



POLYPODIUM



PTERIDOPHYTA CLASSIFICATION

ALABAMA
TRACHEOPHYTE

MARSILEALES

ALABAMA
TRACHEOPHYTE

COMMON NAME

ALABAMA LAKE OR ALABAMA POND



CLOVER WATER FERNS

CLOVER LEAF



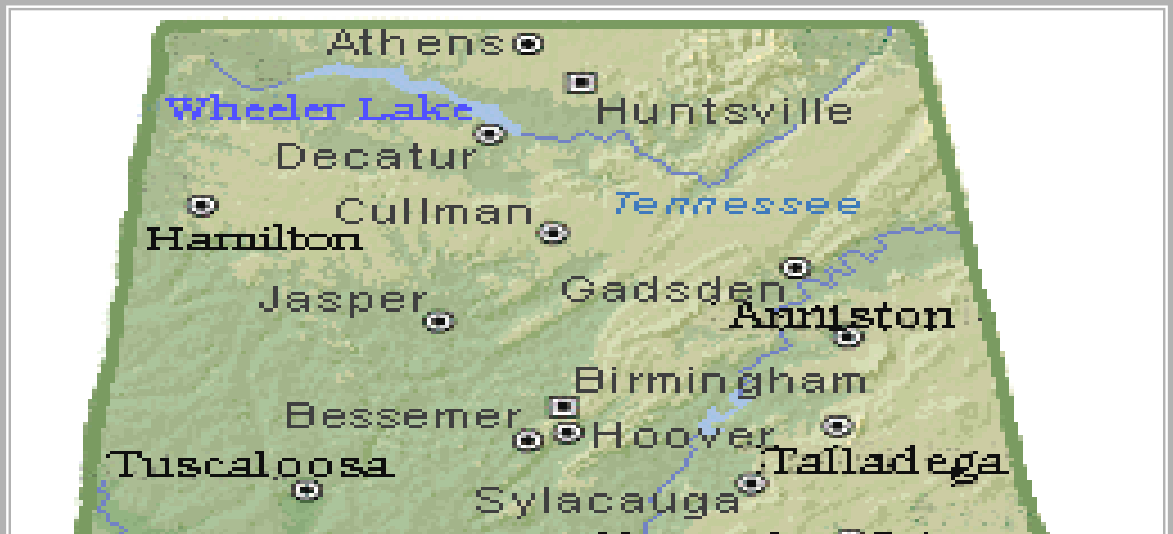


DIVERSITY



~56 SPECIES

EARTH



1 SPECIES





MARSILEALES

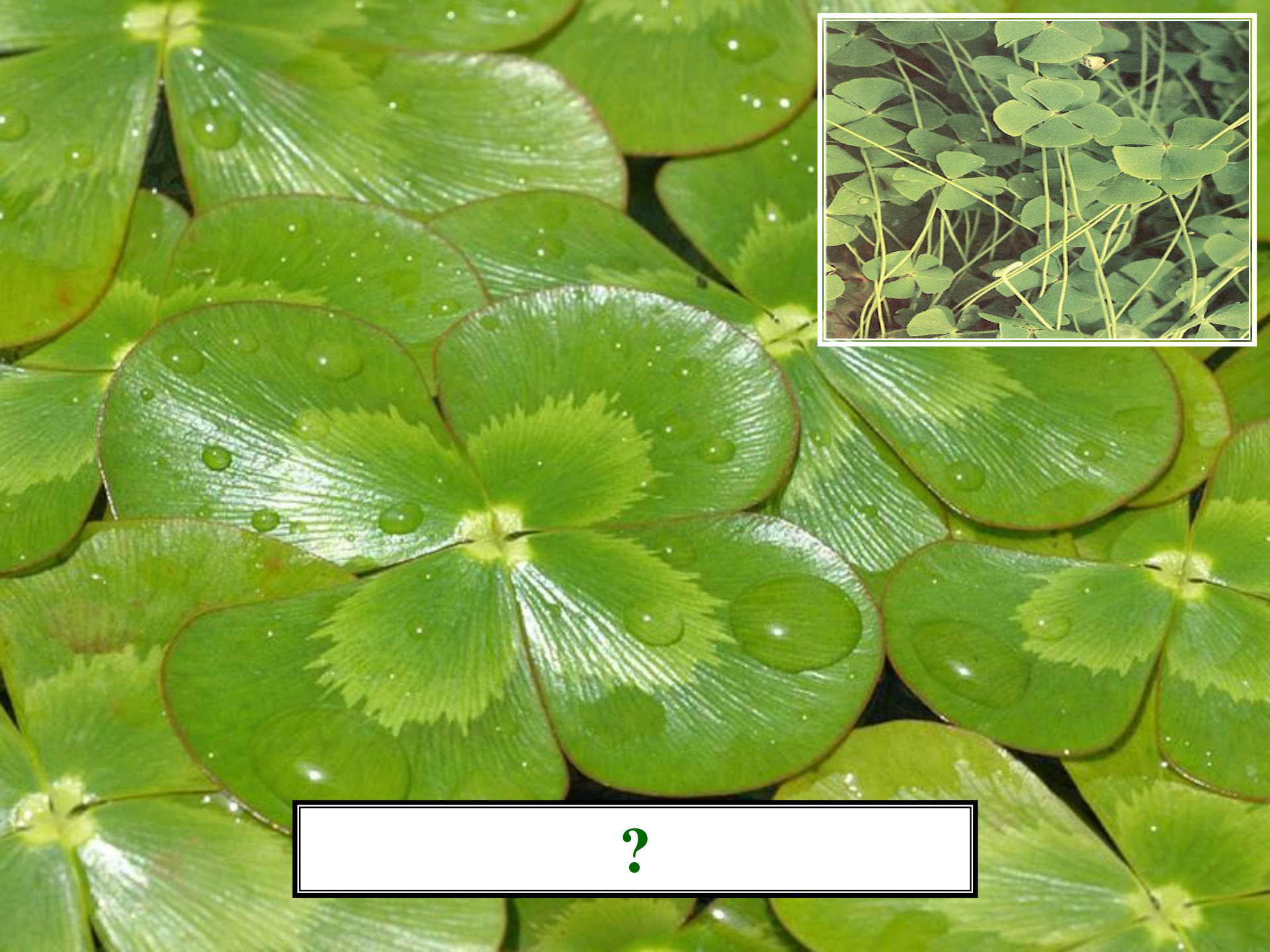
VERY MINOR

COMPONENT

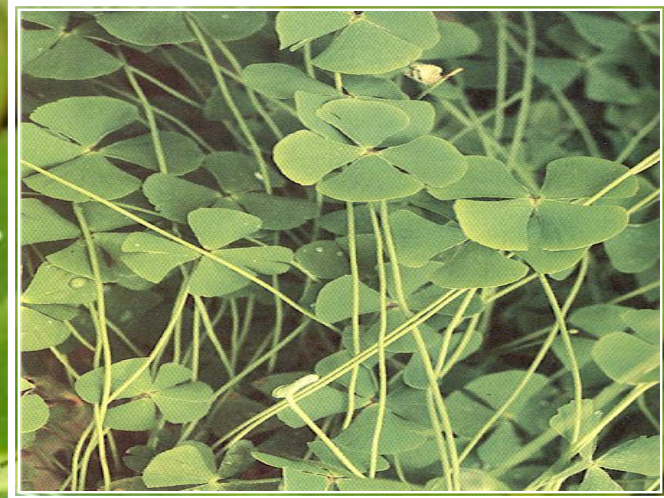
ALABAMA FLORA



REPRESENTATIVE GENUS



?



