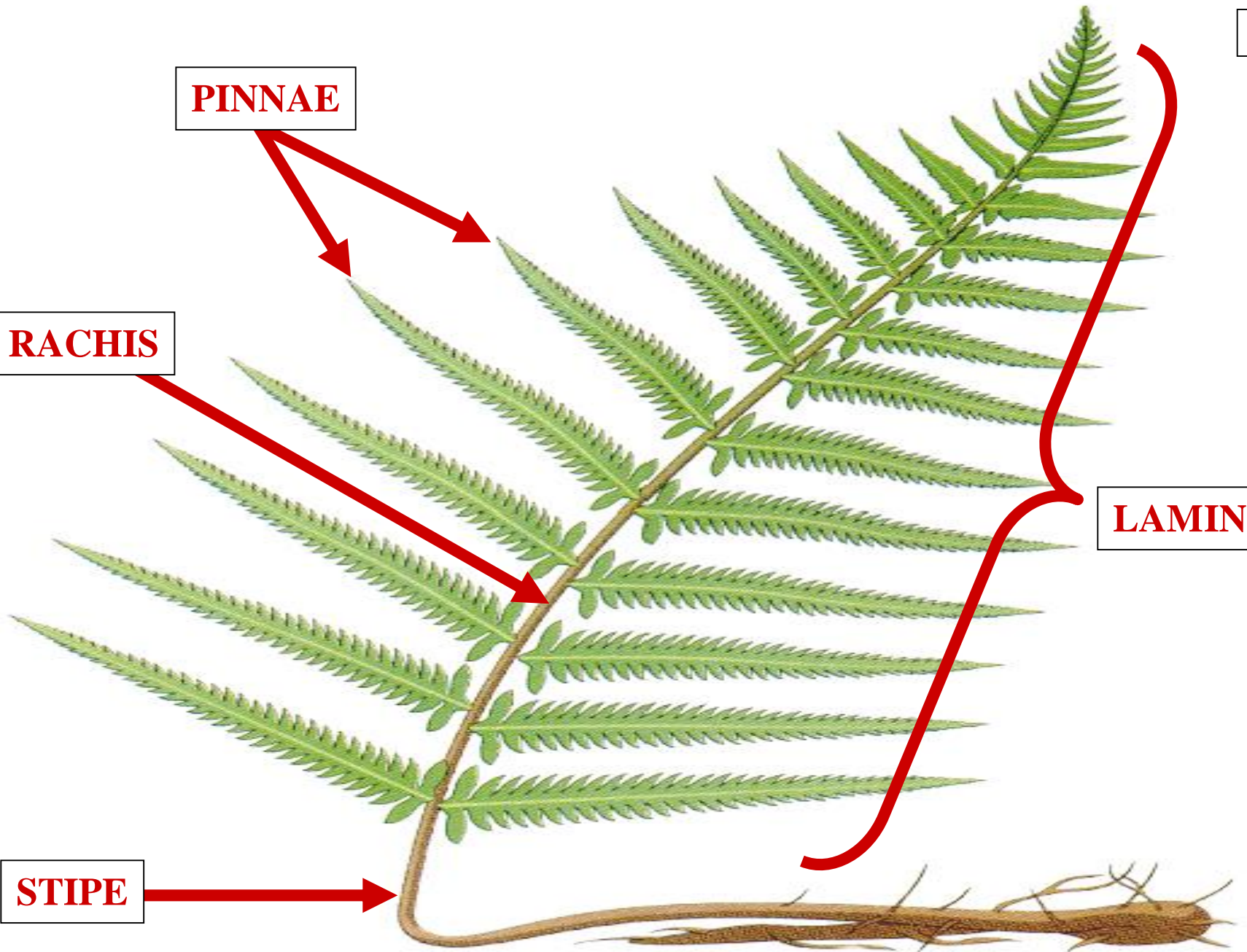
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PINNAE

RACHIS

LAMINA

STIPE



PINNAE

COMPOUND FROND PINNAE



FROND
LEAFLETS

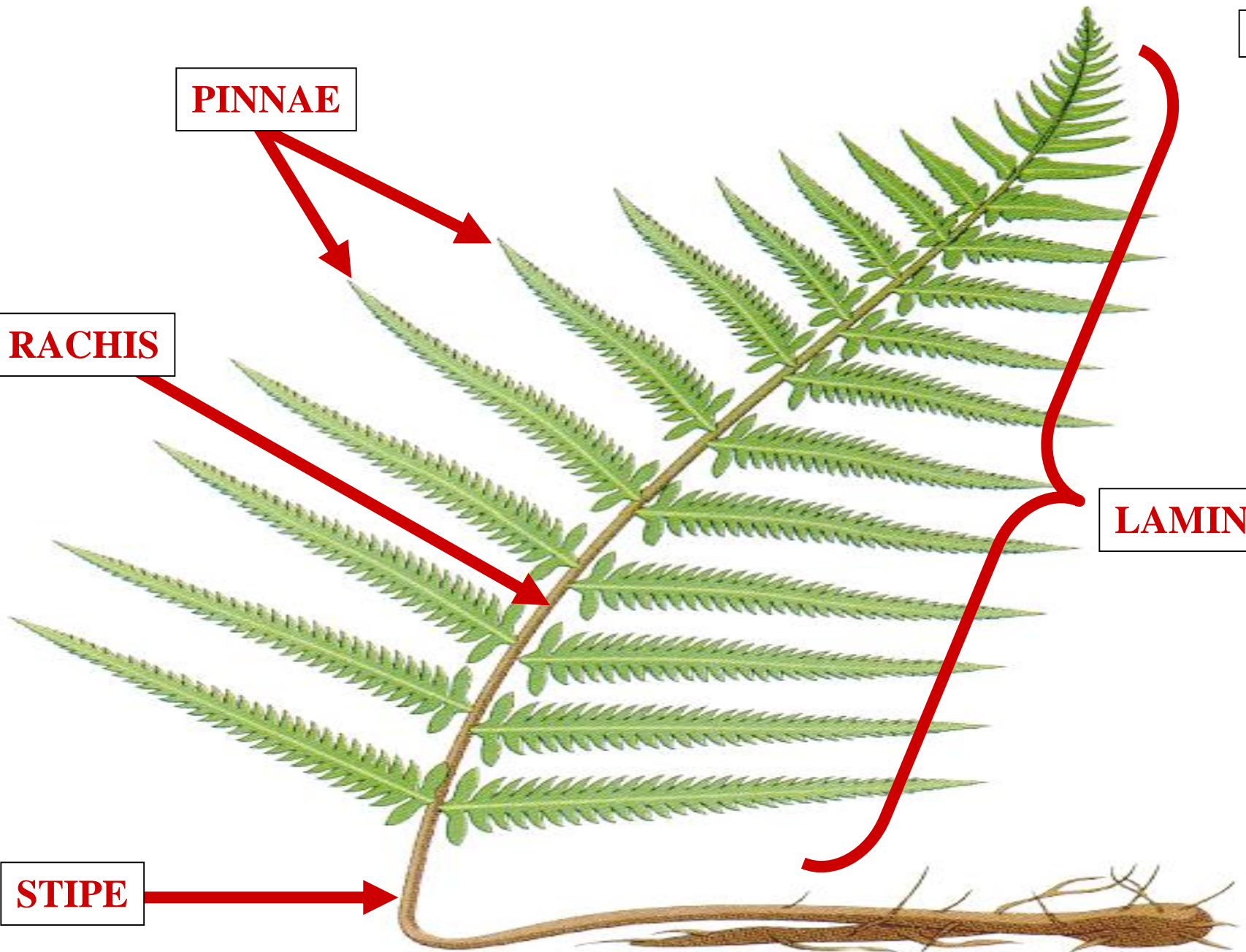
COMPOUND FROND
PINNAE

PINNAE

RACHIS

LAMINA

STIPE



SUBRACHNIS

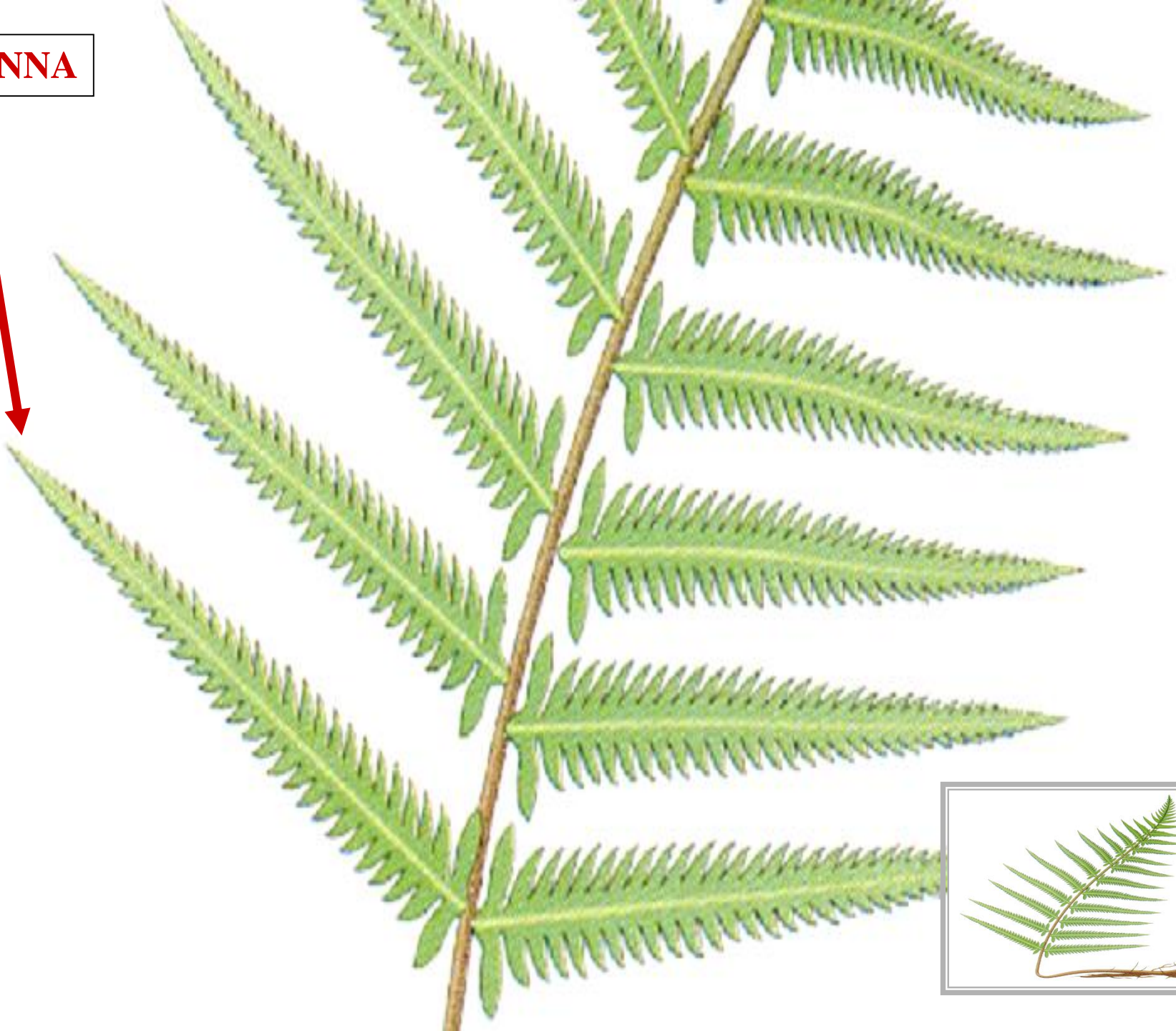
COMPOUND FROND SUBRACHIS



BEARS PINNULES

COMPOUND FROND SUBRACHIS

PINNA



PINNA



SUBRACHIS



PINNA



SUBRACHIS



PINNULES



PINNULES

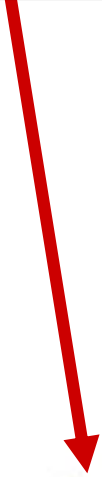
COMPOUND FROND PINNULES



FROND
SUBLEAFLETS

COMPOUND FROND
PINNULES

PINNA



SUBRACHIS



PINNULES



**COMPOUND
FERN FROND
MORPHOLOGY**



COMPOUND FROND TYPES

COMPOUND FROND TYPES

ONCE PINNATE

COMPOUND FROND TYPES

COMPOUND FROND TYPES

0

ONCE PINNATE
TWICE PINNATE

COMPOUND FROND
TYPES

**ONCE PINNATE
COMPOUND
FROND**

**COMPOUND FROND
ONCE PINNATE**



**BEARS
PINNAE ONLY**

**COMPOUND FROND
ONCE PINNATE**

**ONCE PINNATE
COMPOUND
FROND**

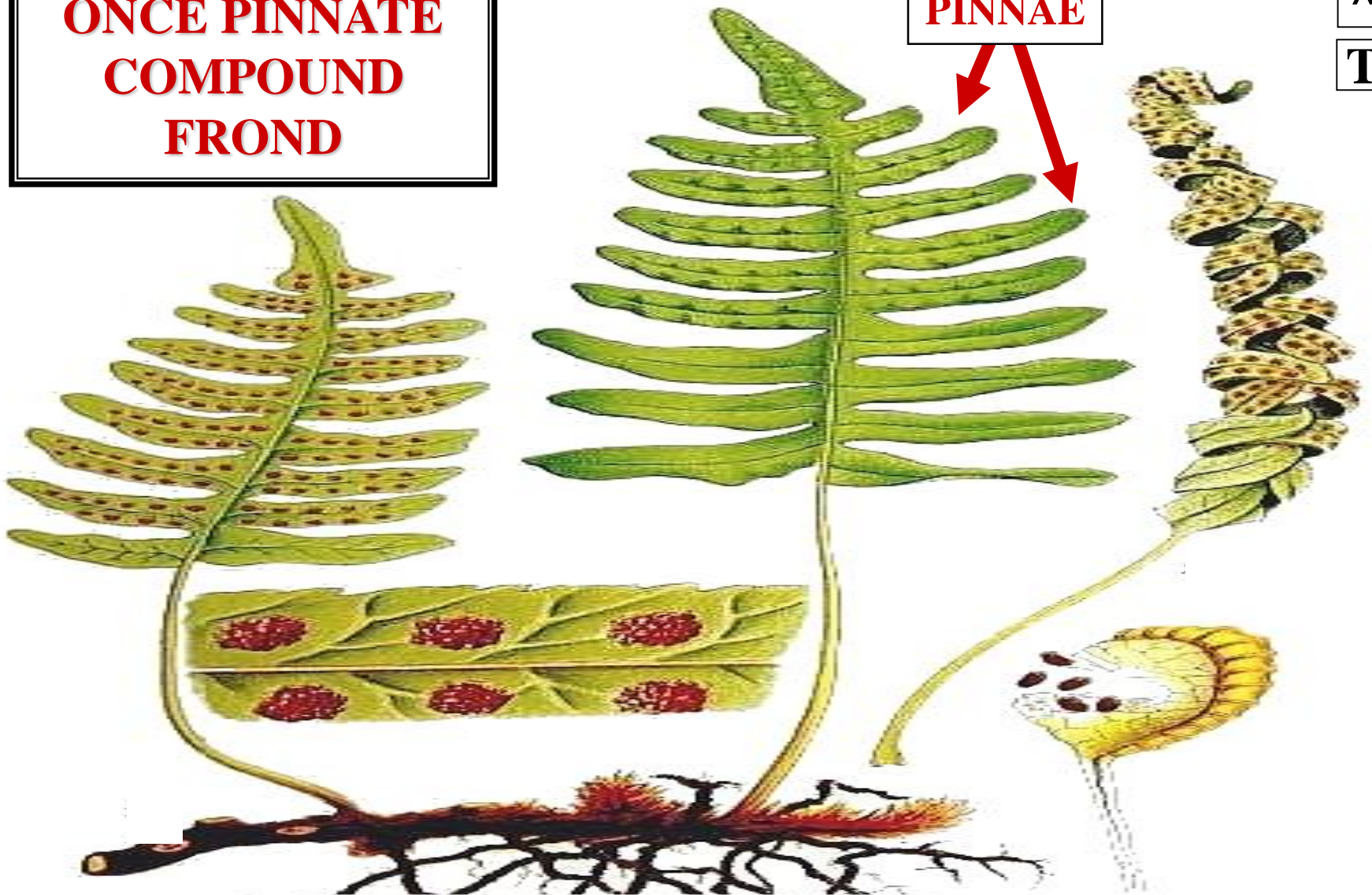


POLYPODIUM

**ONCE PINNATE
COMPOUND
FROND**

PINNAE

^
T



POLYPODIUM

**TWICE PINNATE
COMPOUND
FROND**

COMPOUND FROND TWICE PINNATE



BEARS
PINNAE & PINNULES

COMPOUND FROND
TWICE PINNATE

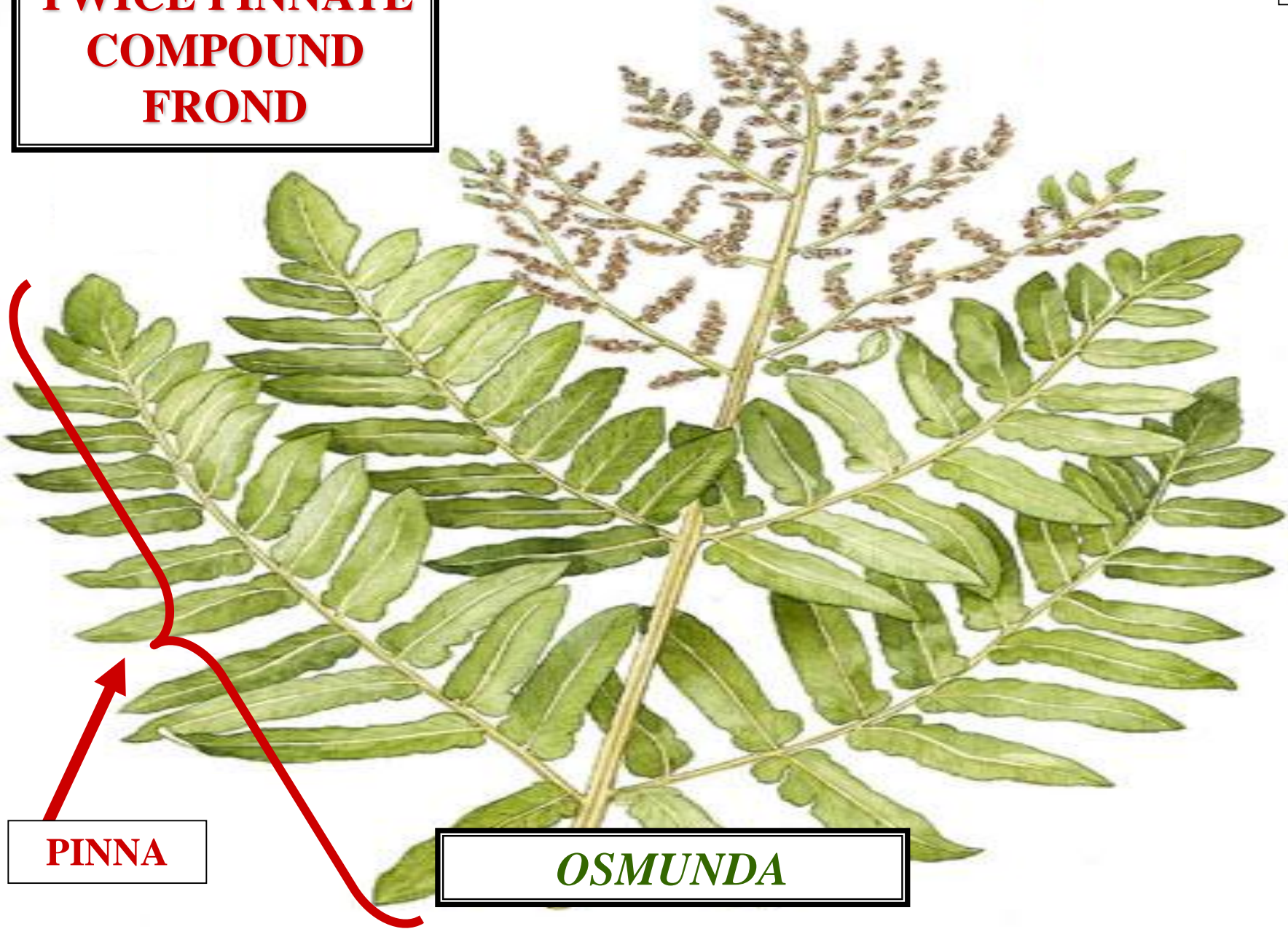
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COMPOUND
FROND**