MARSILEA



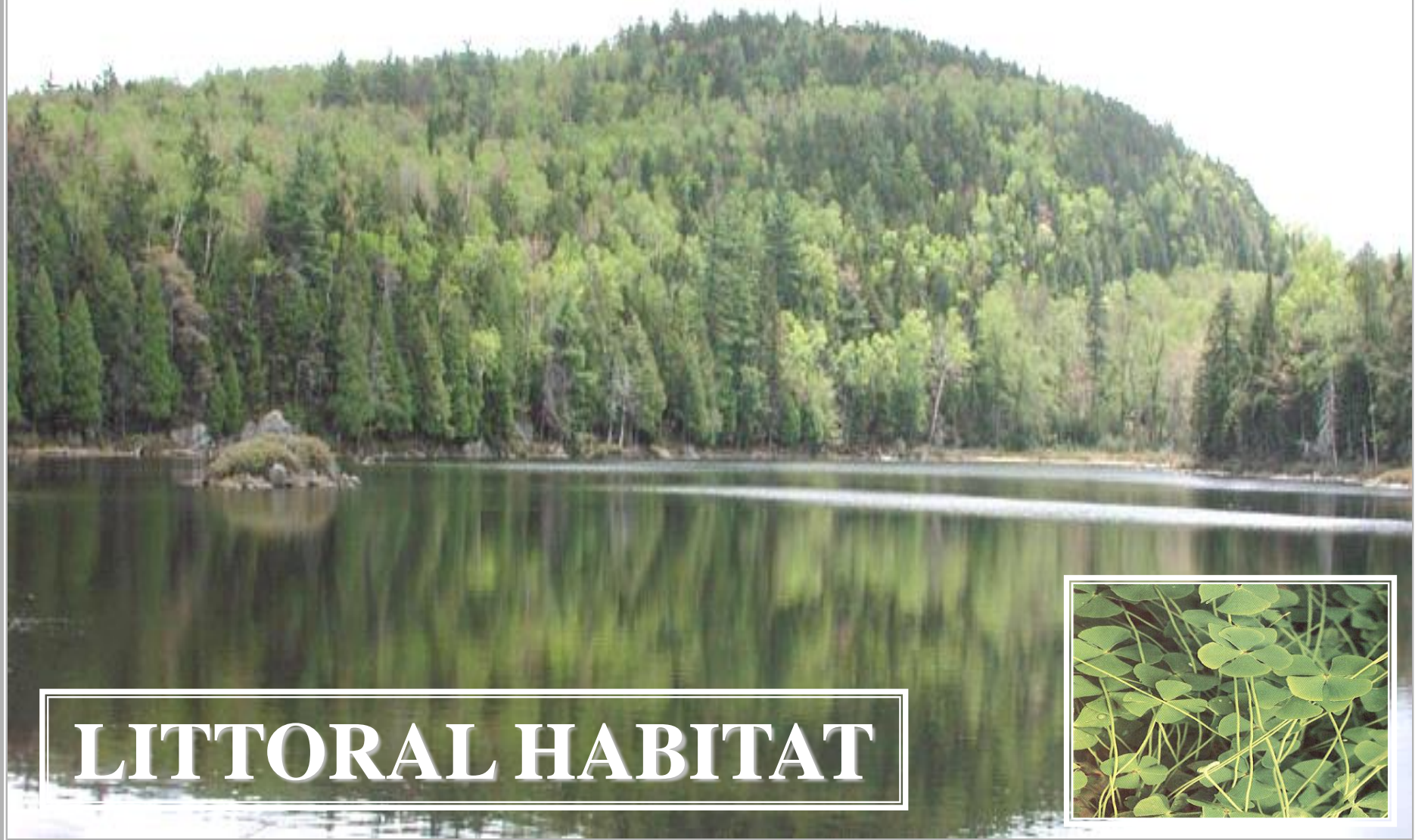
HABITAT

ALABAMA LAKE OR ALABAMA POND

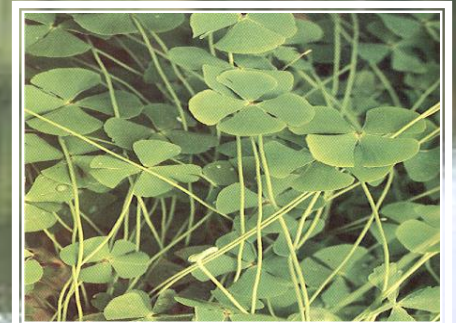


AQUATIC HABITAT

ALABAMA LAKE OR ALABAMA POND



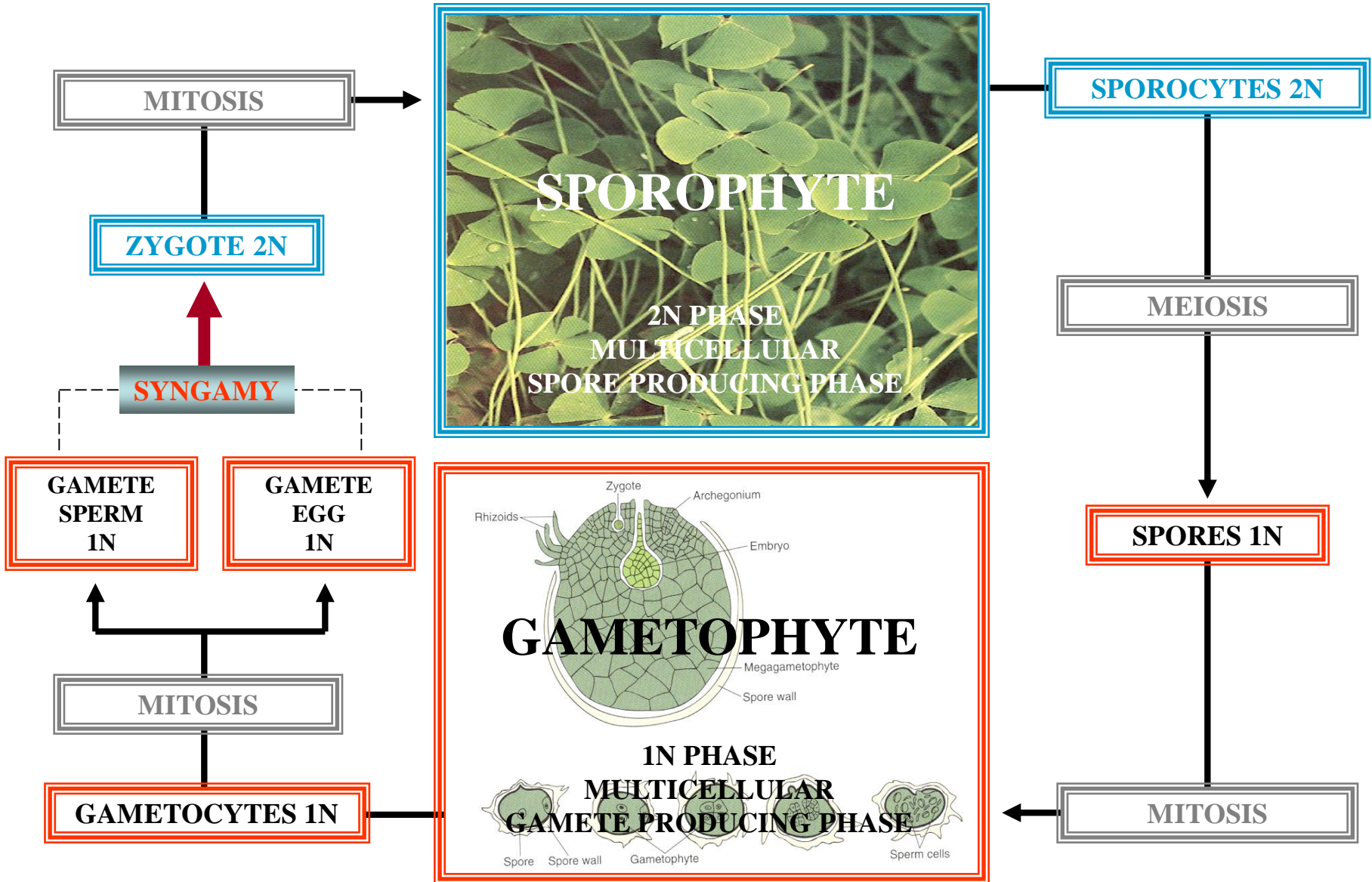
LITTORAL HABITAT





GENERAL CHARACTERS

MARSILEALES LIFE CYCLE



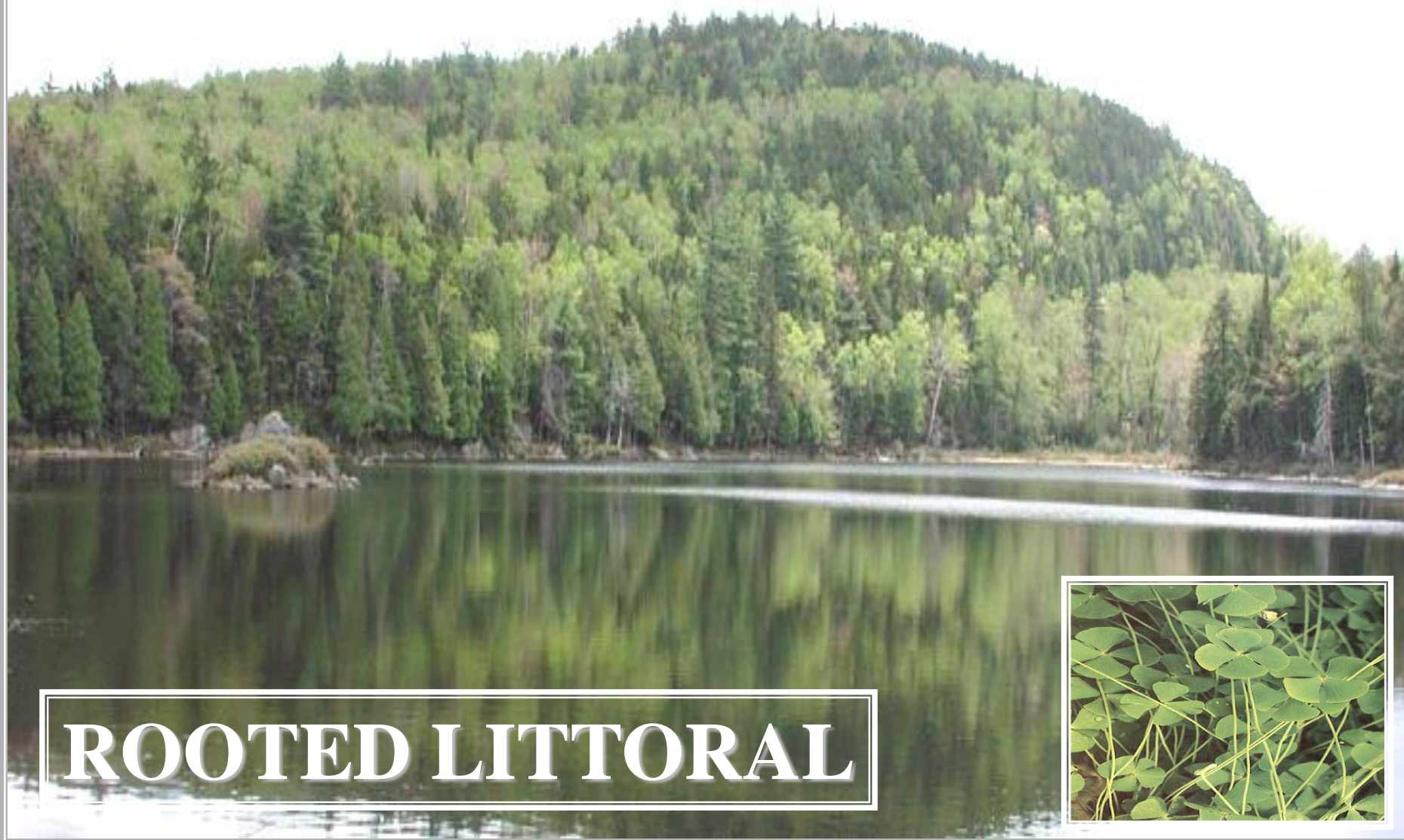


SPOROPHYTE CHARACTERS

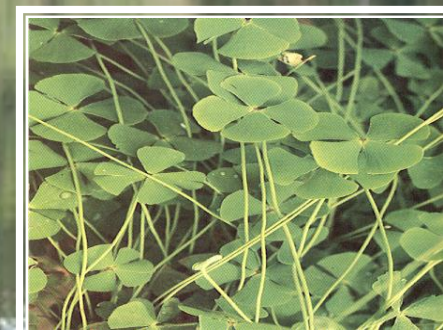


GROWTH HABIT

ALABAMA LAKE OR ALABAMA POND



ROOTED LITTORAL



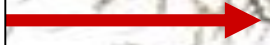


MARSILEA



**ROOTED
LITTORAL
AQUATIC**

**ADVENTITIOUS
ROOTS**



WATER



MORPHOLOGY



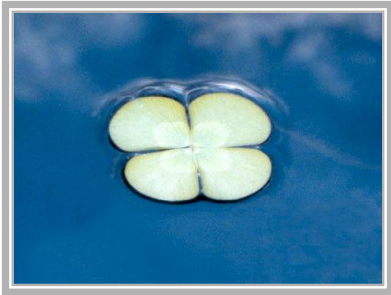
A

MARSILEA

MARSILEA



N



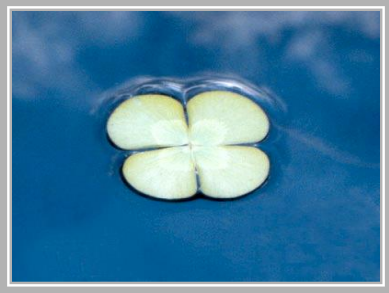
WATER

**ATYPICAL
MORPHOLOGY**





MARSILEA

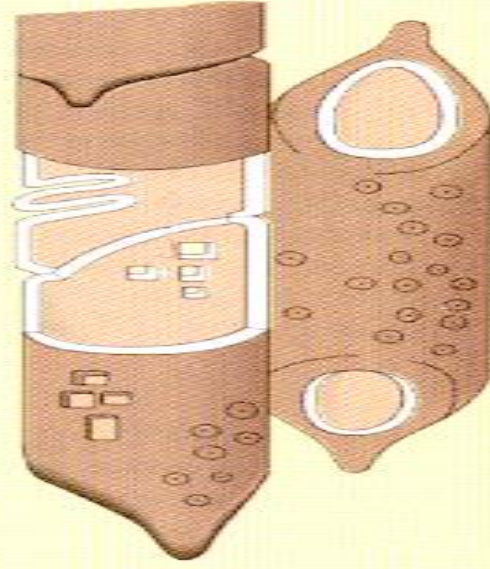
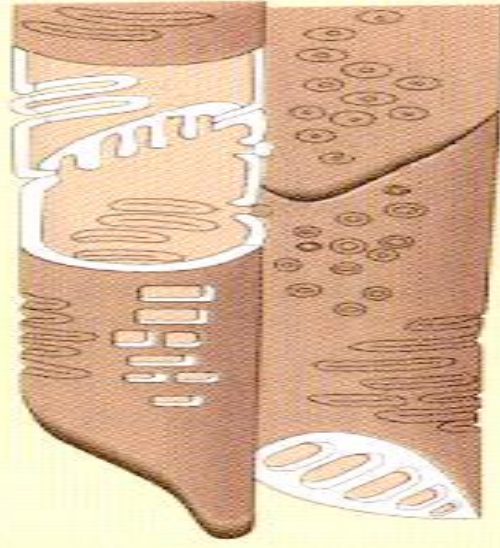
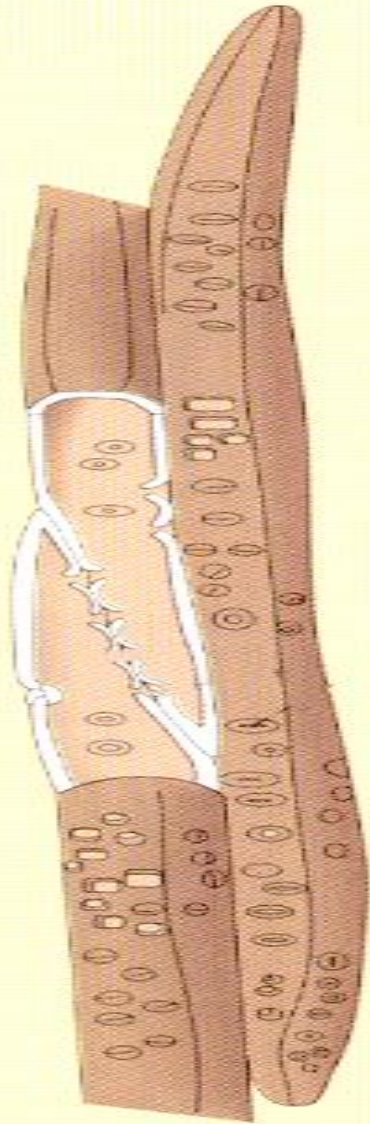


WATER

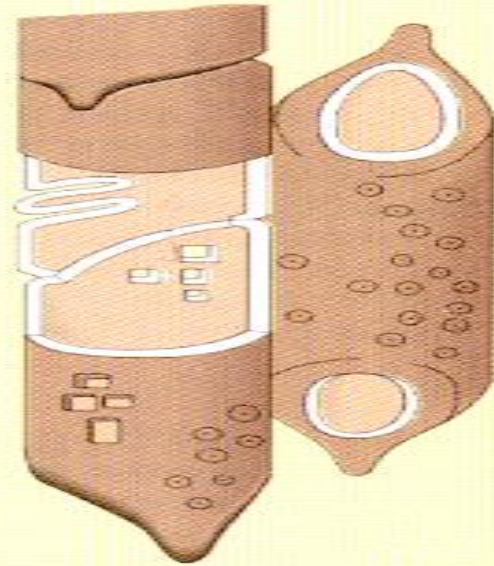
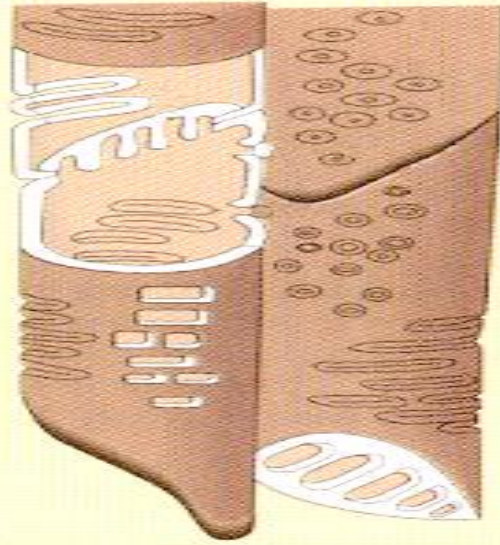
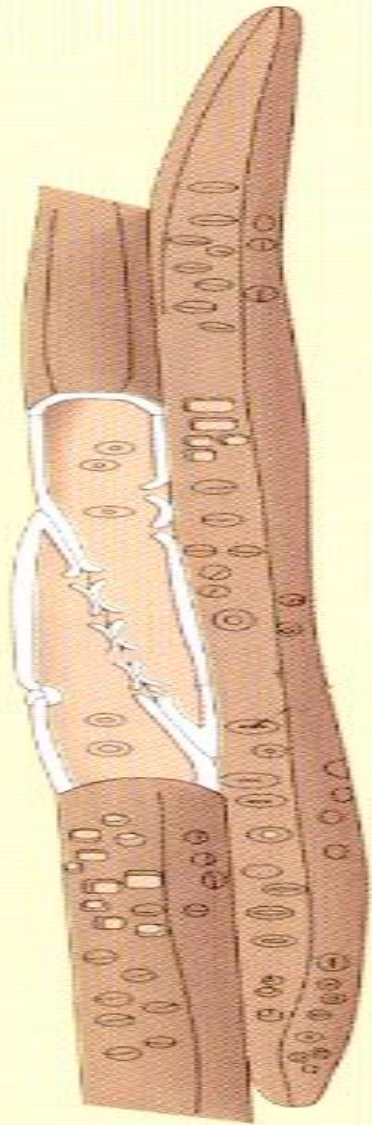
**ATYPICAL
MORPHOLOGY
NOT
FERN-LIKE**



XYLEM



XYLEM CELLS



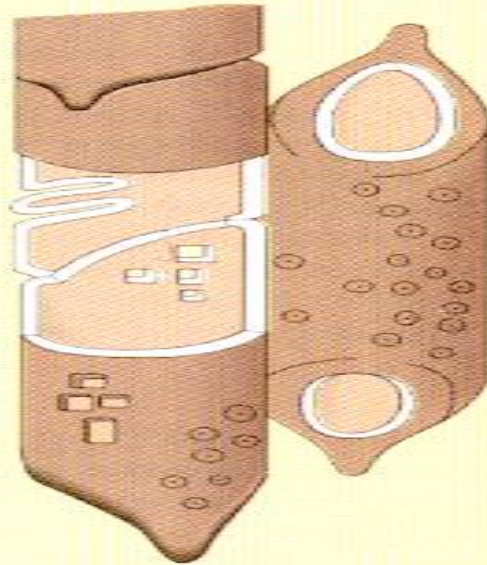
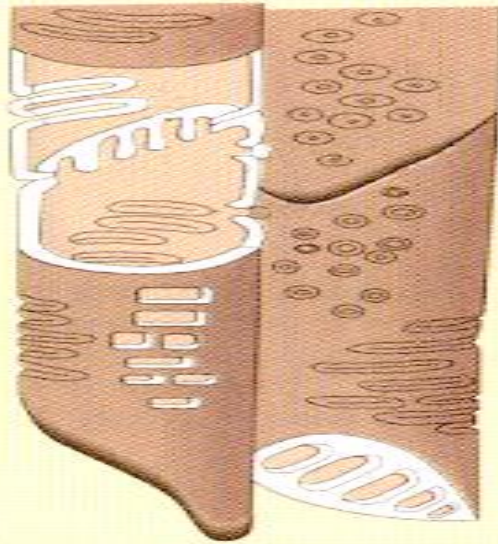
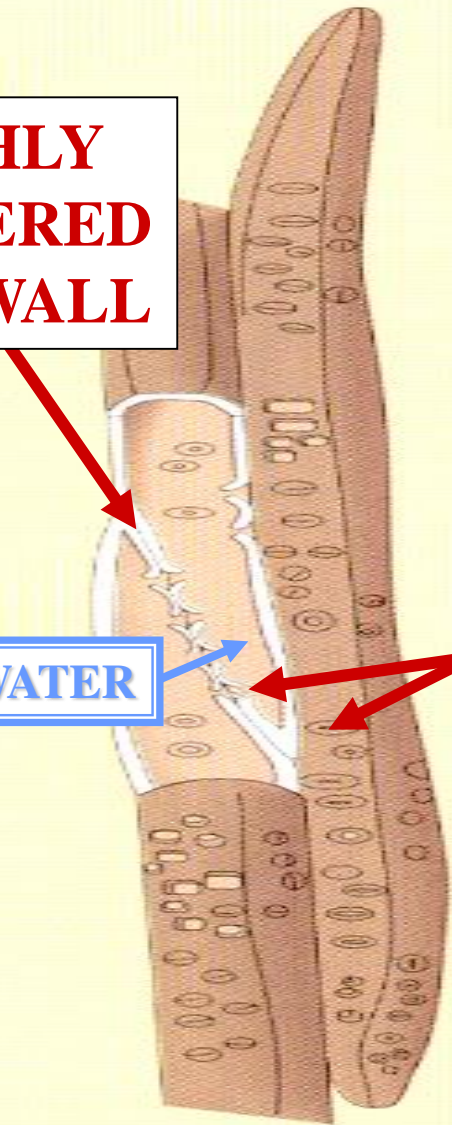
TRACHEARY ELEMENTS

**HIGHLY
TAPPED
END WALL**

WATER

PITS

?

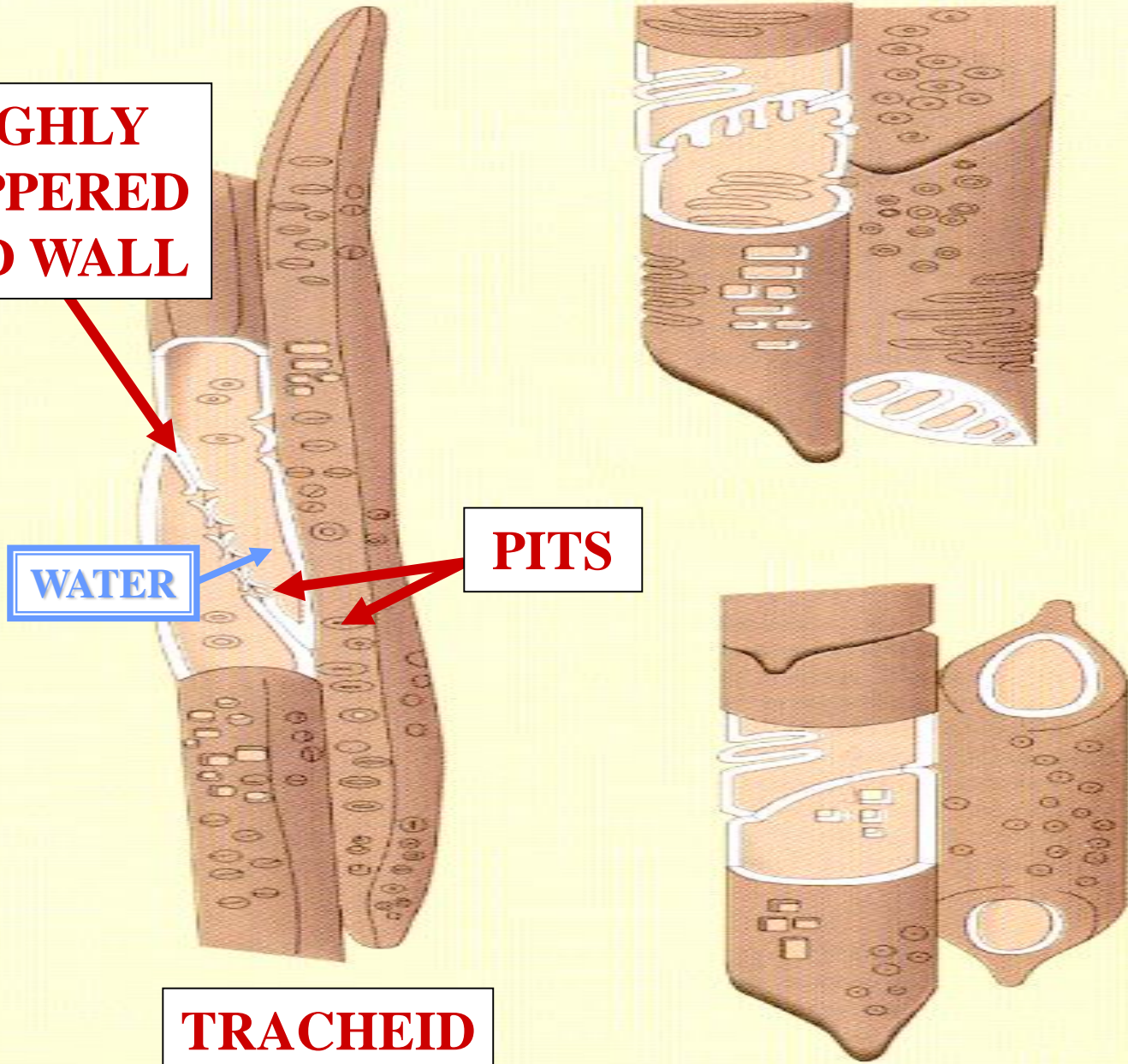


**HIGHLY
TAPPED
END WALL**

WATER

PITS

TRACHEID



**HIGHLY
TAPPED
END WALL**

**LESS
TAPPED
END WALL**

?