P



OSMUNDA

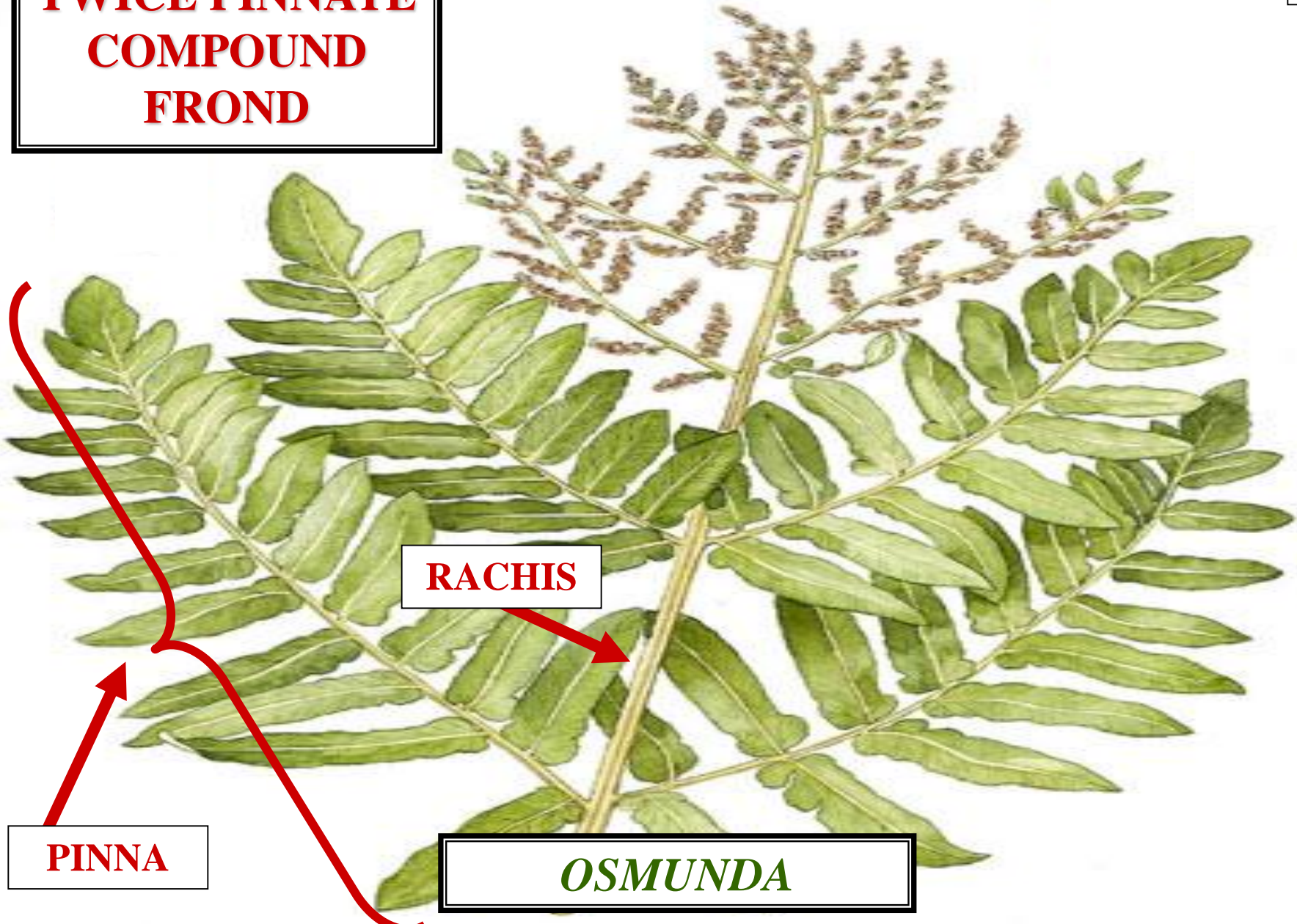
**TWICE PINNATE
COMPOUND
FROND**



PINNA

OSMUNDA

**TWICE PINNATE
COMPOUND
FROND**

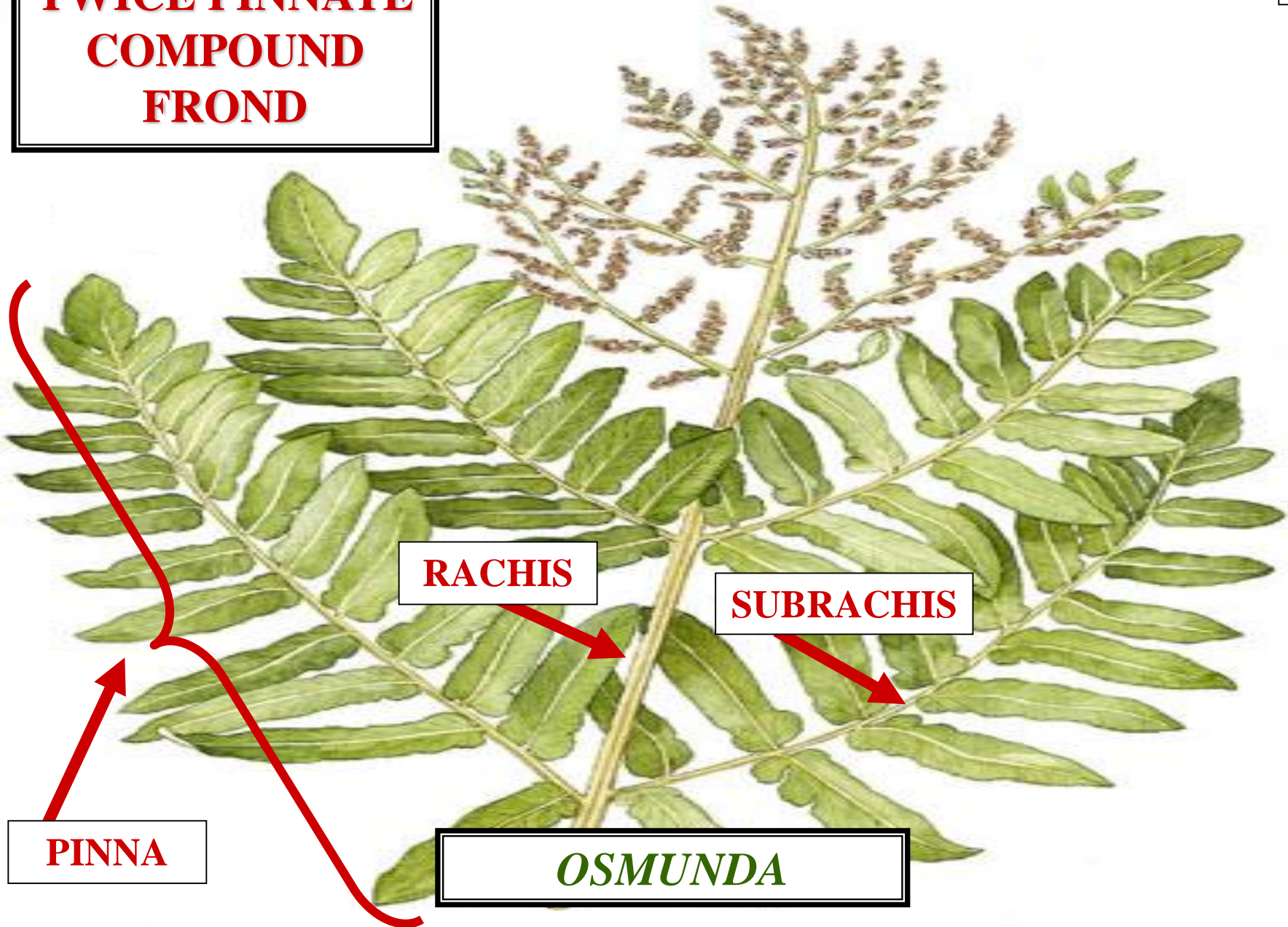


RACHIS

PINNA

OSMUNDA

**TWICE PINNATE
COMPOUND
FROND**



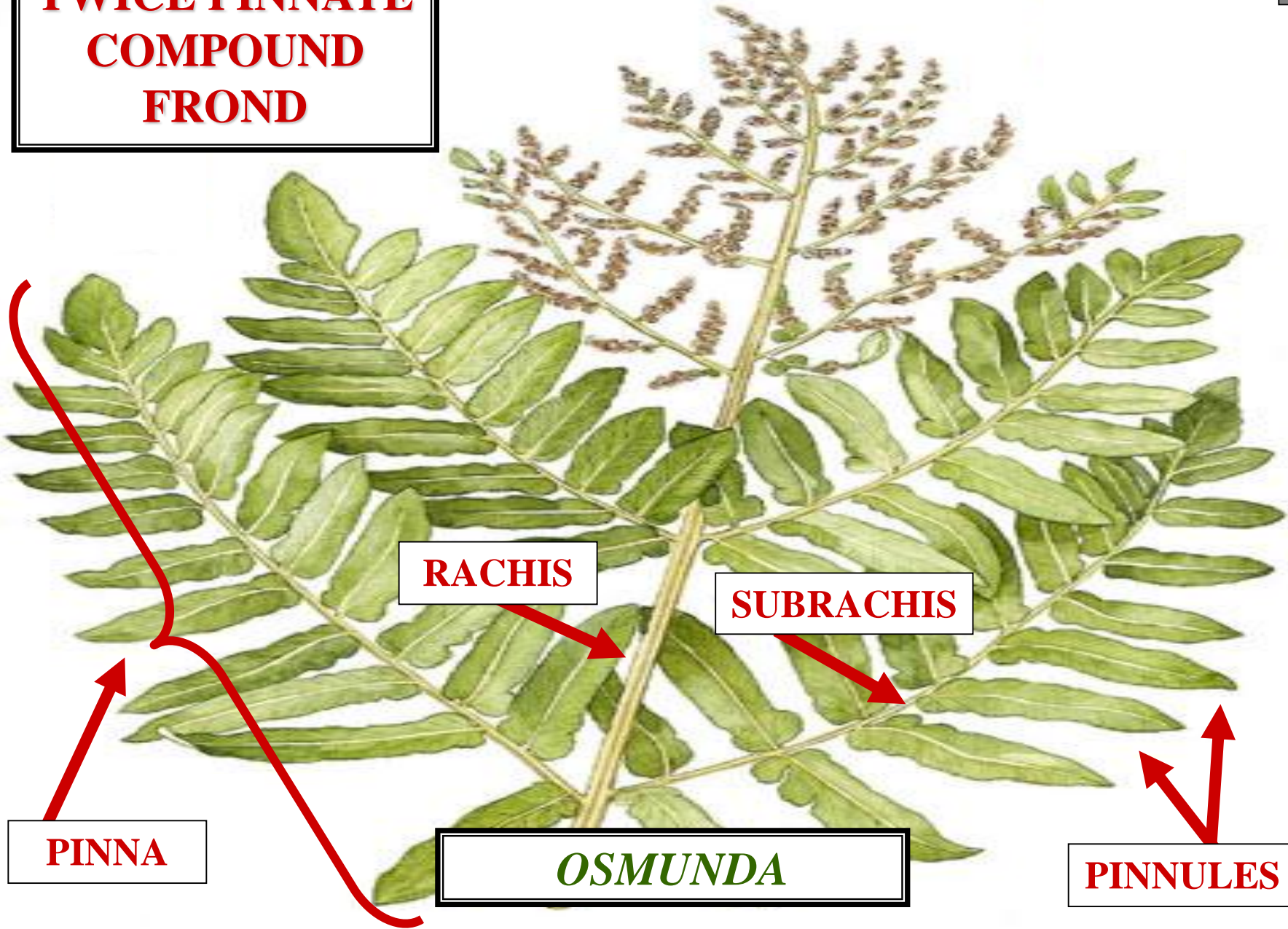
RACHIS

SUBRACHIS

PINNA

OSMUNDA

**TWICE PINNATE
COMPOUND
FROND**



RACHIS

SUBRACHIS

PINNA

OSMUNDA

PINNULES

SIMPLE FROND

SIMPLE FROND

FROND MORPHOLOGY

SIMPLE FROND



PINNAE ASBSENT

FROND MORPHOLOGY

SIMPLE FROND

**SIMPLE
FERN FROND
MORPHOLOGY**





**SIMPLE
FERN FROND
MORPHOLOGY**

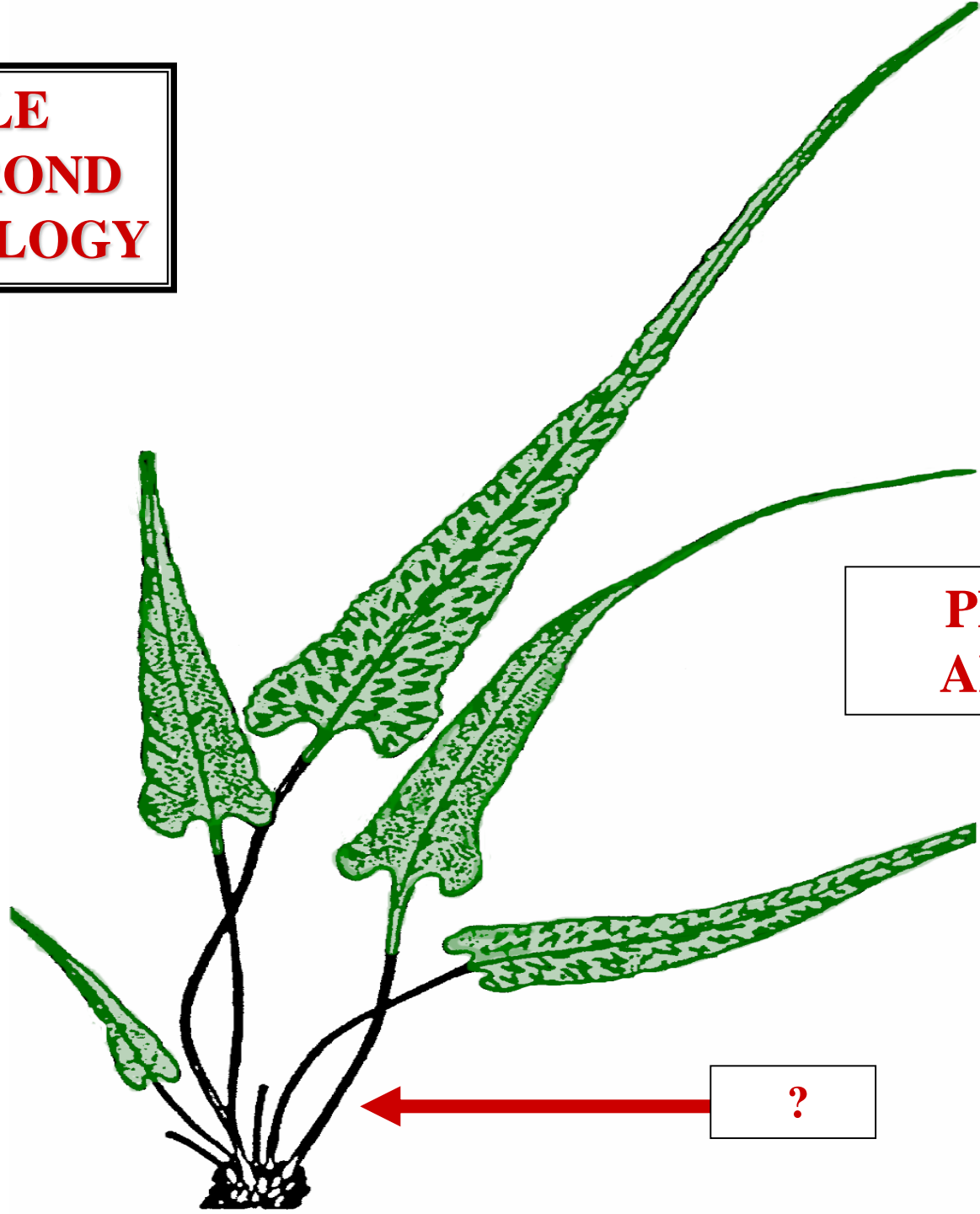


**PINNAE
ABSENT**



SIMPLE FROND MORPHOLOGY

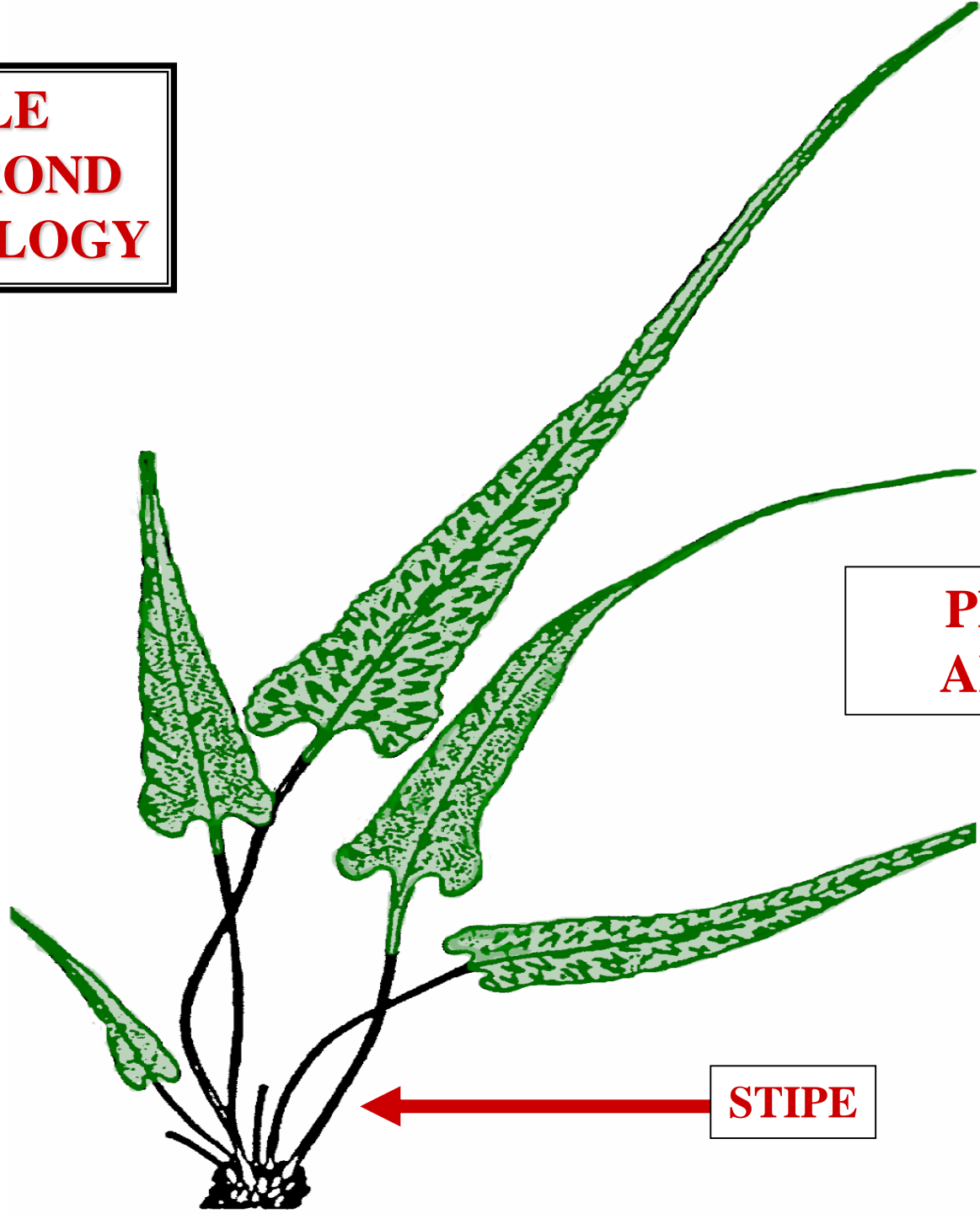
**SIMPLE
FERN FROND
MORPHOLOGY**



**PINNAE
ABSENT**

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**SIMPLE
FERN FROND
MORPHOLOGY**



**PINNAE
ABSENT**

STIPE

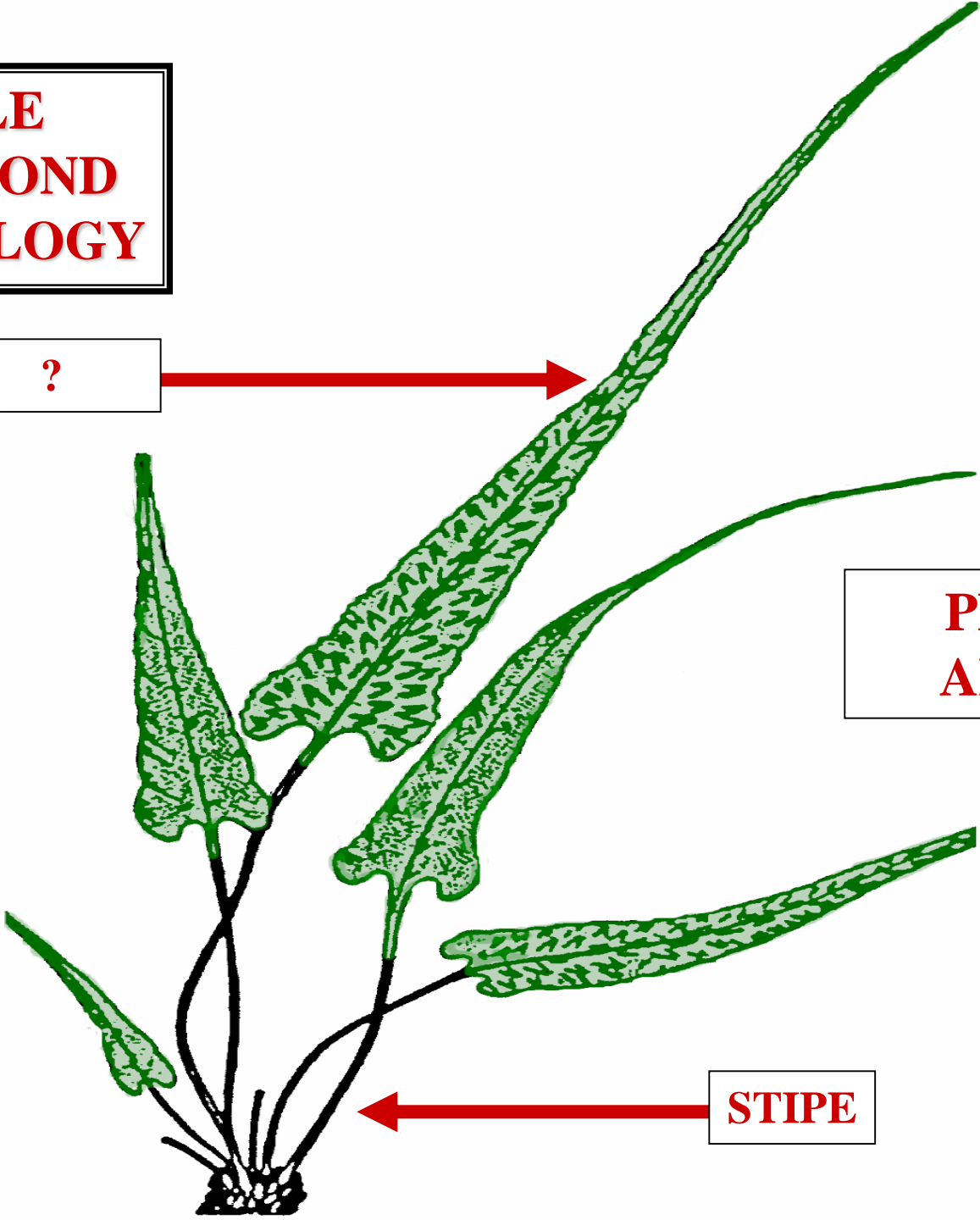


**SIMPLE
FERN FROND
MORPHOLOGY**

?



**PINNAE
ABSENT**



STIPE





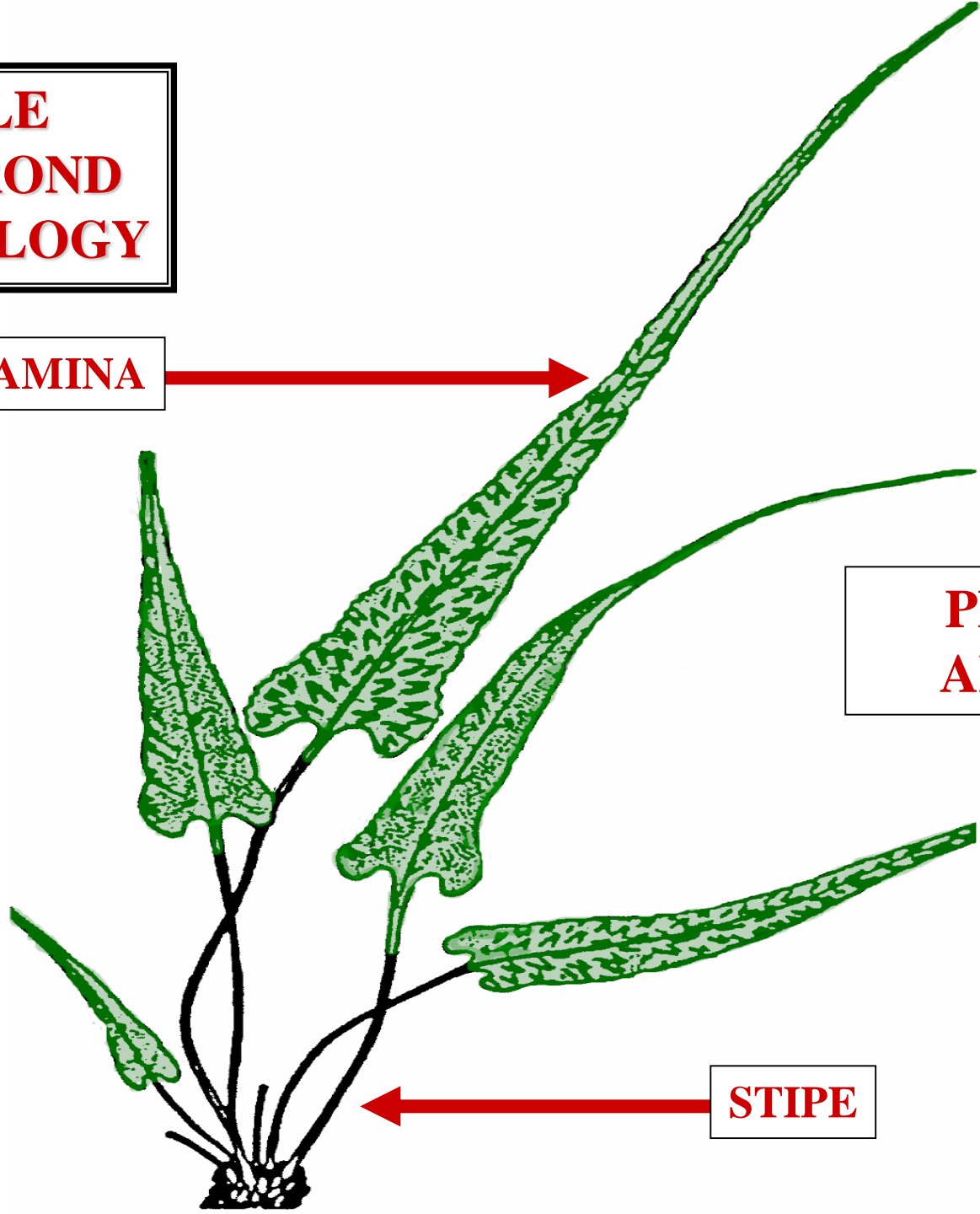
**SIMPLE
FERN FROND
MORPHOLOGY**

LAMINA



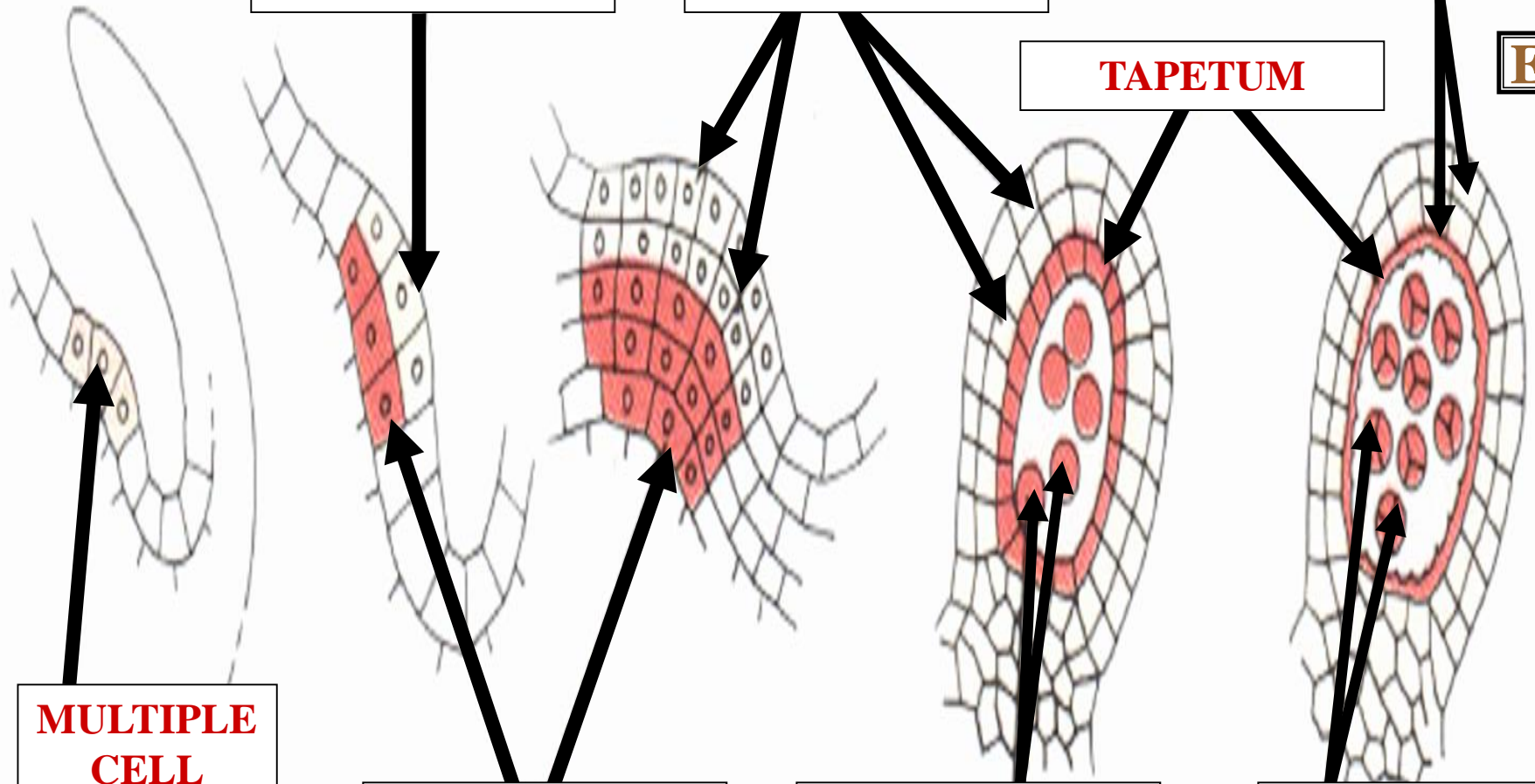
**PINNAE
ABSENT**

STIPE





SPORANGIUM



WALL CELLS

WALL CELLS

LARGE SIZE

THICK WALL

TAPETUM

E

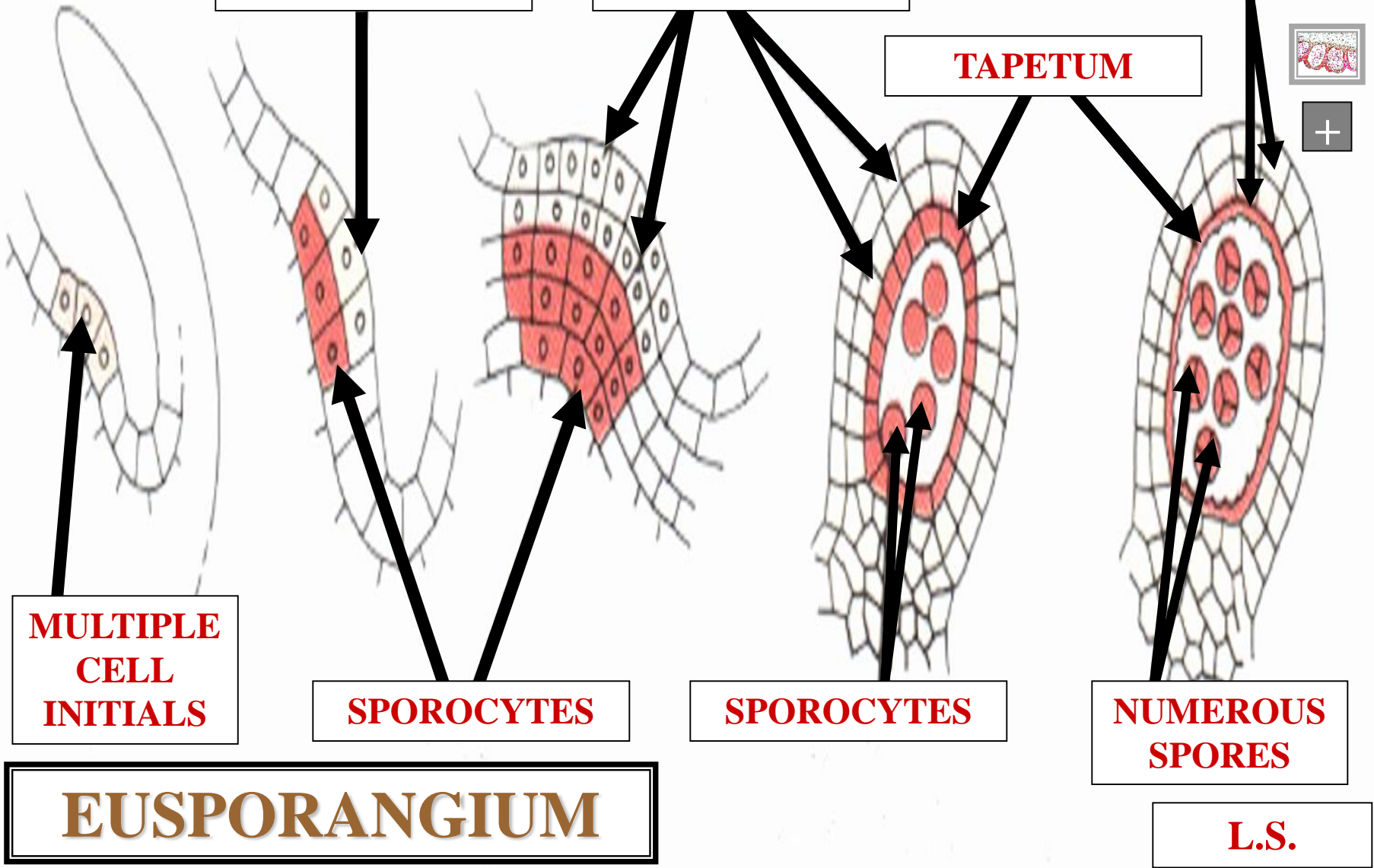
**MULTIPLE
CELL
INITIALS**

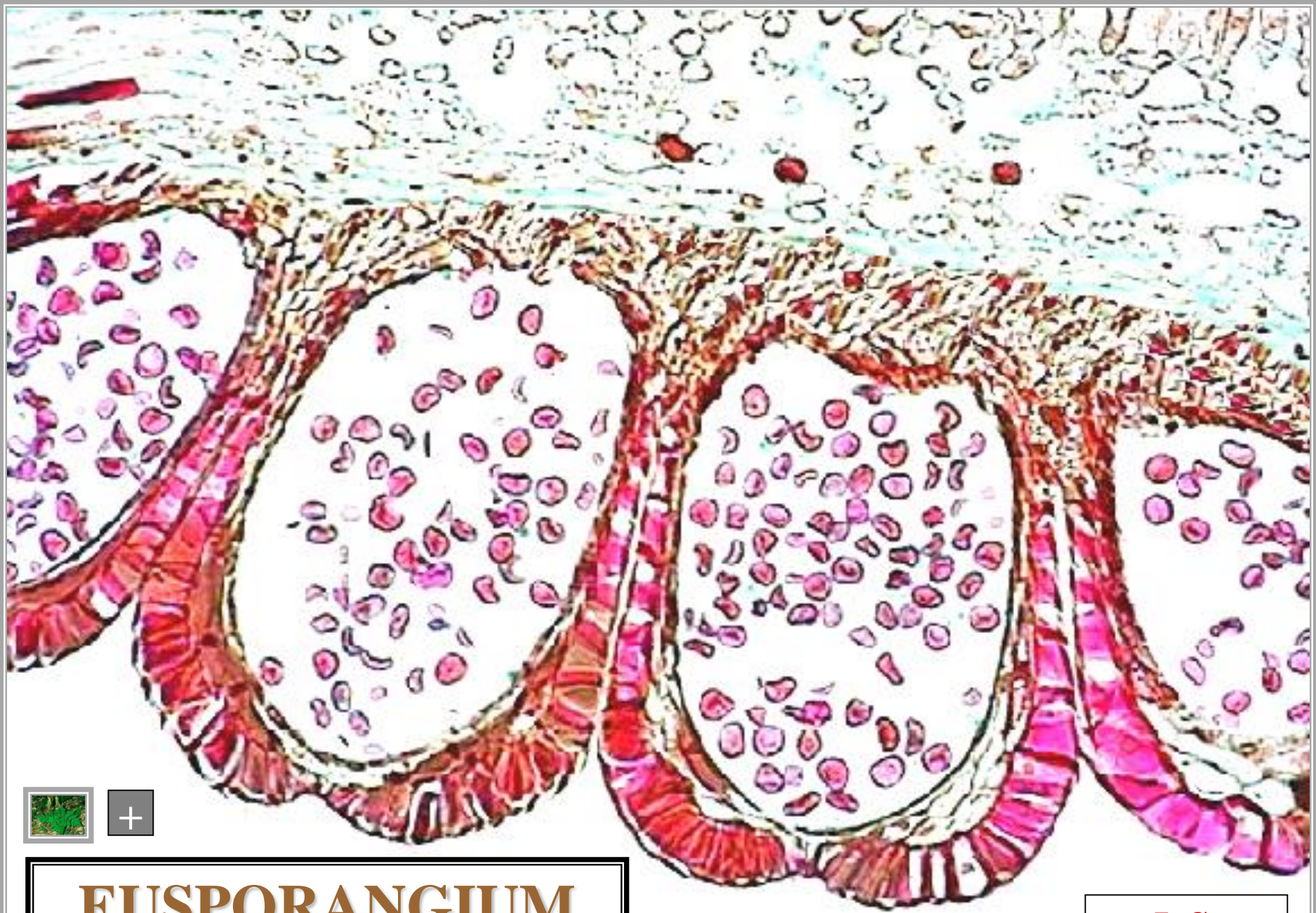
SPOROCTES

SPOROCTES

**NUMEROUS
SPORES**

L.S.





EUSPORANGIUM

L.S.



BOTRYCHIUM

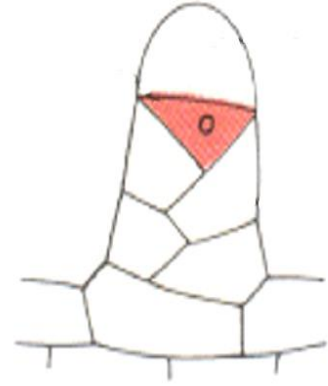
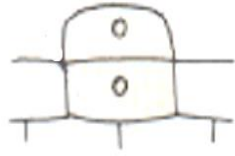
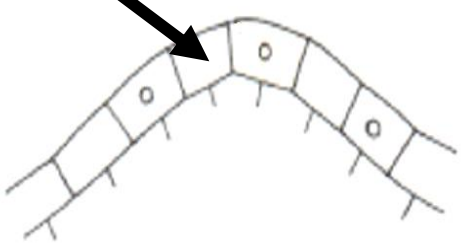
EUSPORANGIUM



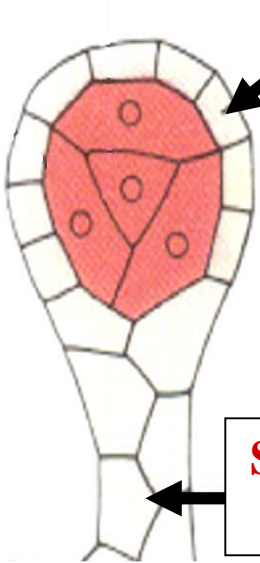