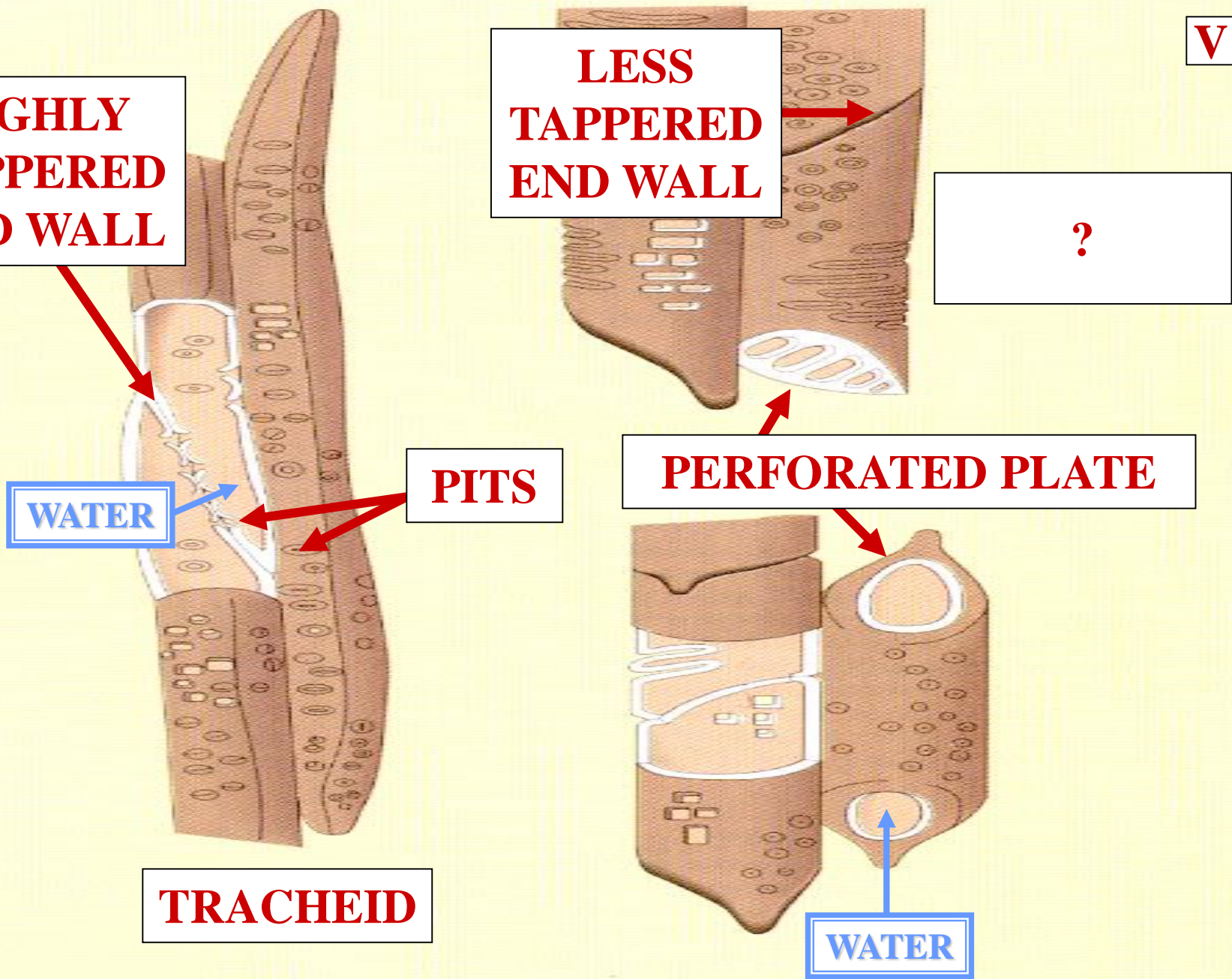
WATER

PITS

PERFORATED PLATE

TRACHEID

WATER



**HIGHLY
TAPPED
END WALL**

**LESS
TAPPED
END WALL**

**VESSEL
MEMBER**



T

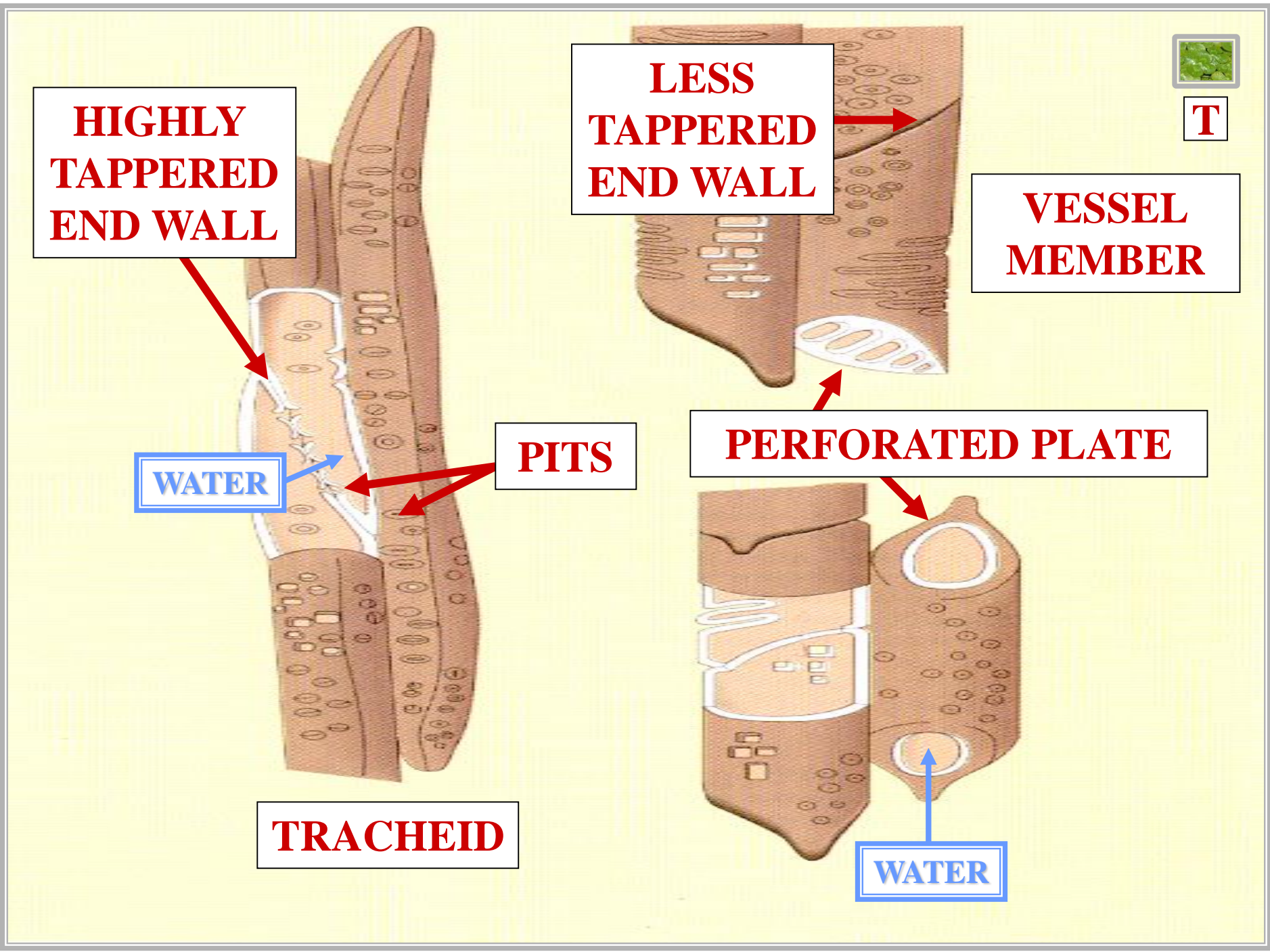
WATER

PITS

PERFORATED PLATE

TRACHEID

WATER



A close-up photograph of Marsilea leaves, which are bright green and have a fan-like shape with a central vein. The leaves are covered with numerous small, clear water droplets. The background is dark, making the green leaves stand out.

**TRACHEIDS
&
VESSEL MEMBERS**



MARSILEA

**TRACHEIDS
&
VESSEL MEMBERS**

S





**TRACHEIDS
&
VESSEL MEMBERS**



SELAGINELLA

**TRACHEIDS
&
VESSEL MEMBERS**

E





**TRACHEIDS
&
VESSEL MEMBERS**



EQUISETUM



STEM



STEM STELE

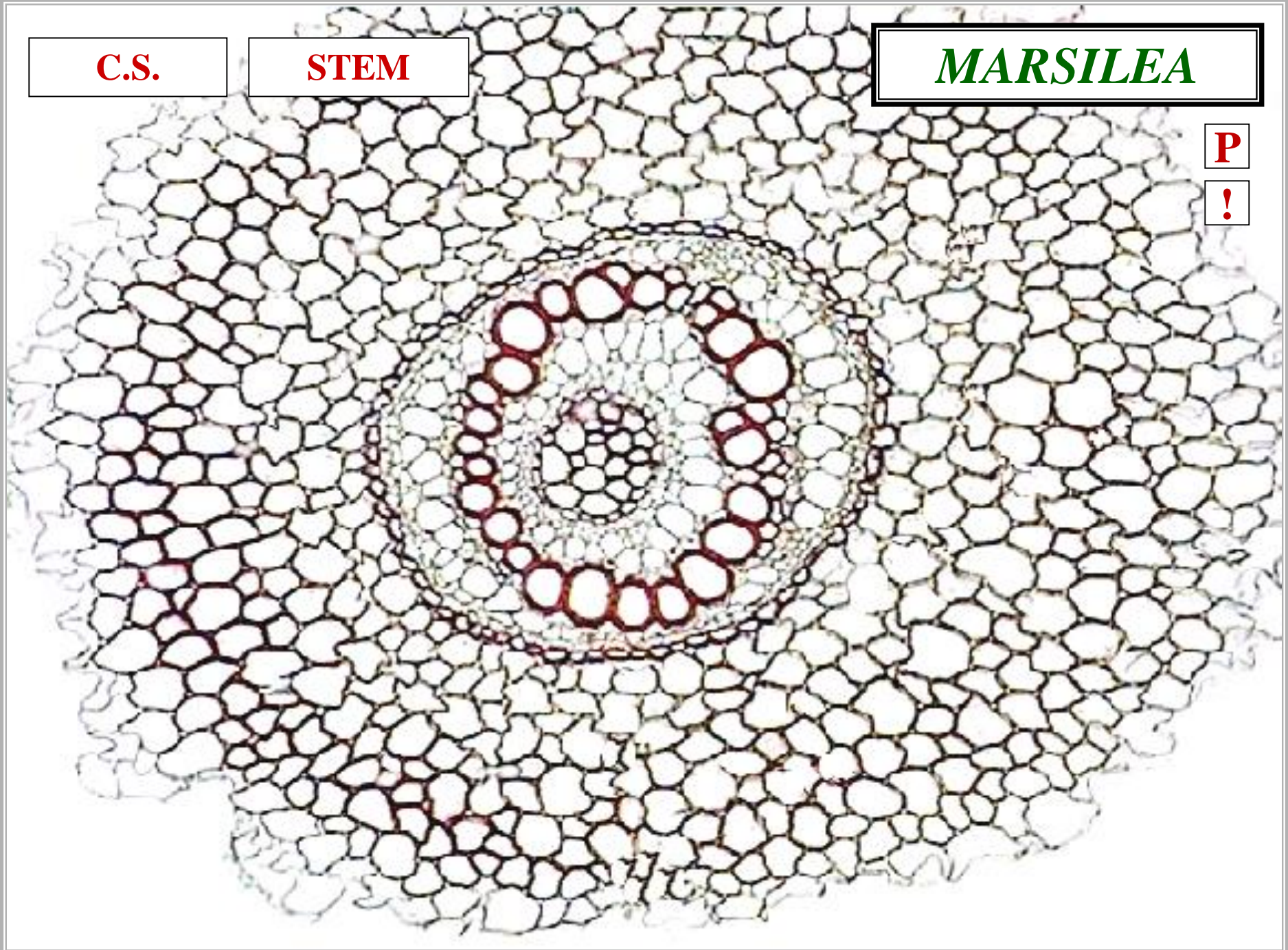
C.S.