PSILOTUM

EUSPORANGIUM

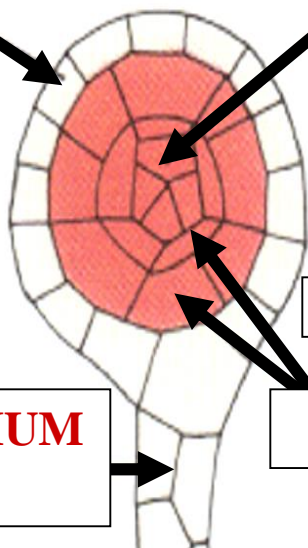
CELL INITIAL



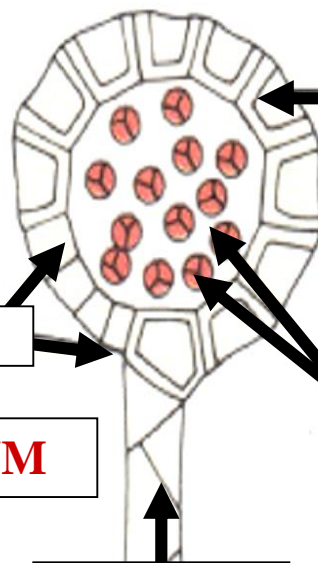
SPORANGIUM WALL



SPOROCYTES



SMALL SIZE



ANNULUS

THIN WALL

STOMIUM

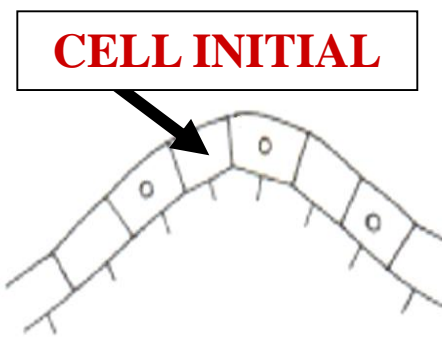
FEW SPORES

SPORANGIUM STALK

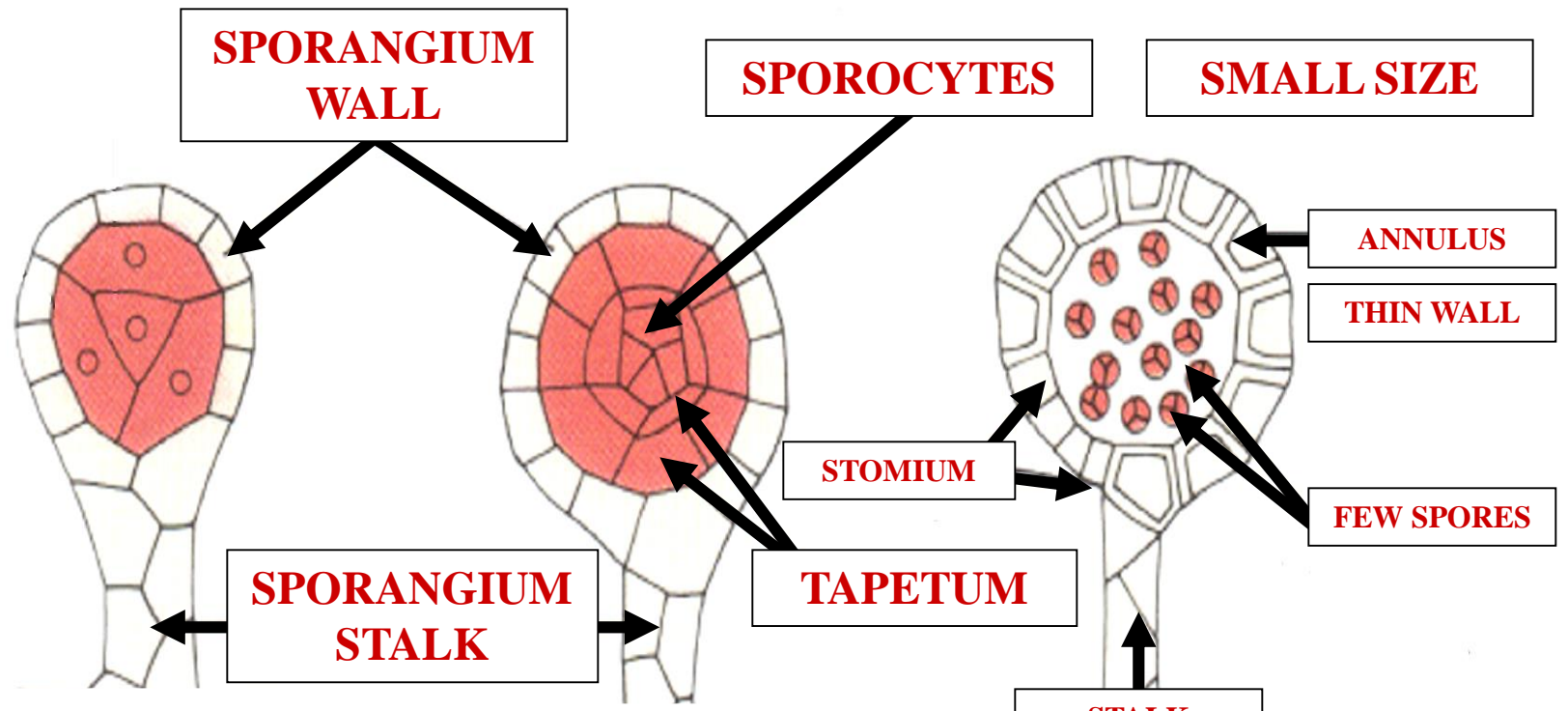
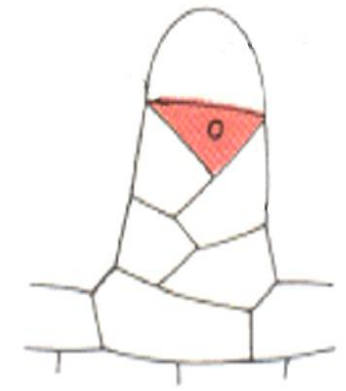
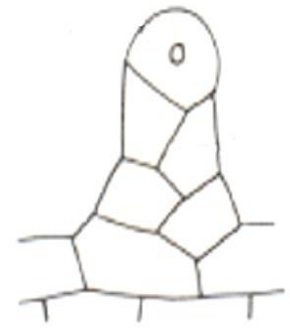
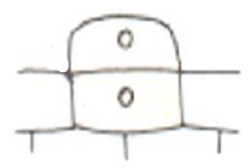
TAPETUM

STALK

L.S.

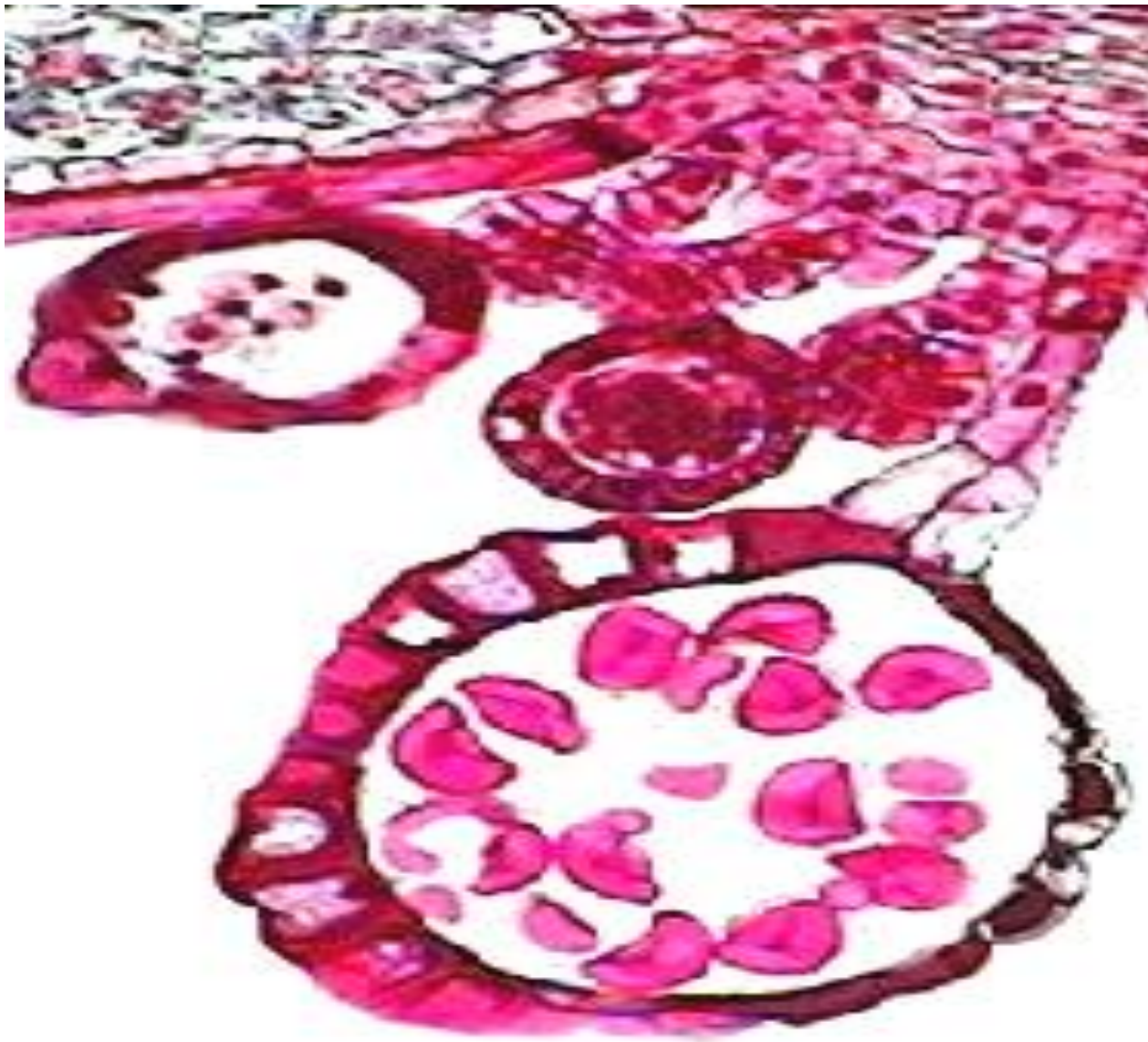


CELL INITIAL



LEPTOSPORANGIUM

L.S.



LEPTOSPORANGIUM

L.S.

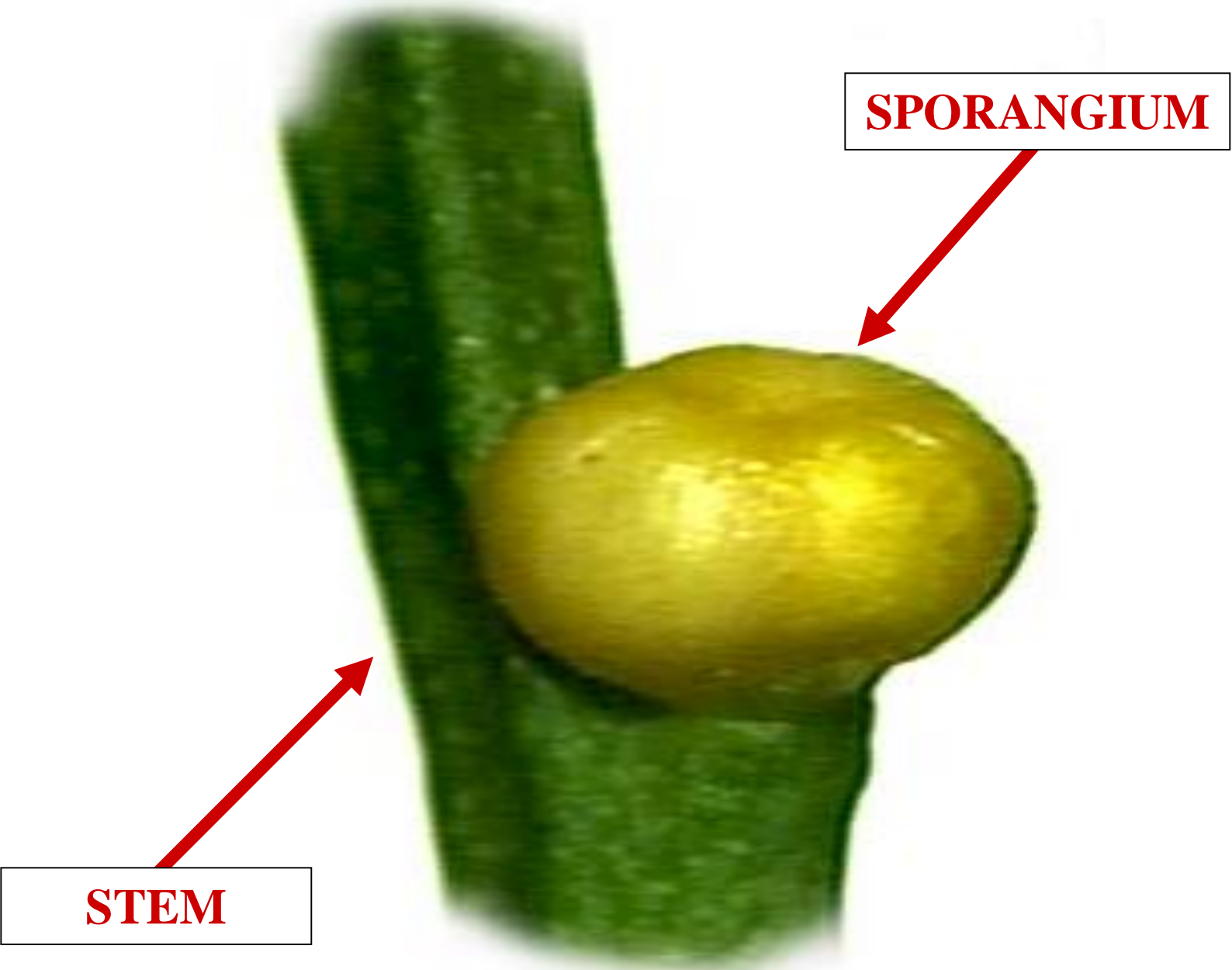


“ADVANCED FERNS”



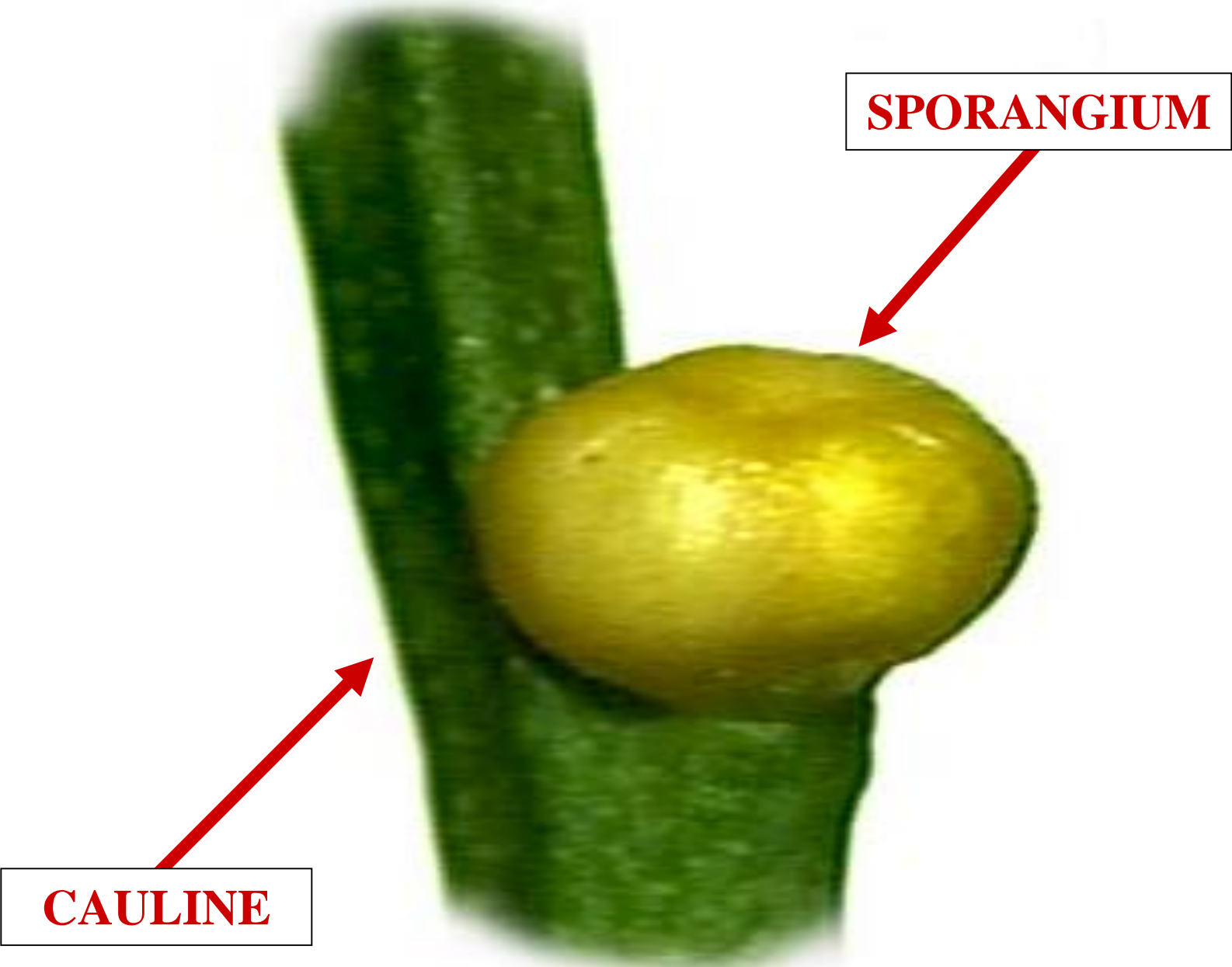


SPORANGIUM POSITION



SPORANGIUM

STEM



CAULINE

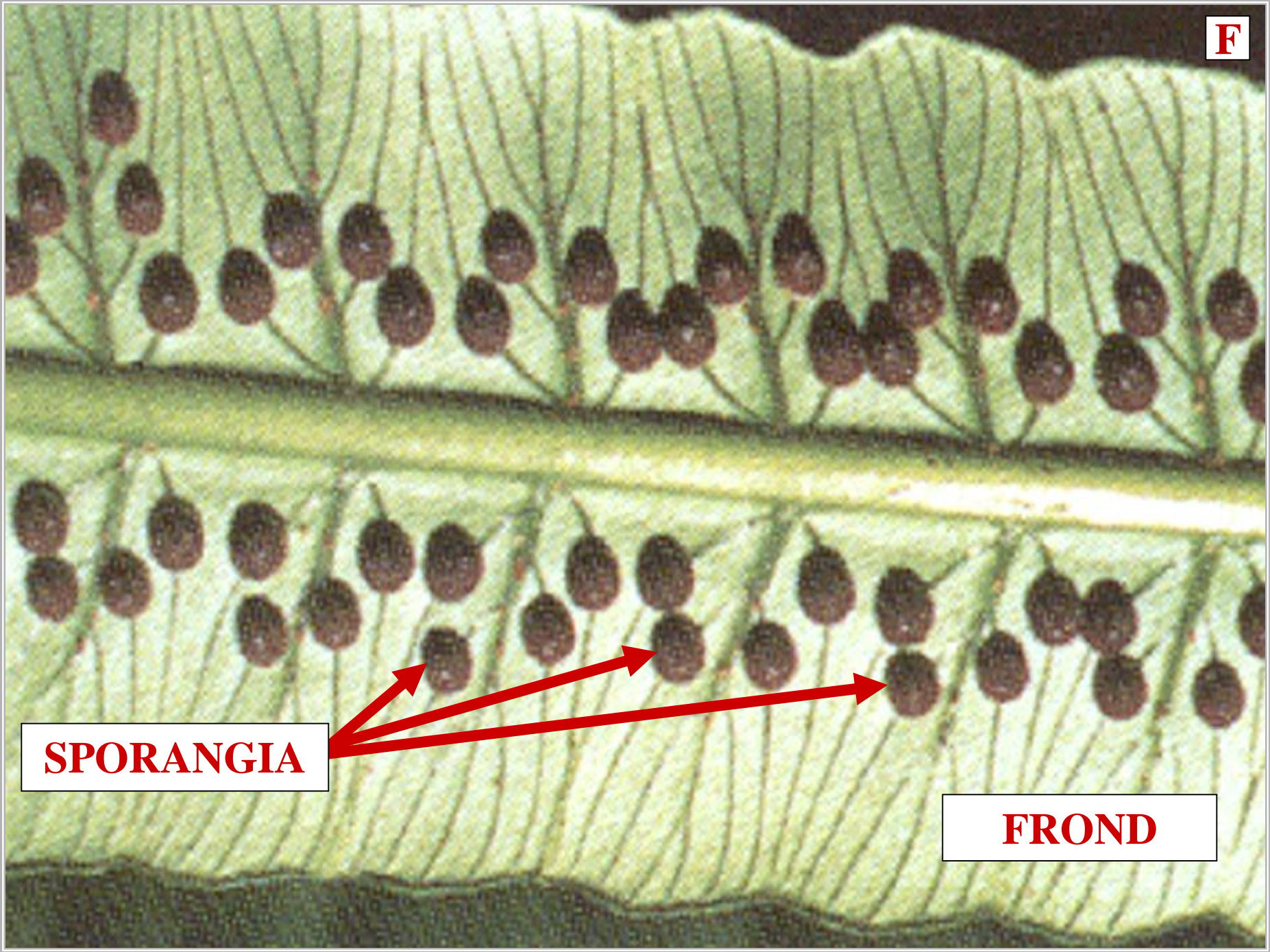
**SPORANGIUM
CAULINE DERIVED**

STEM DERIVED

**SPORANGIUM
CAULINE DERIVED**

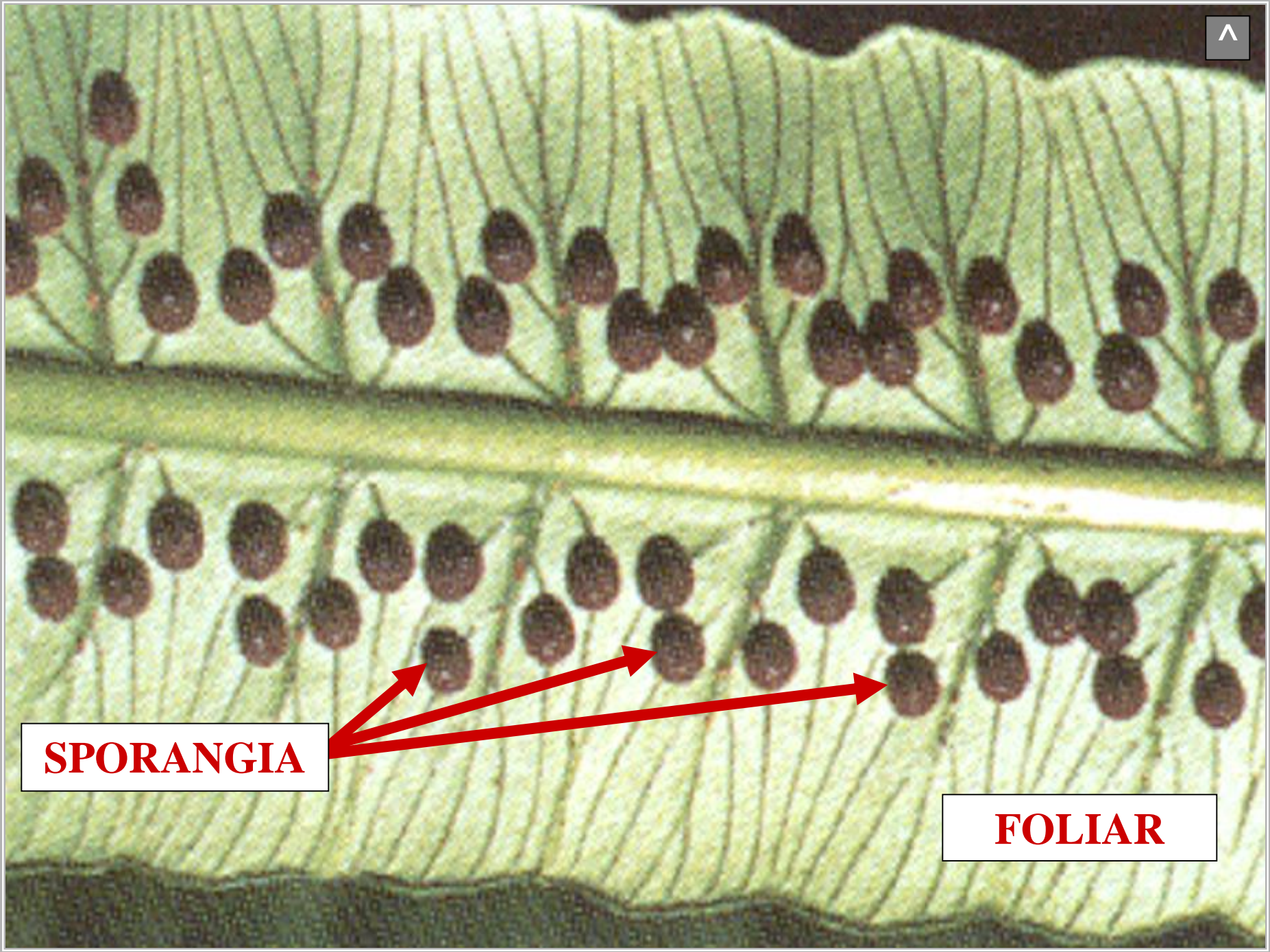


F



SPORANGIA

FROND



SPORANGIA

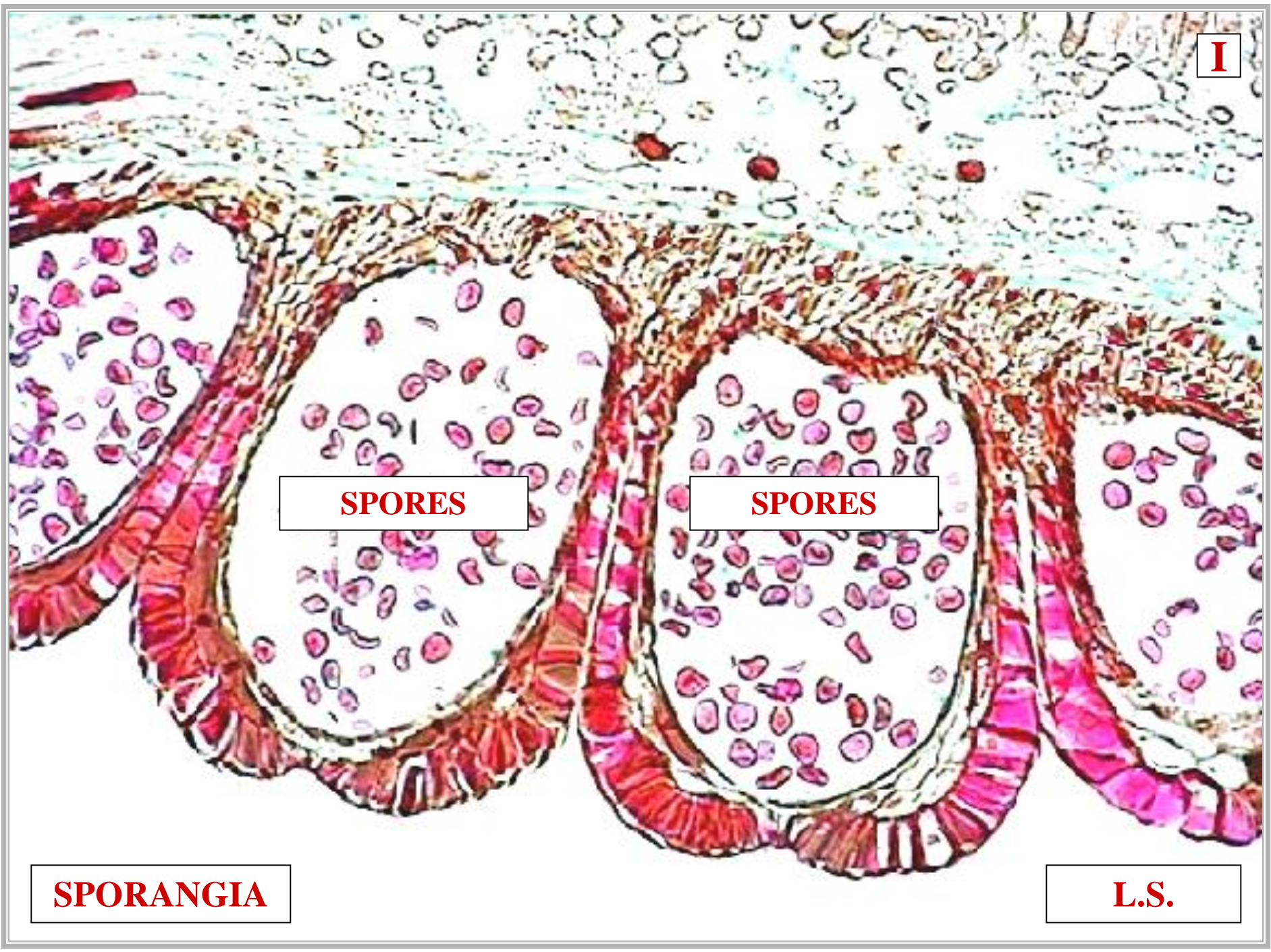


FOLIAR



SPORE HABIT

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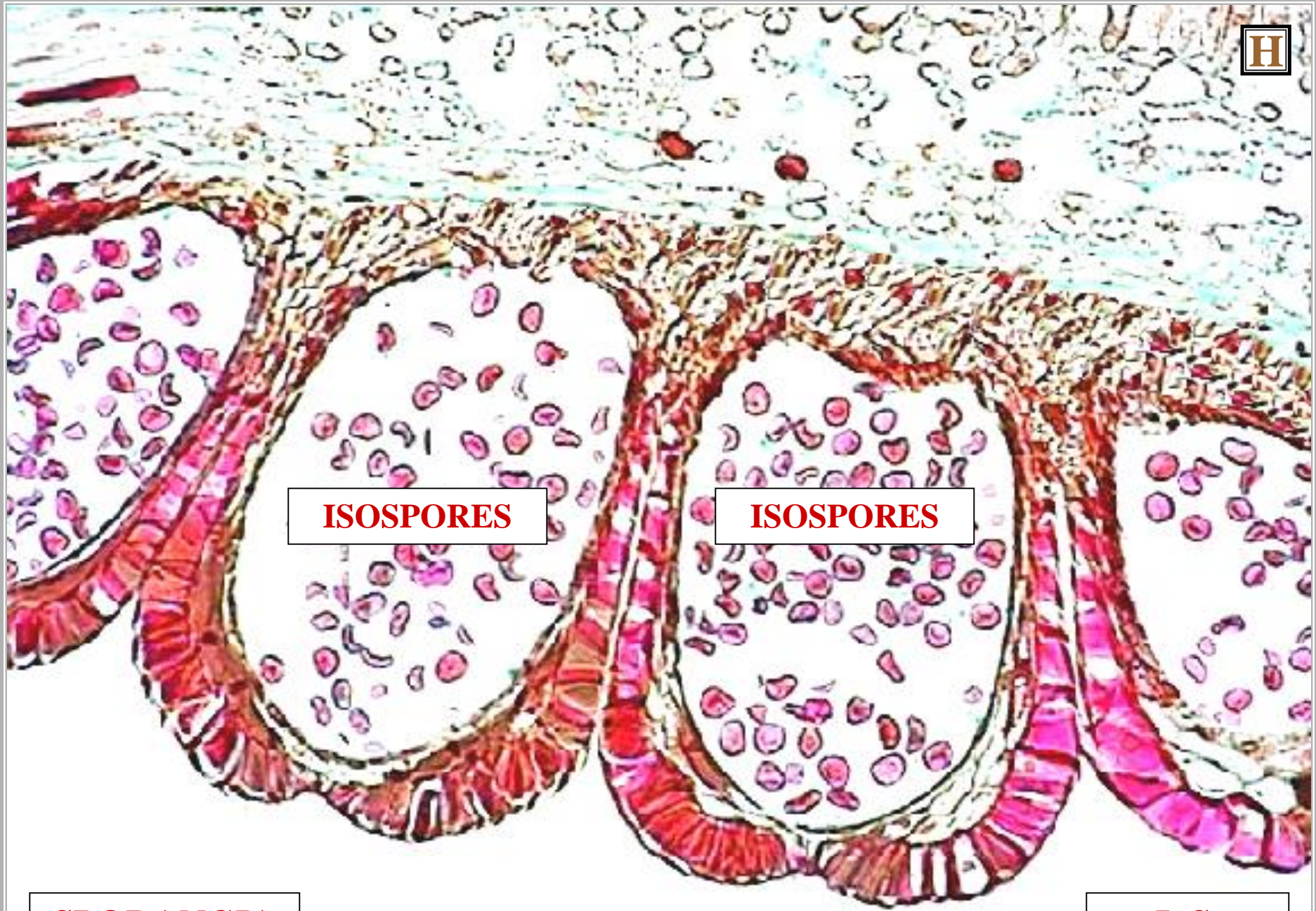


SPORES

SPORES

SPORANGIA

L.S.