STEM

MARSILEA

P

!



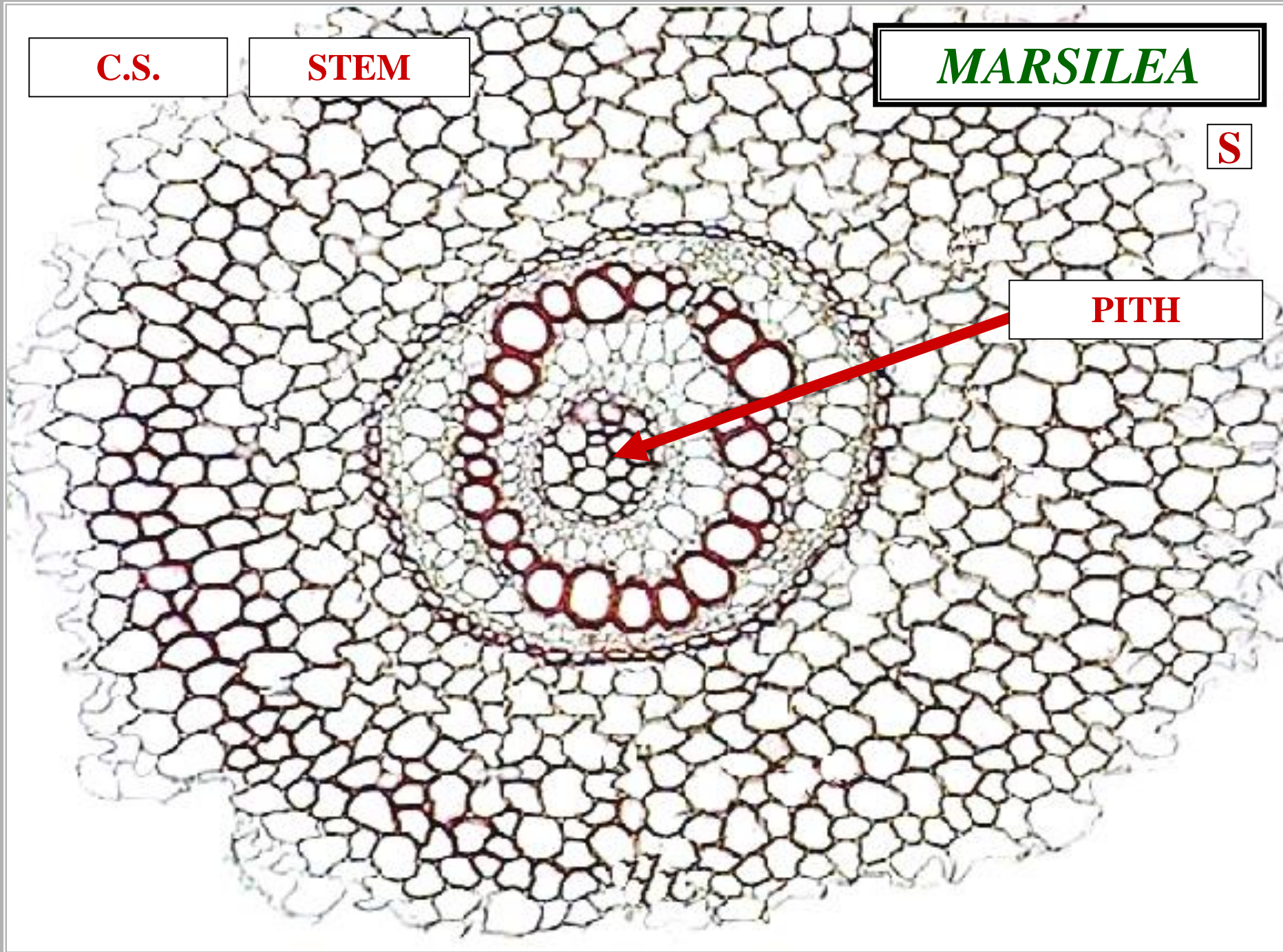
C.S.

STEM

MARSILEA

S

PITH



C.S.

STEM

MARSILEA

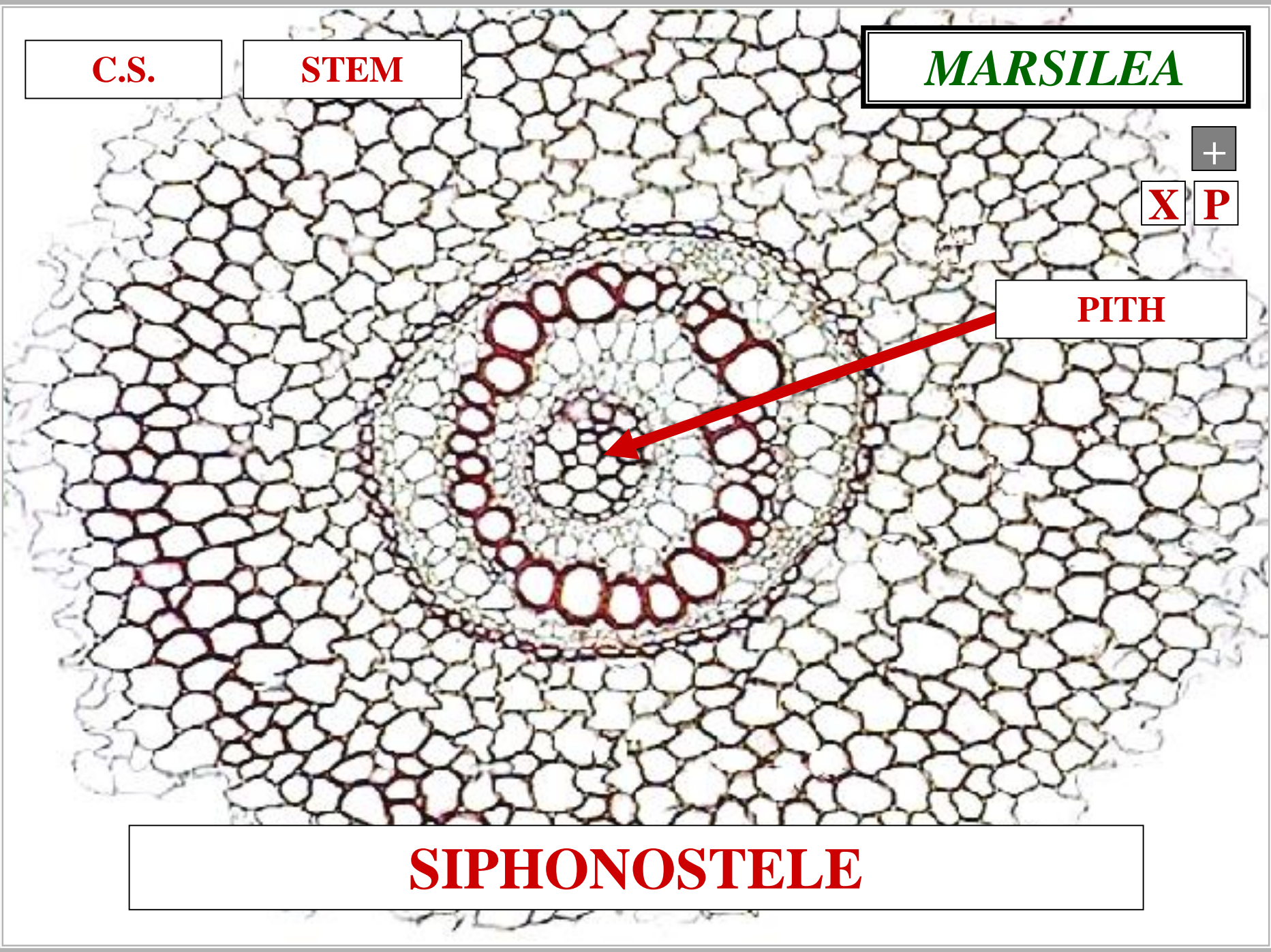
+

X

P

PITH

SIPHONOSTELE



MARSILEA

A

C.S.

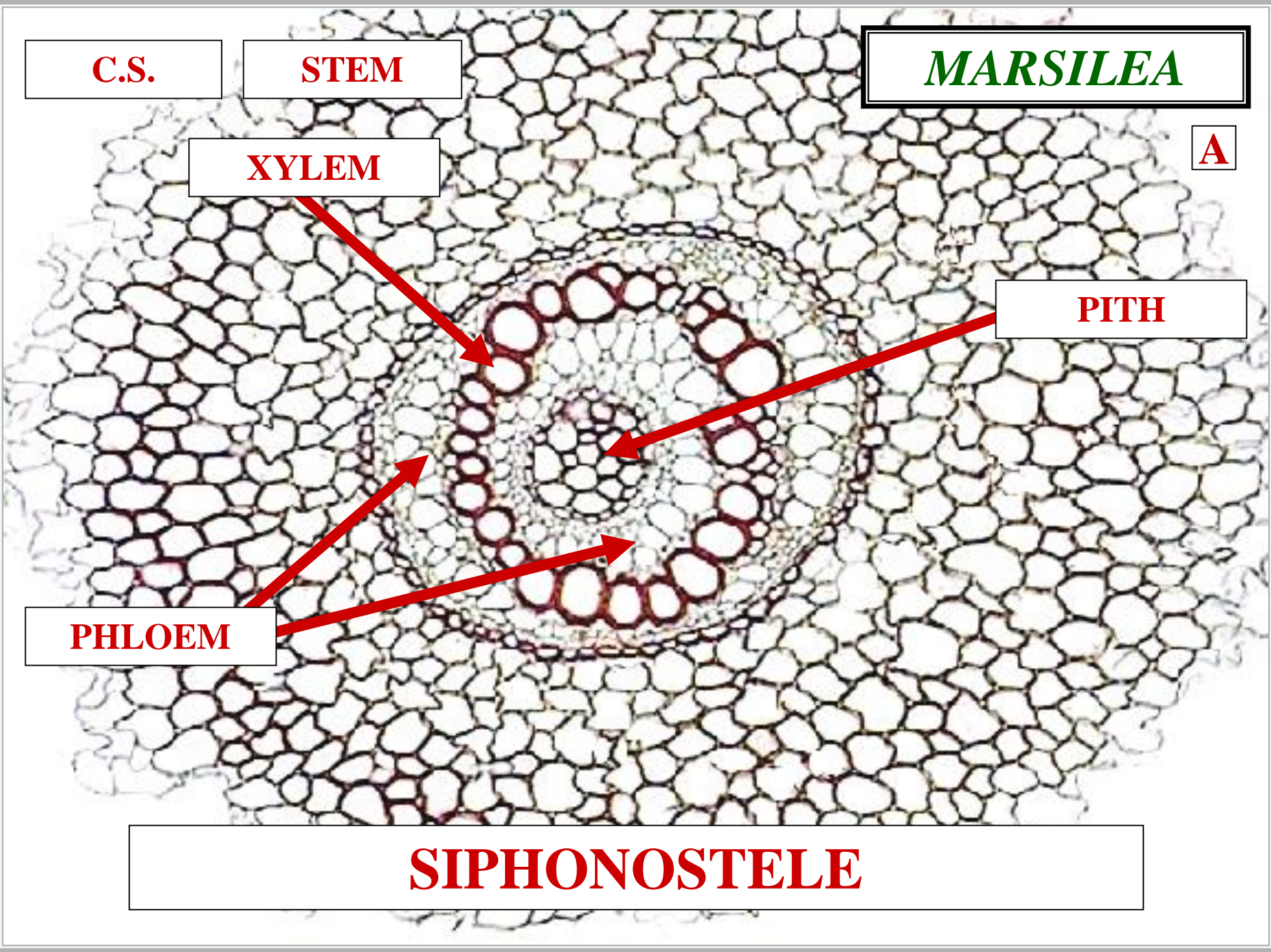
STEM

XYLEM

PITH

PHLOEM

SIPHONOSTELE



MARSILEA

C.S.