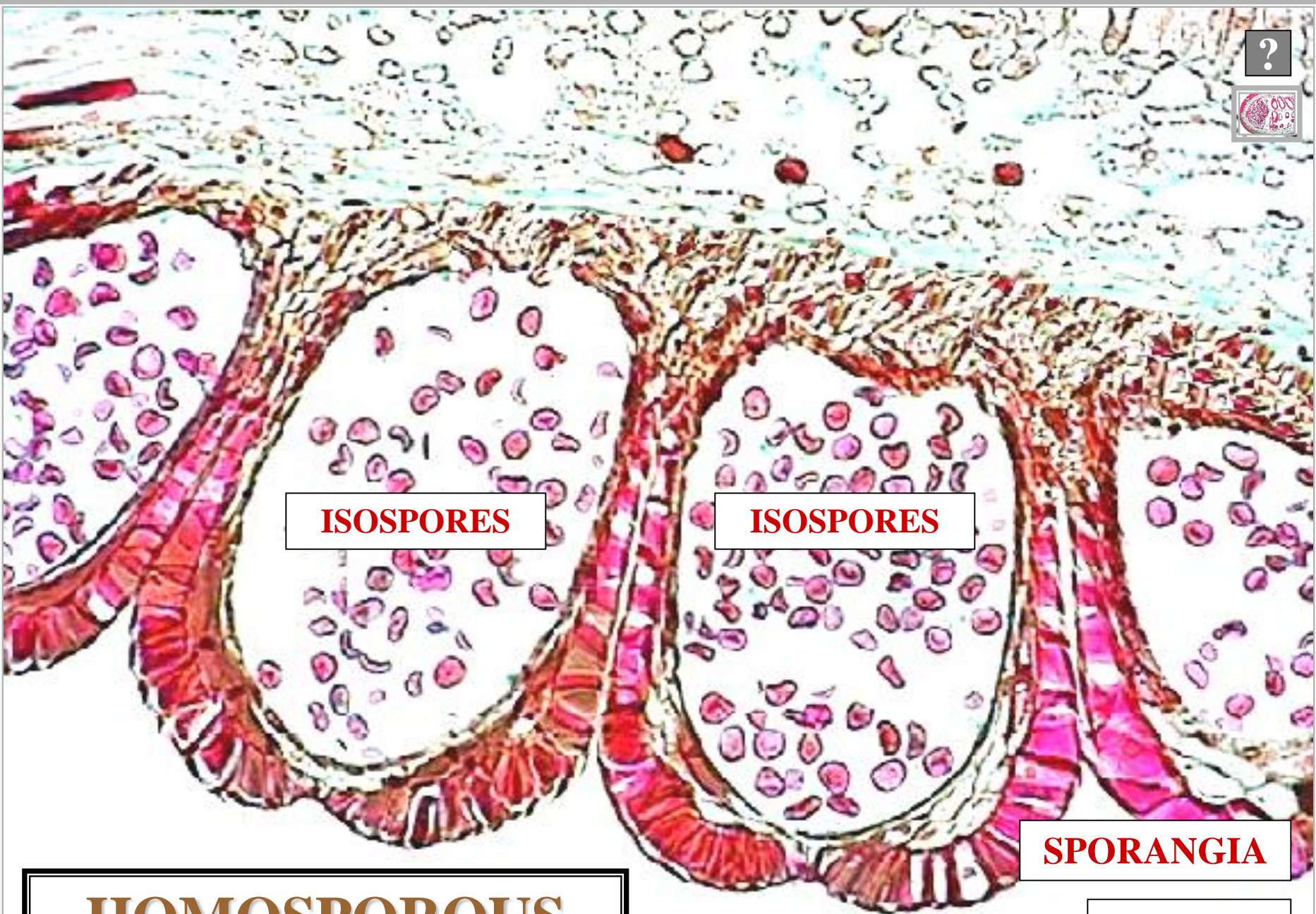
ISOSPORES

ISOSPORES

SPORANGIA

L.S.

?



ISOSPORES

ISOSPORES

SPORANGIA

HOMOSPOROUS

L.S.



?



SPOROCARP

L.S.

M

MEGASPORES

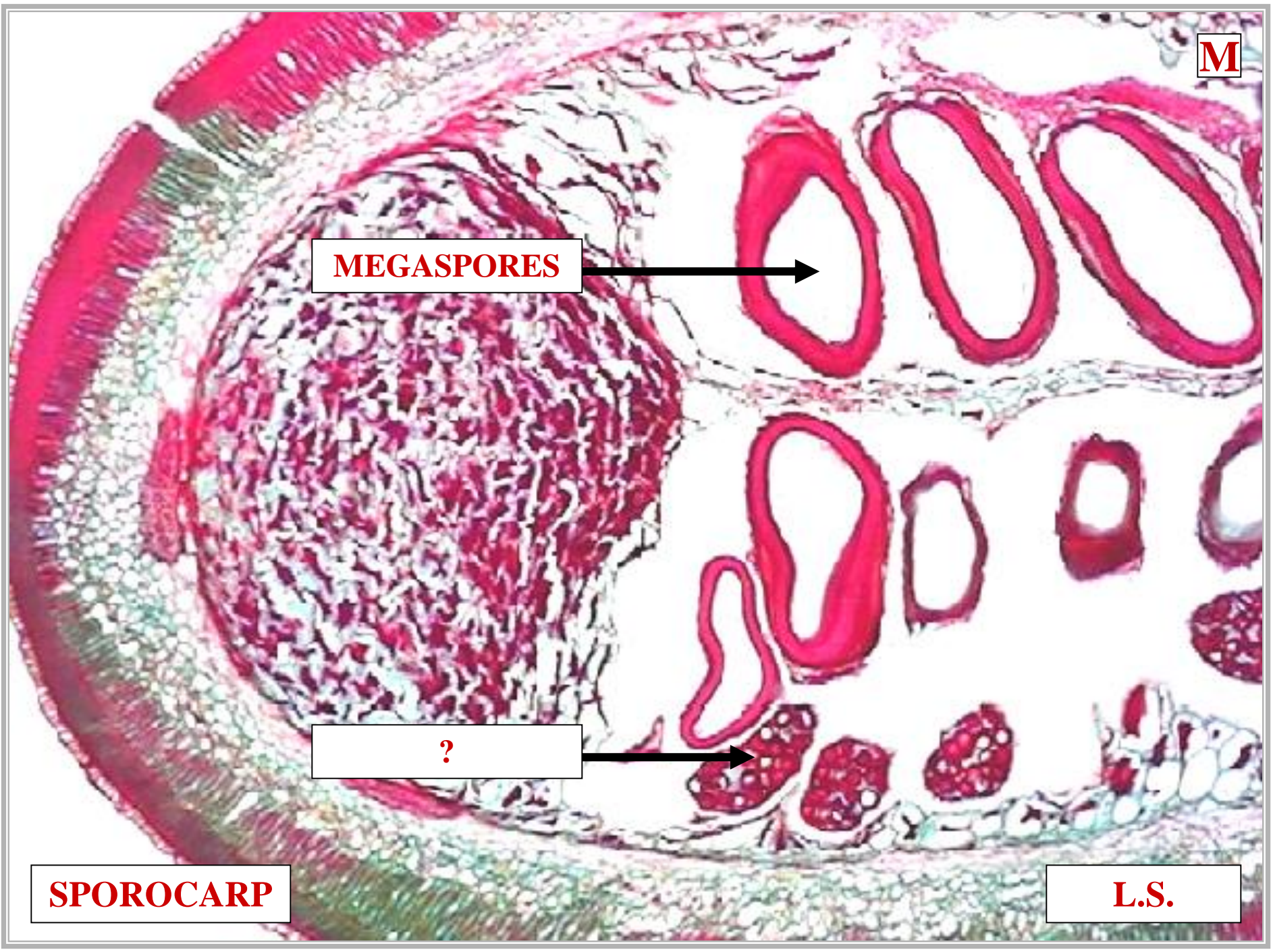


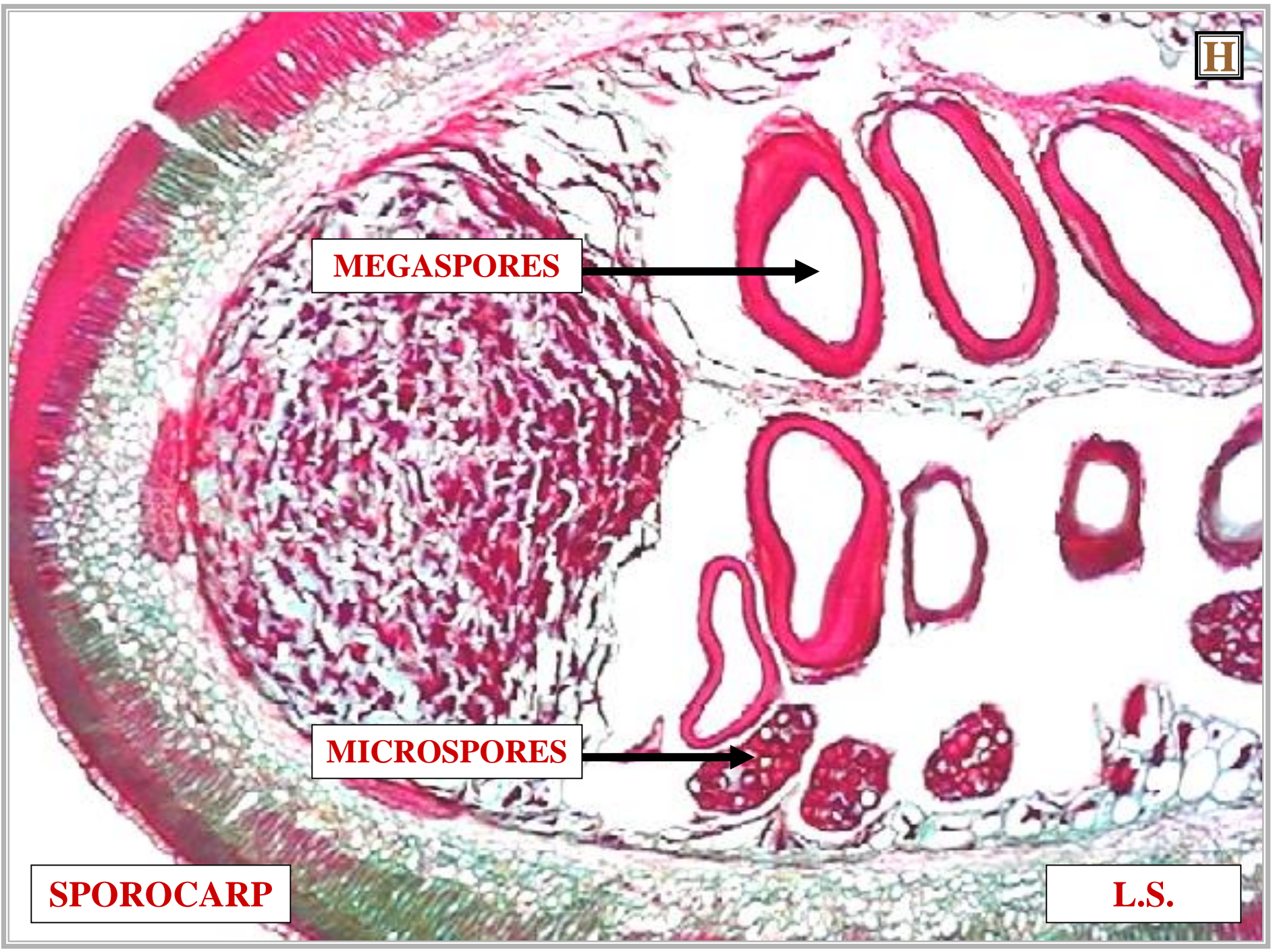
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SPOROCARP

L.S.





MEGASPORES

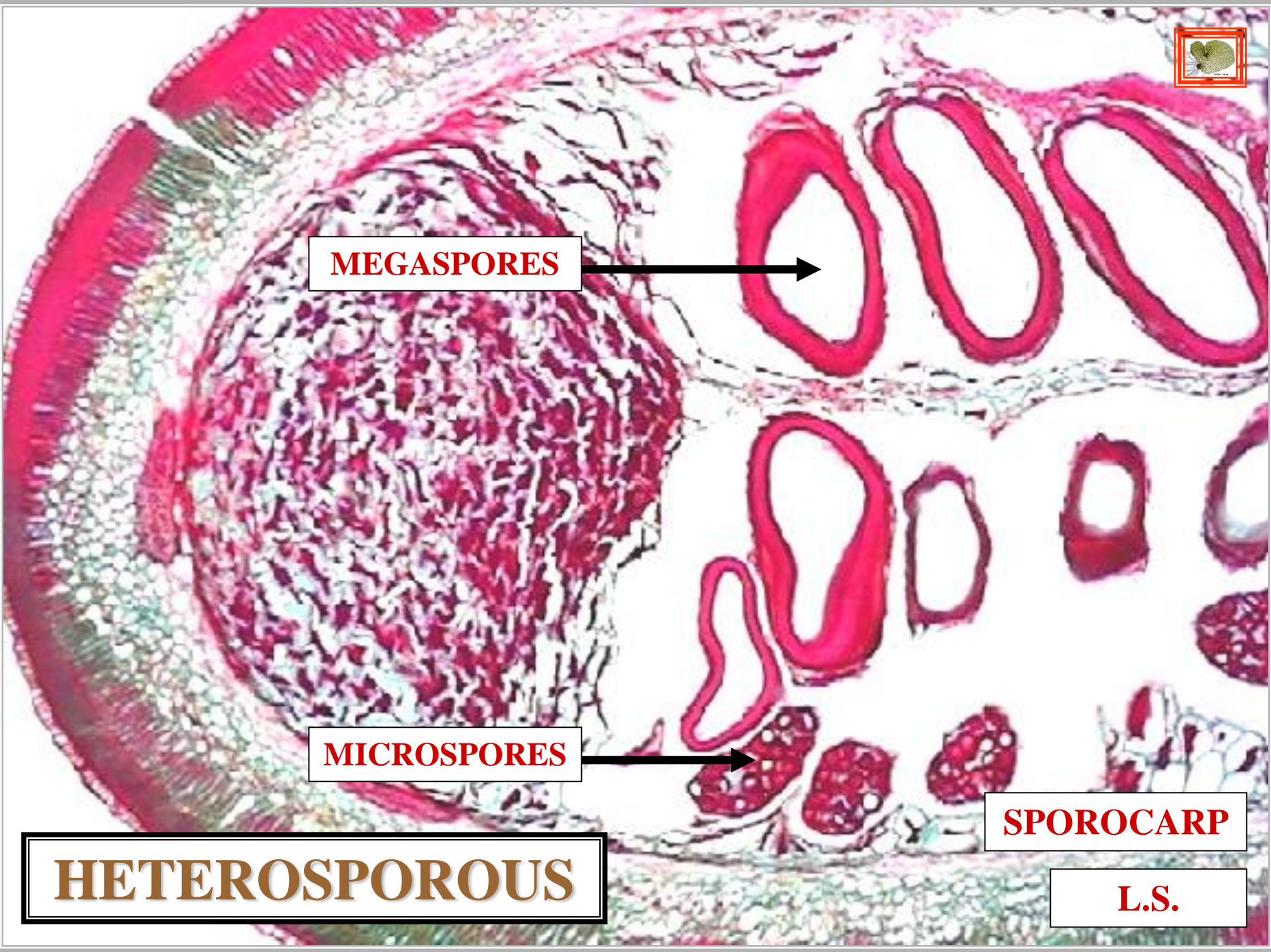


MICROSPORES



SPOROCARP

L.S.