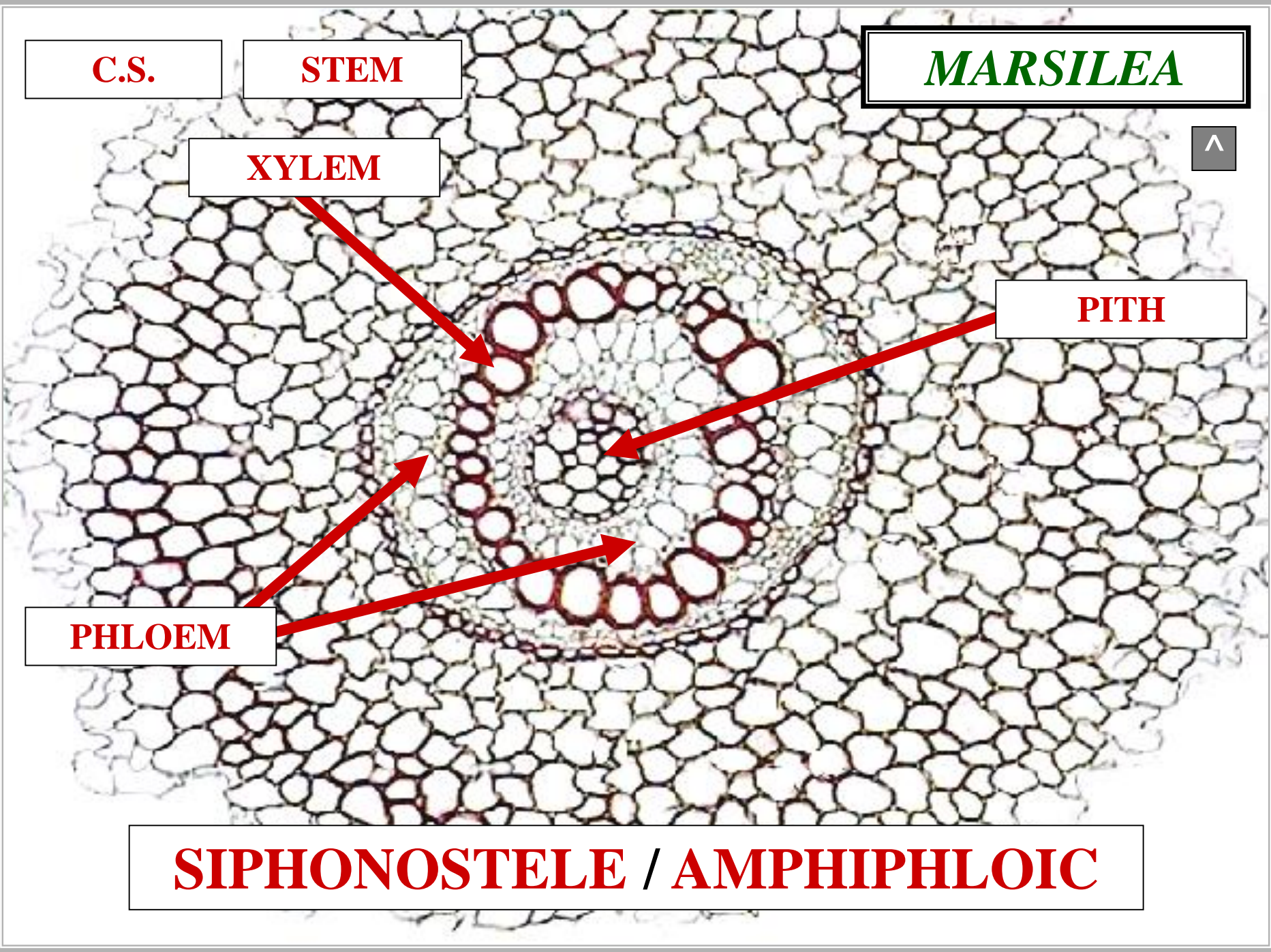
STEM

XYLEM

PITH

PHLOEM

SIPHONOSTELE / AMPHIPHLOIC



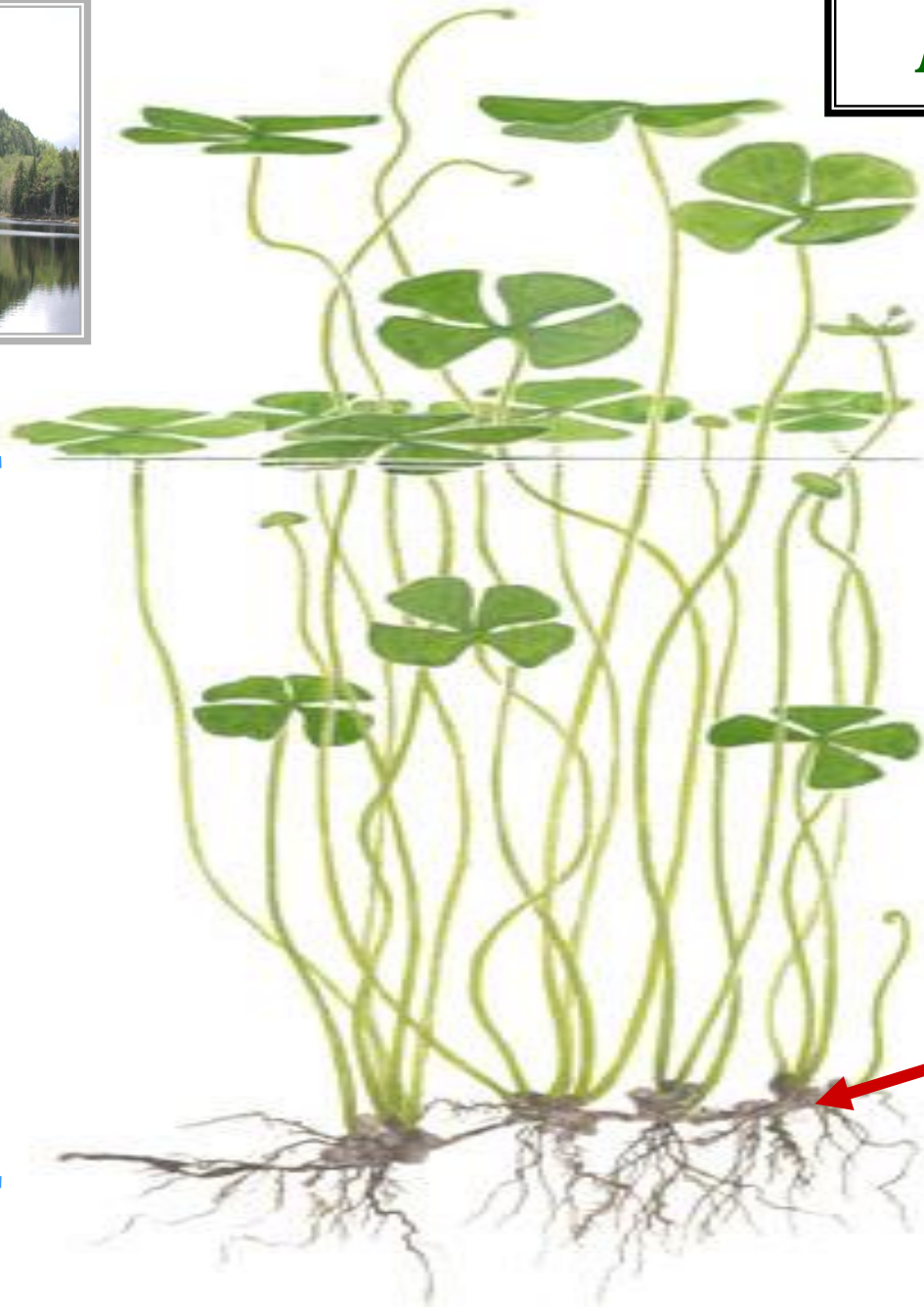
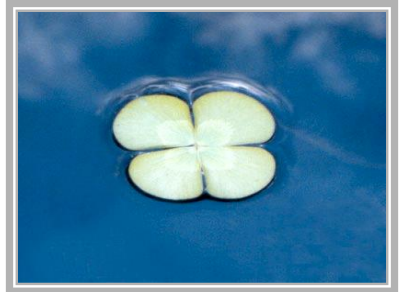


RHIZOME



MARSILEA

L



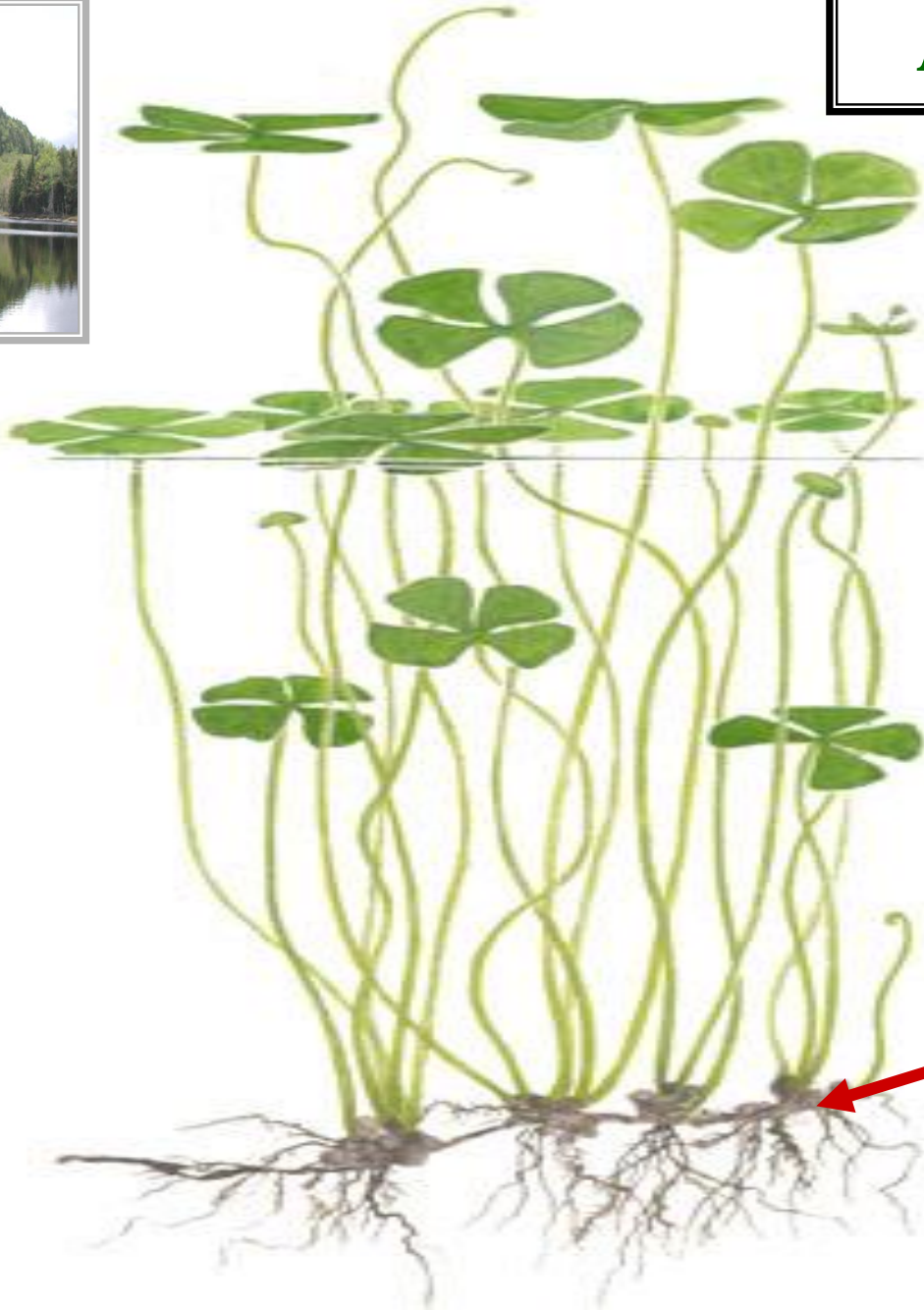
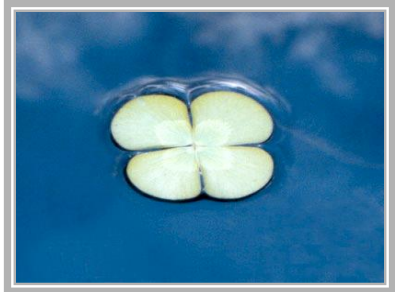
WATER