MEGASPORES



MICROSPORES



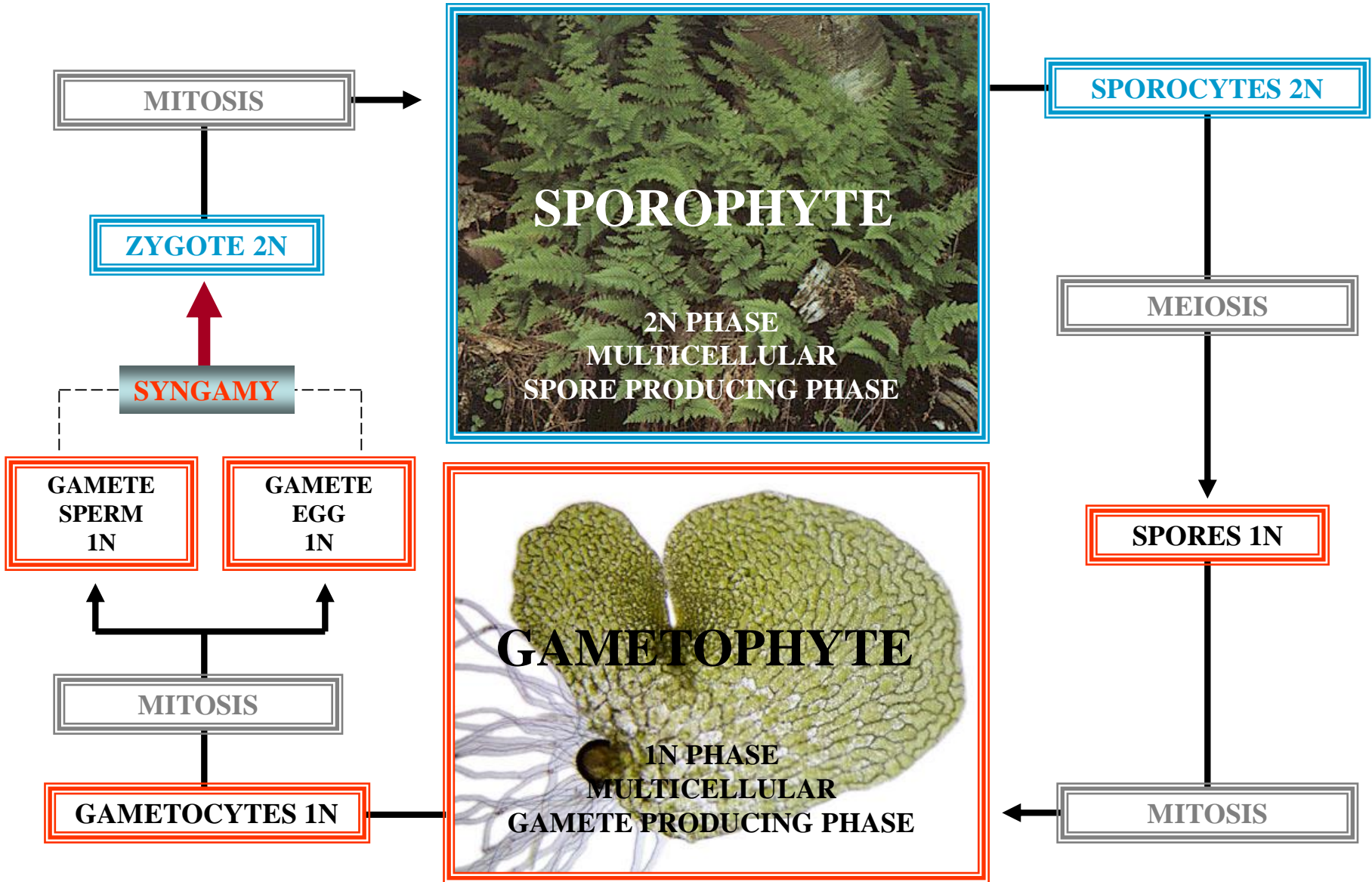
SPOROCARP

HETEROSPOROUS

L.S.

PTERIDOPHYTA

LIFE CYCLE





GAMETOPHYTE CHARACTERS

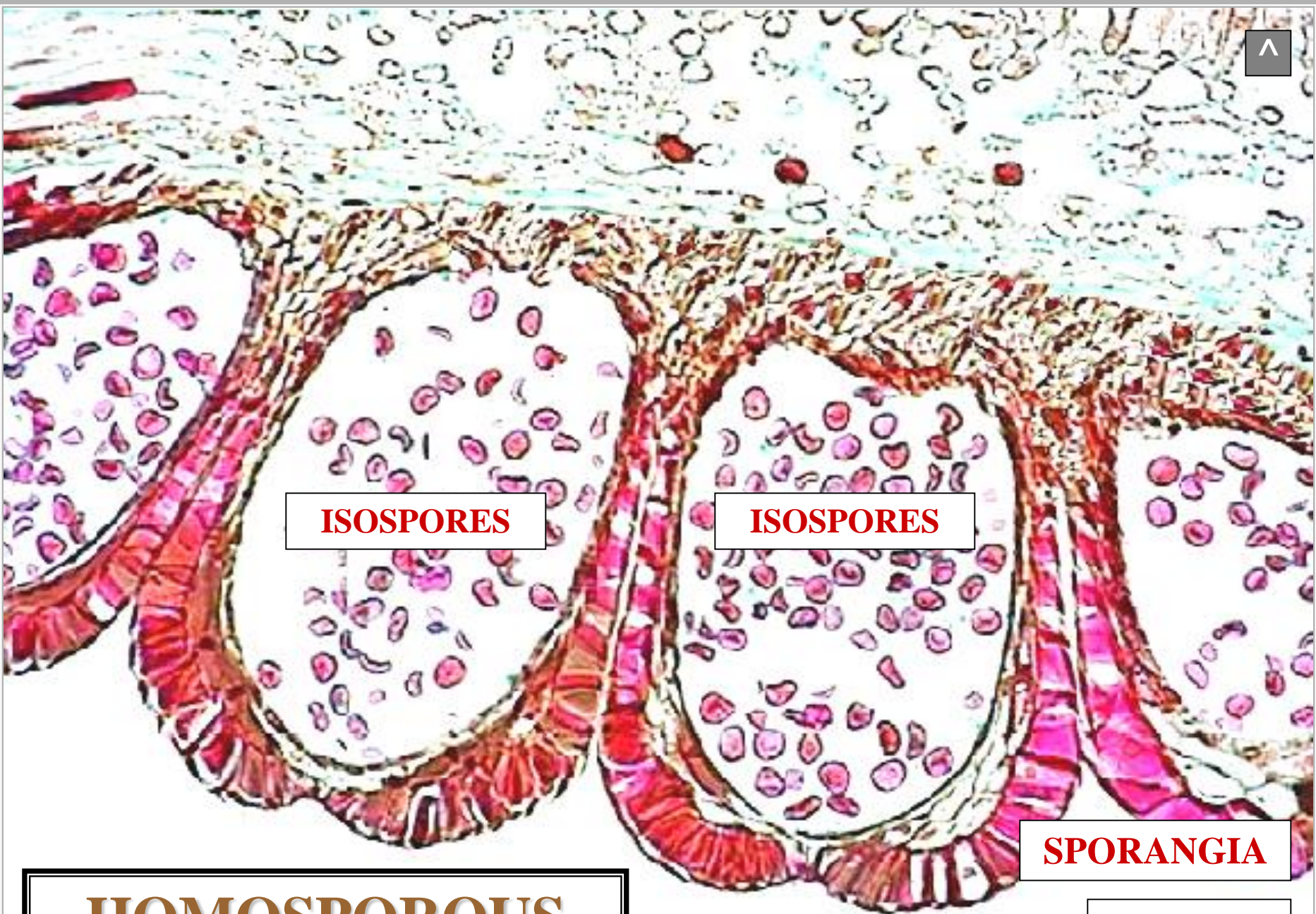


EXOSPORIC GAMETOPHYTE



ENDOSPORIC GAMETOPHYTE





ISOSPORES

ISOSPORES

SPORANGIA

HOMOSPOROUS

L.S.

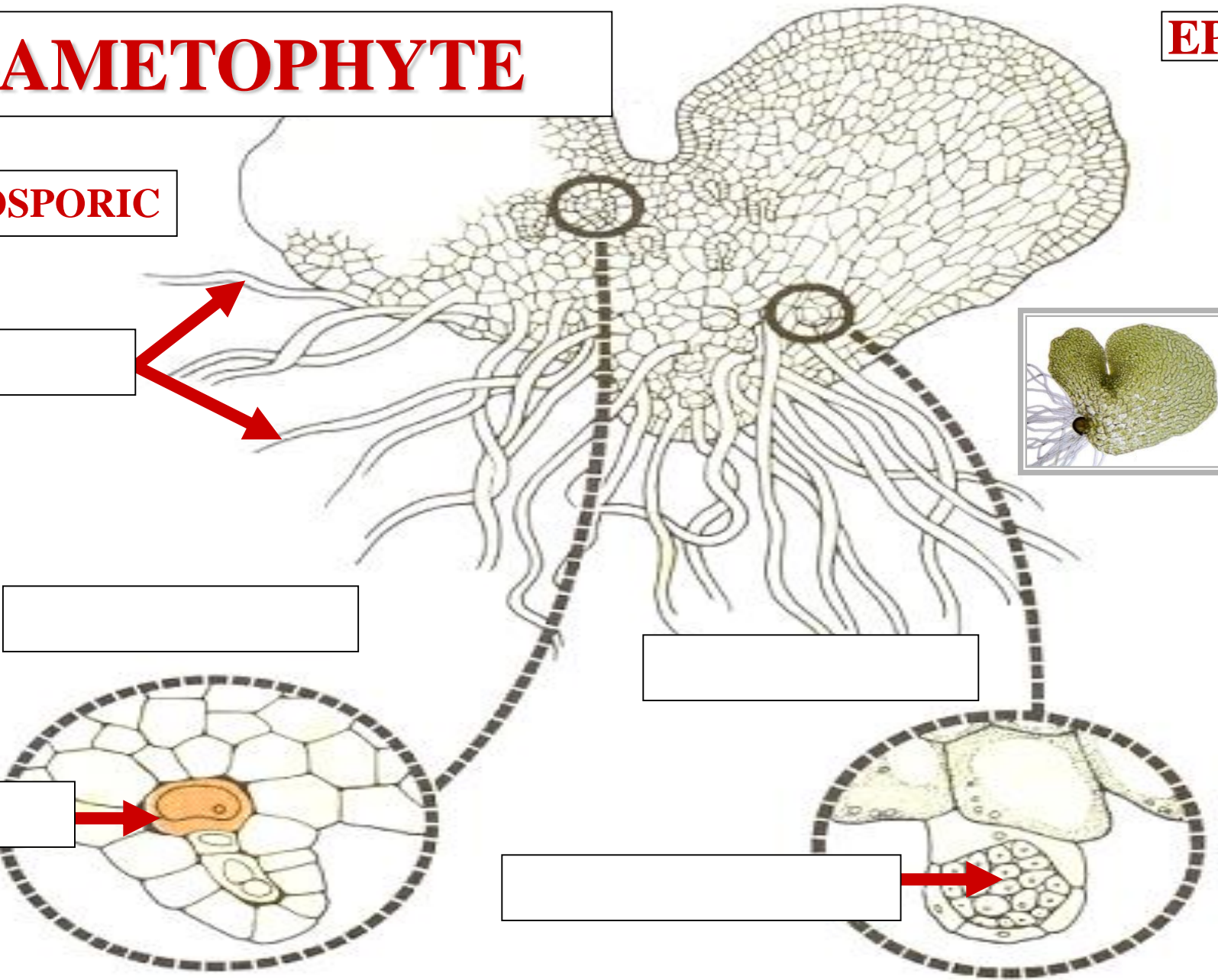
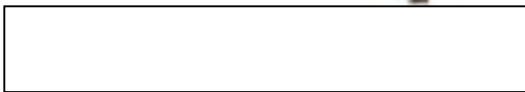
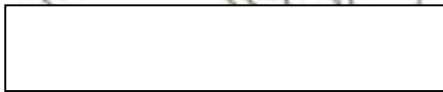
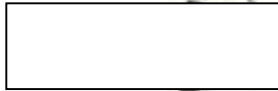
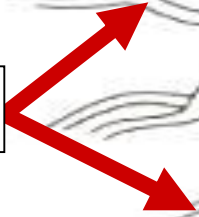


EXOSPORIC GAMETOPHYTE

GAMETOPHYTE

EP

EXOSPORIC



GAMETOPHYTE

EPITERRANEAN

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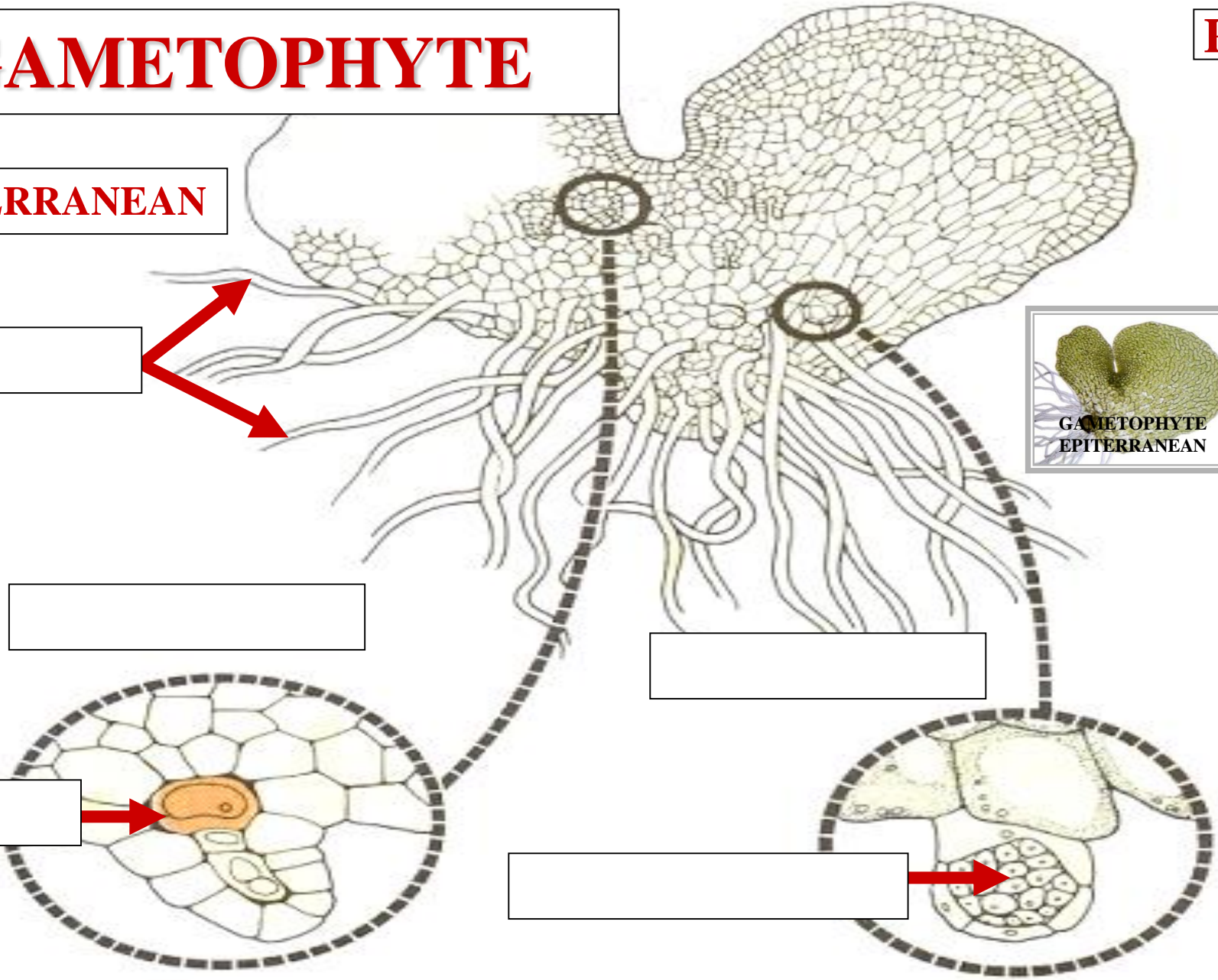
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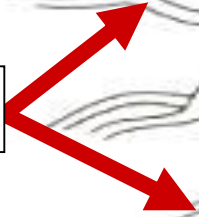
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GAMETOPHYTE

PSYN

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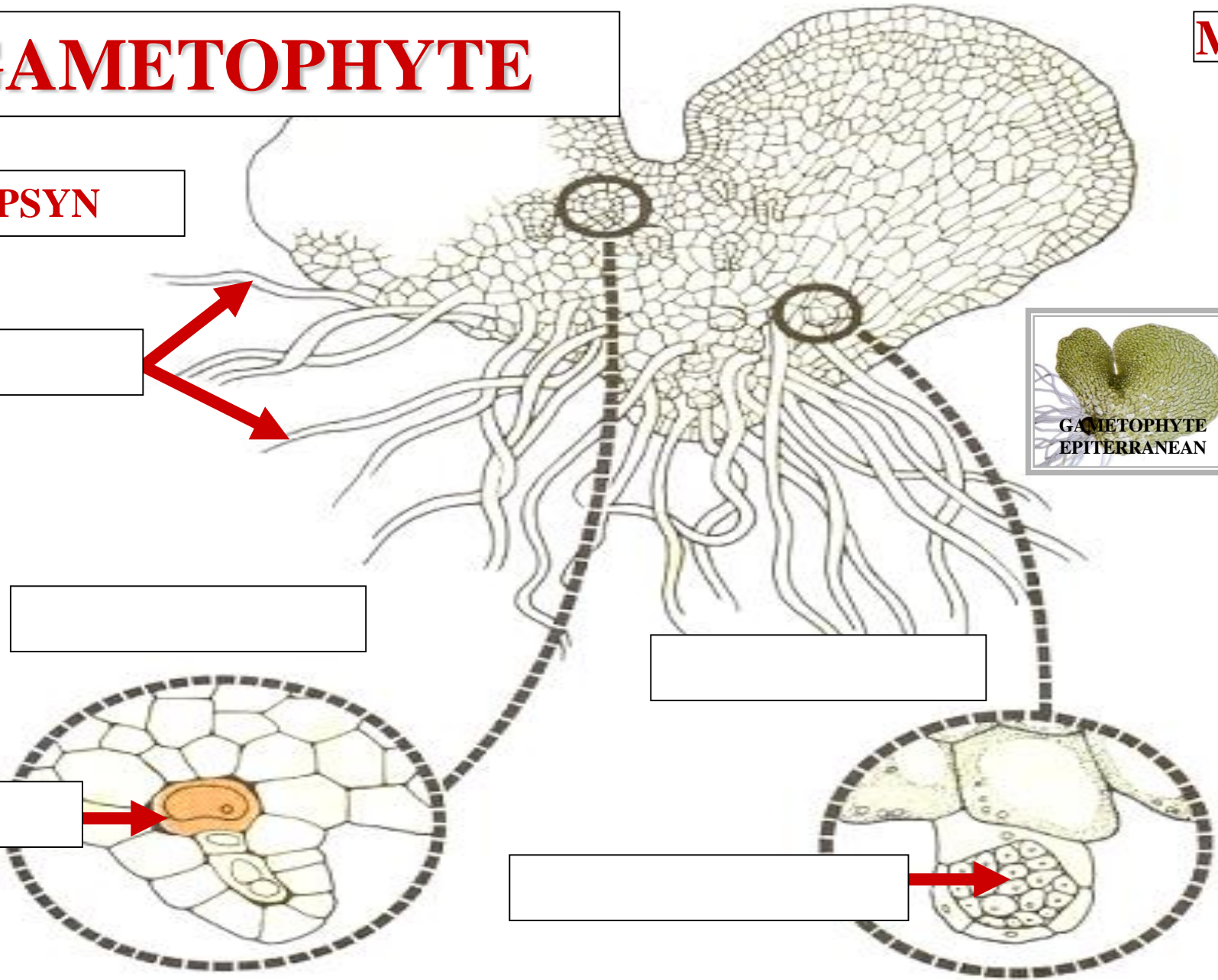
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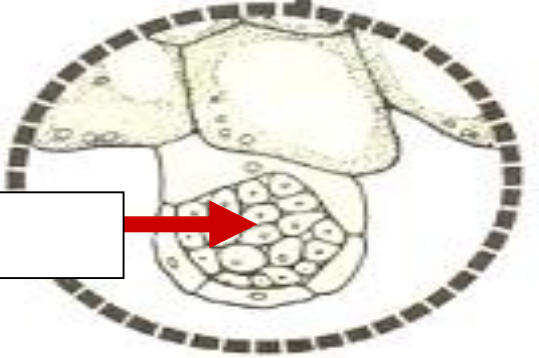
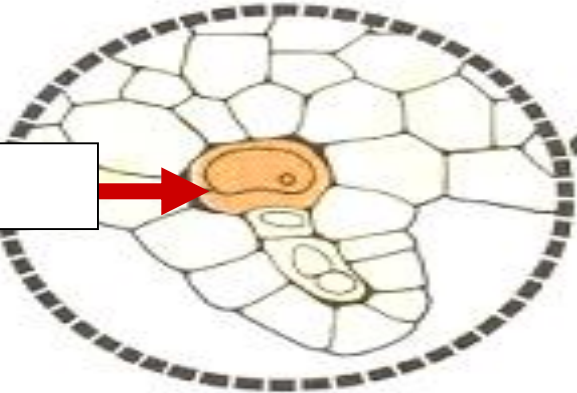
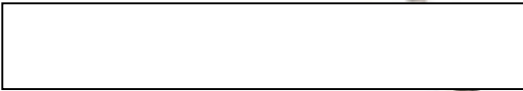
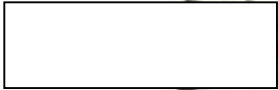
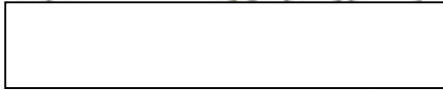
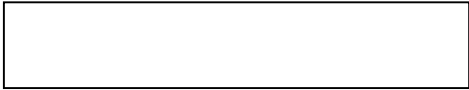
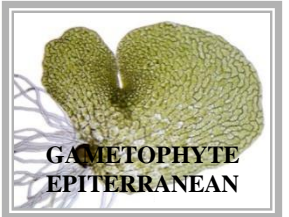
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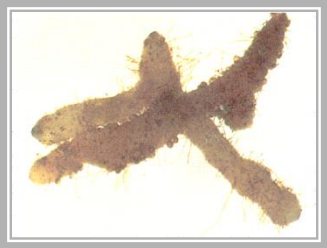