RHIZOME



MARSILEA

E



WATER

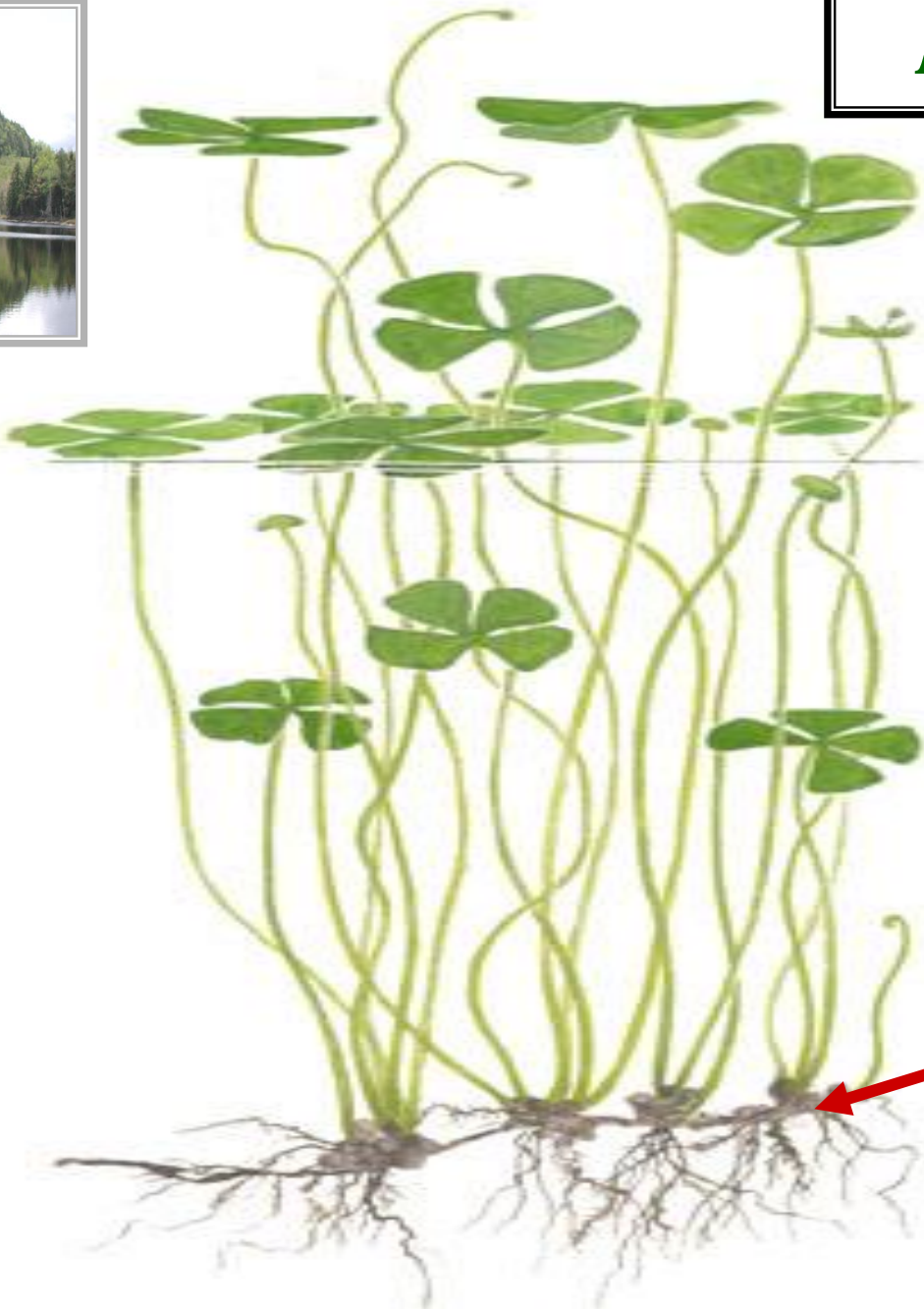
**LATERAL
GROWTH**



MARSILEA



WATER

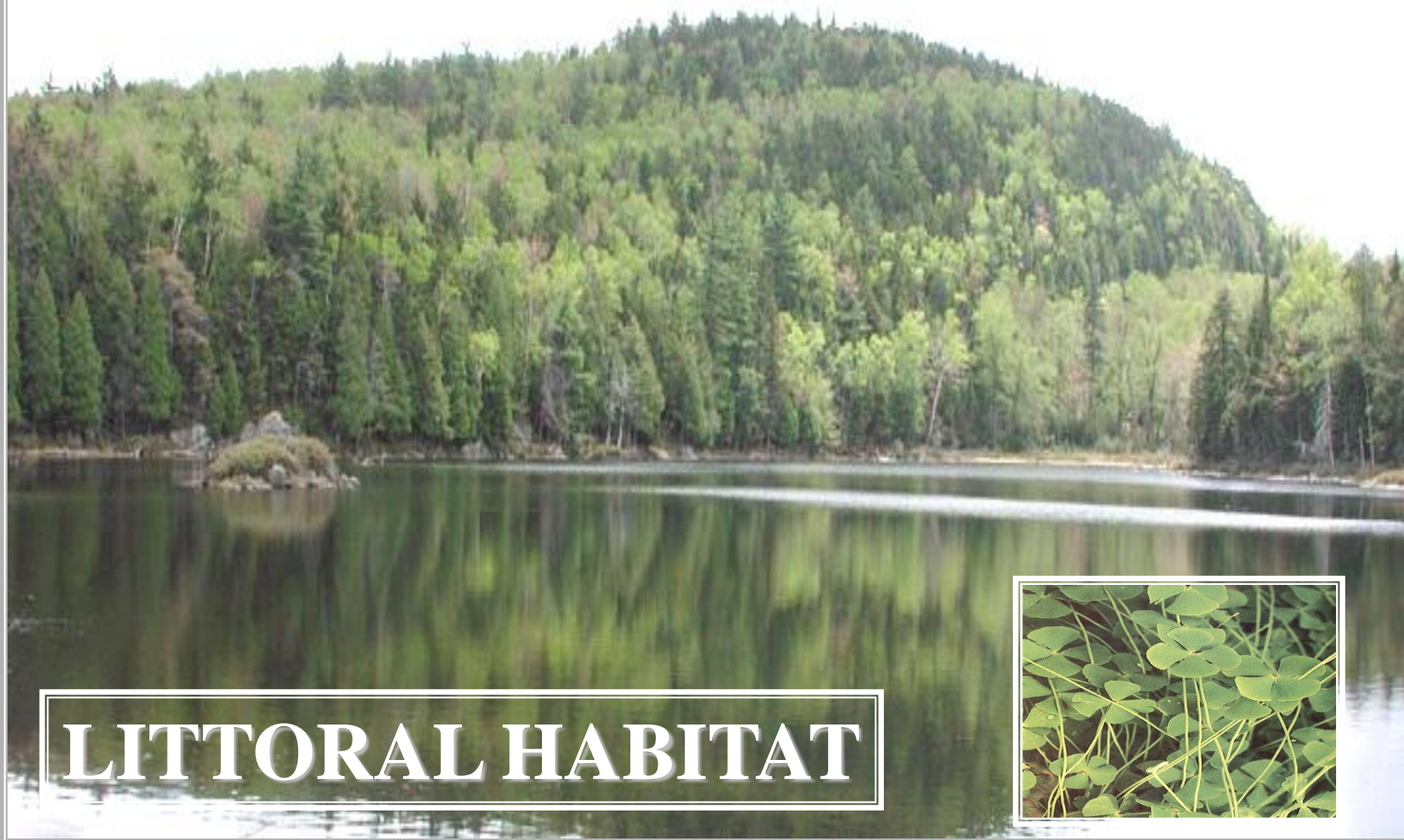


EXTENSIVE BRANCHING

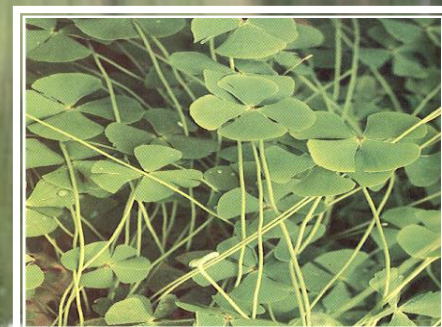




ALABAMA LAKE OR ALABAMA POND



LITTORAL HABITAT

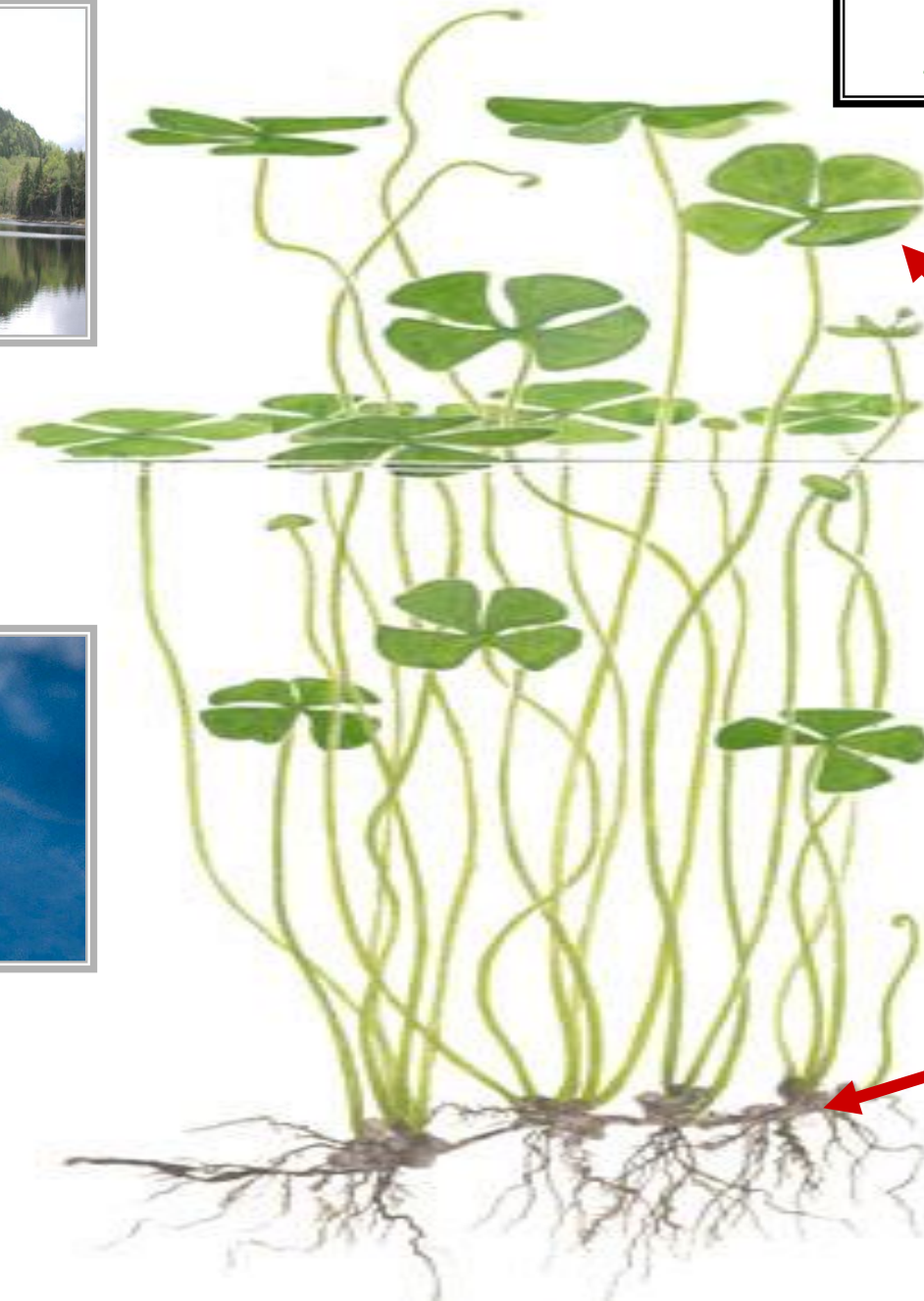