GAMETOPHYTE

**MYCORRHIZAE
ABSENT**



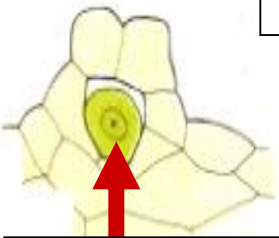
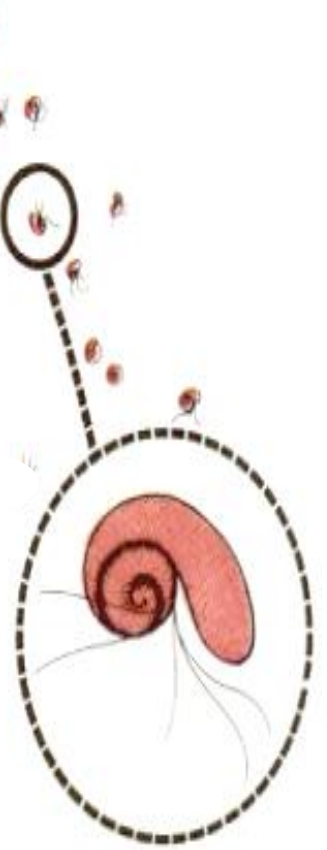
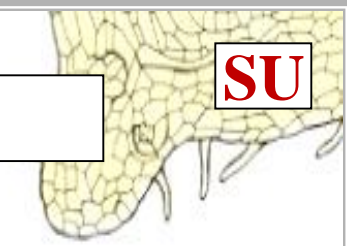
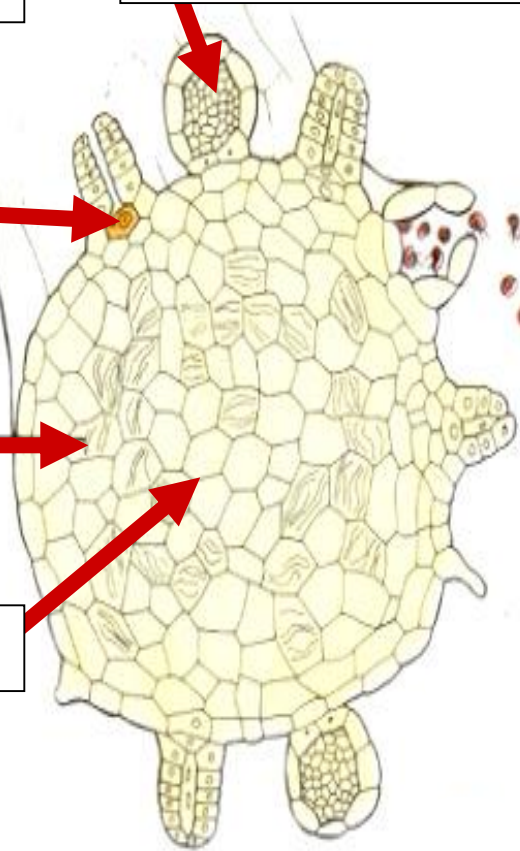
GAMETOPHYTE



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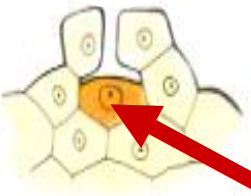
EXOSPORIC

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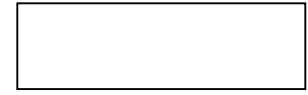
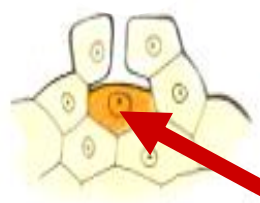
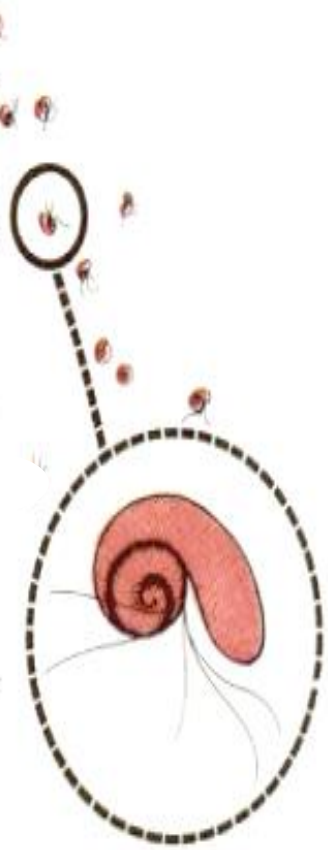
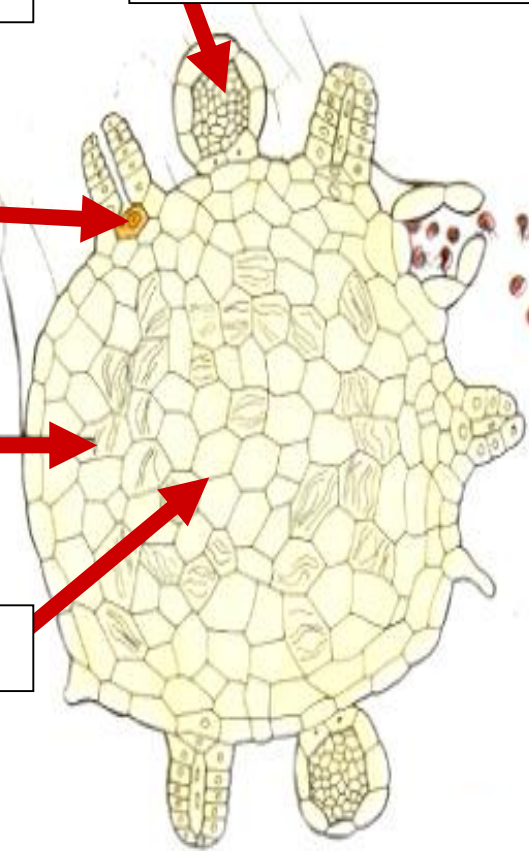
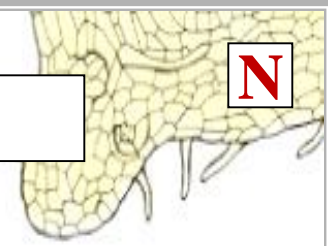
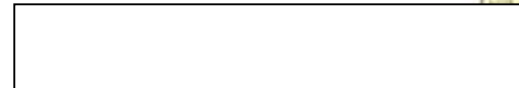
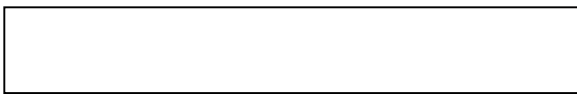
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SUBTERRANEAN



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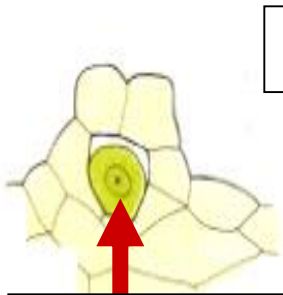
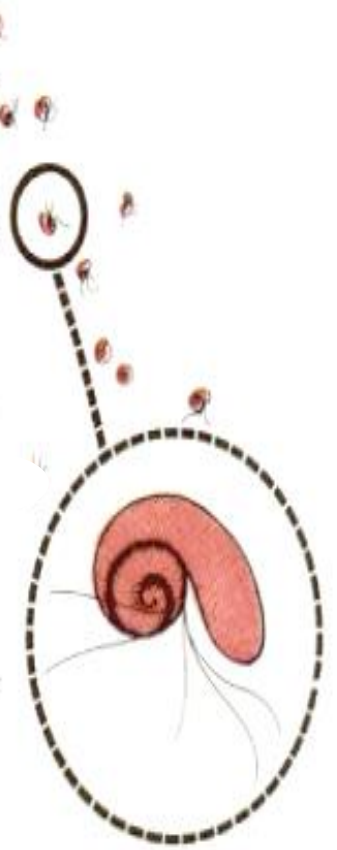
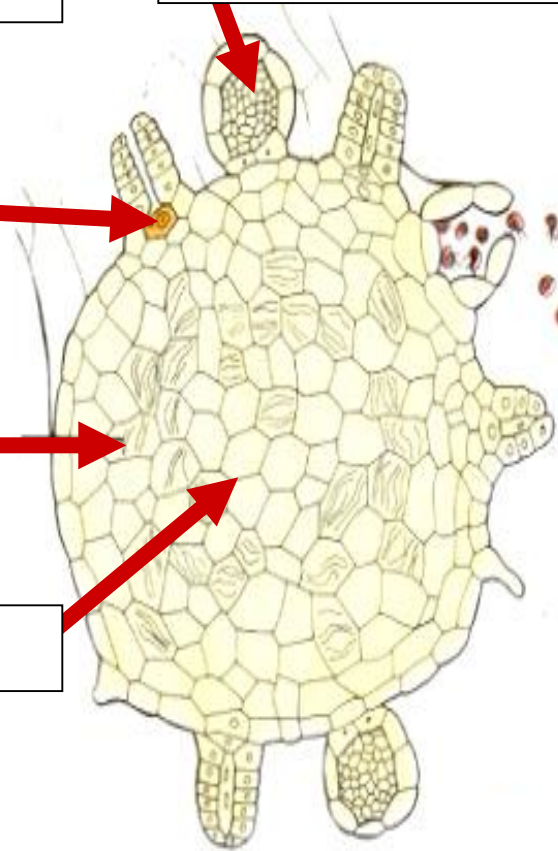
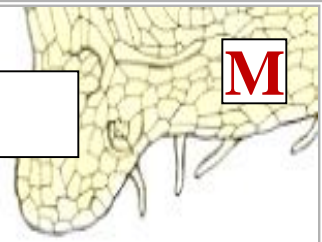


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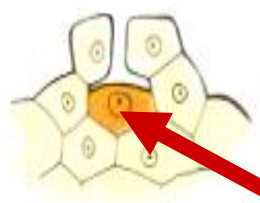
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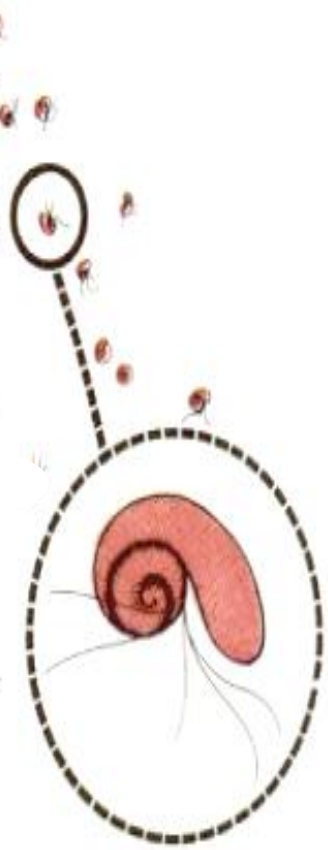
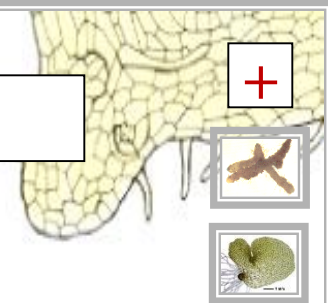
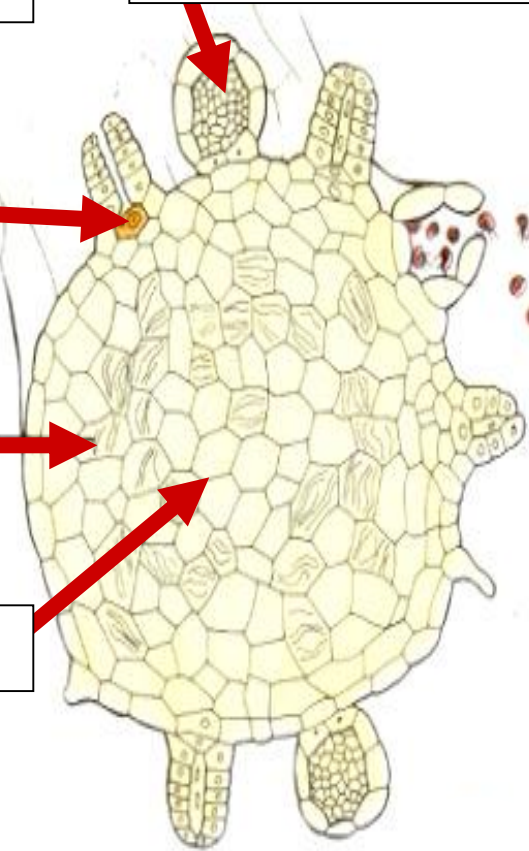


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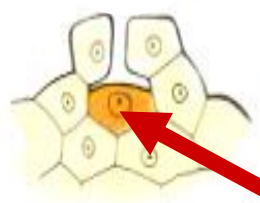
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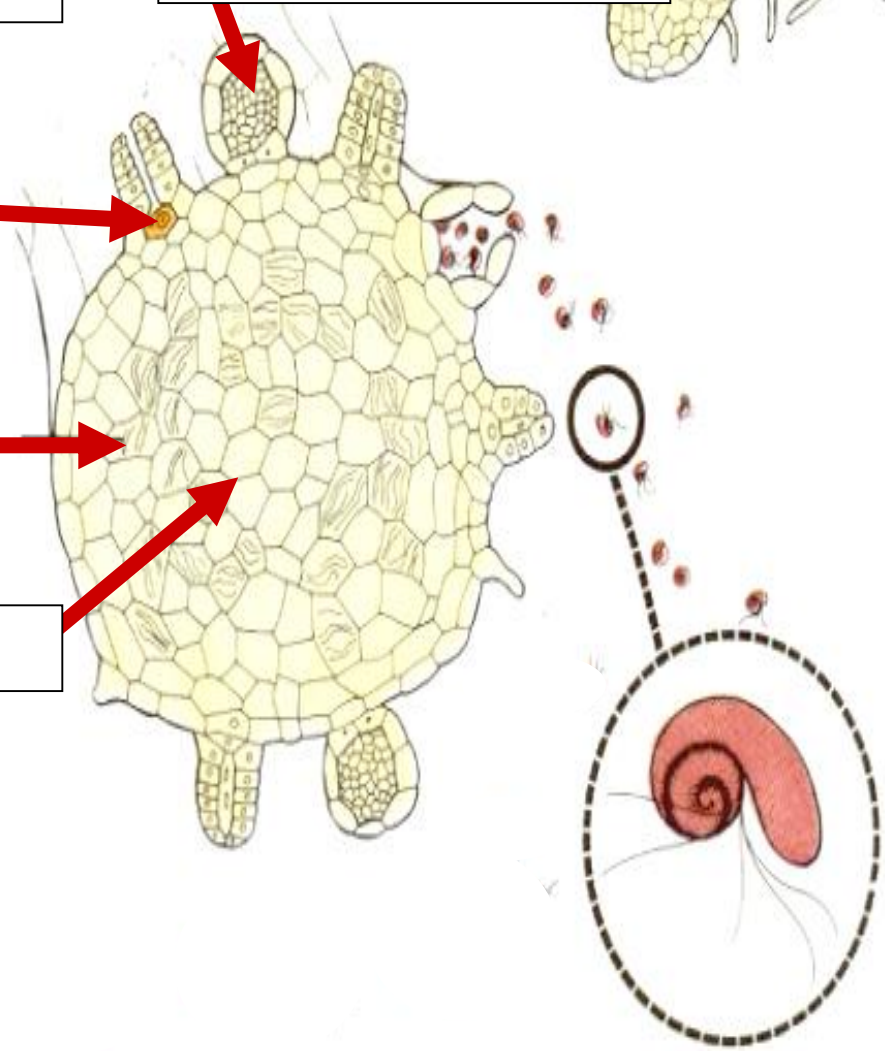
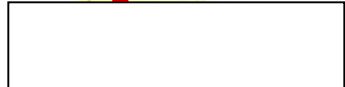
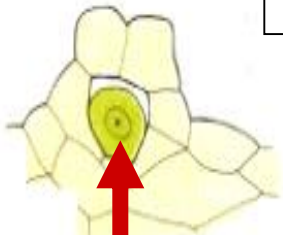
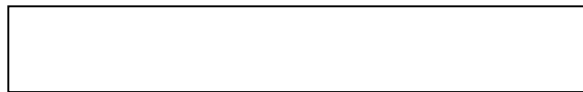
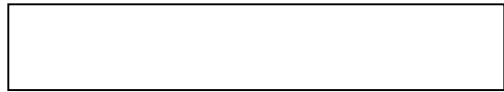
GAMETOPHYTE



ARCHEGONIUM

ANTHERIDIUM

B



GAMETOPHYTE



ARCHEGONIUM

ANTHERIDIUM

BISEXUAL