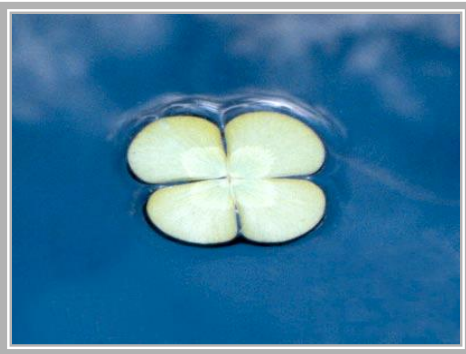




FROND



PHYLLOTAXY

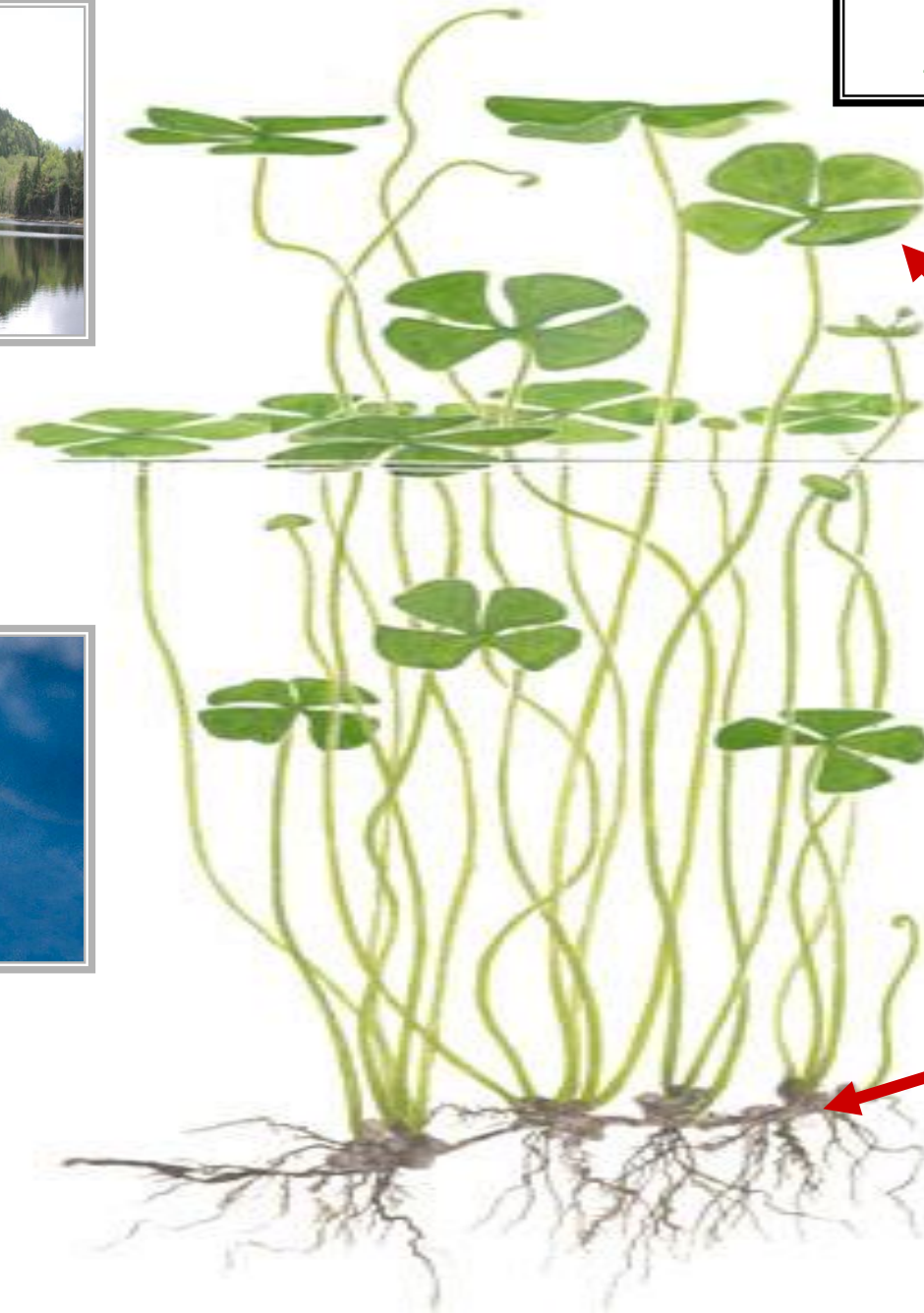
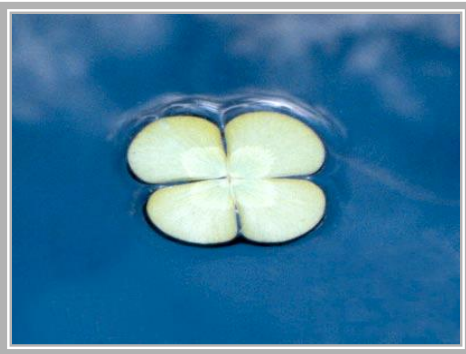


MARSILEA

1

**FROND
PHYLLOTAXY**

RHIZOME

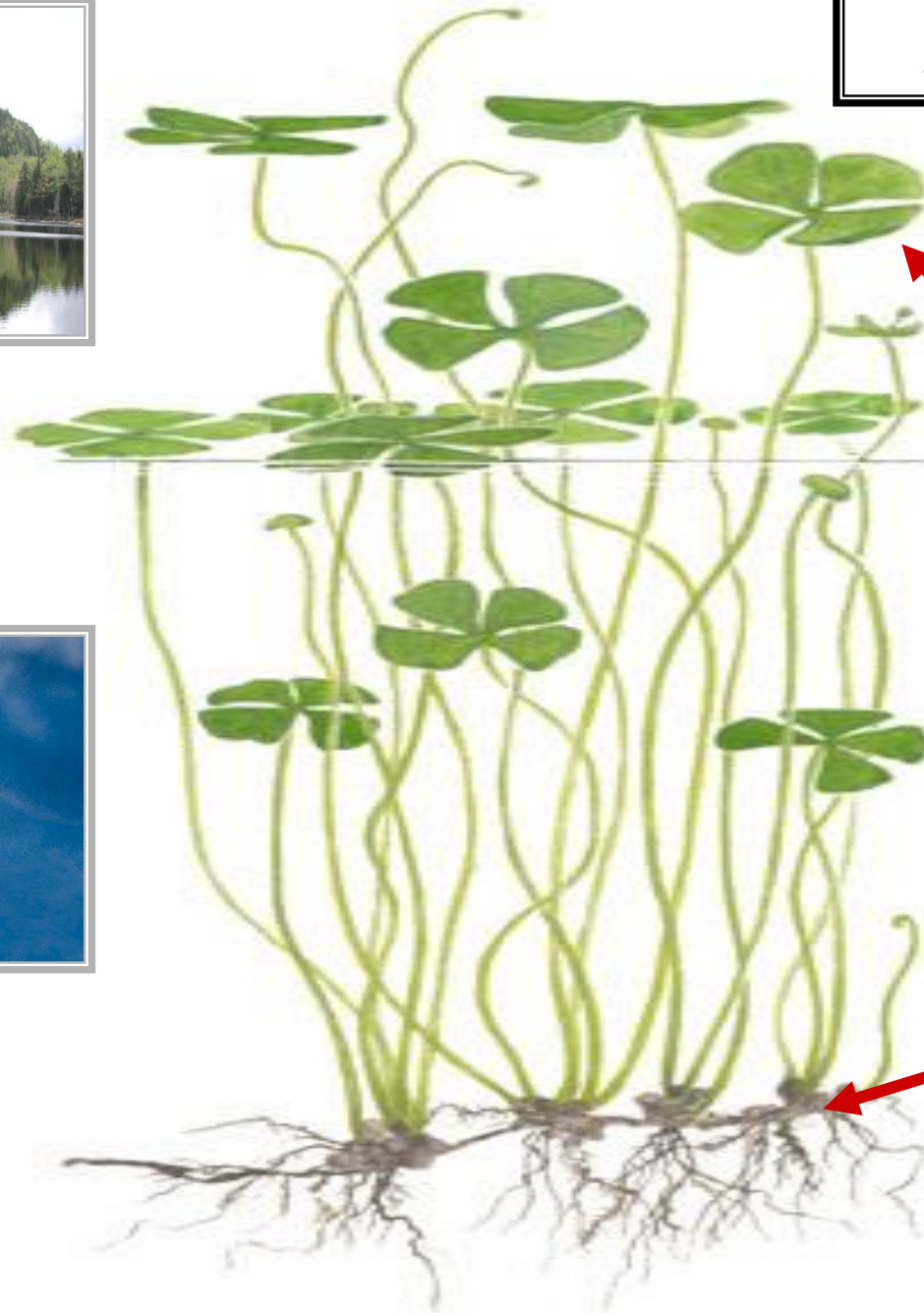
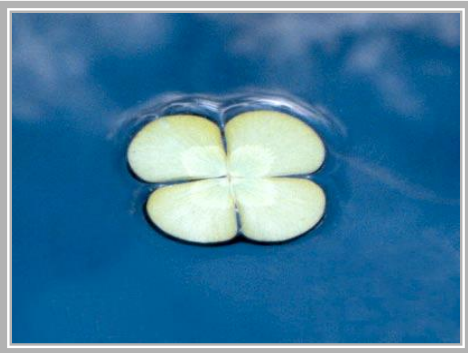


MARSILEA

A

**1 FROND
PER NODE**

RHIZOME



MARSILEA

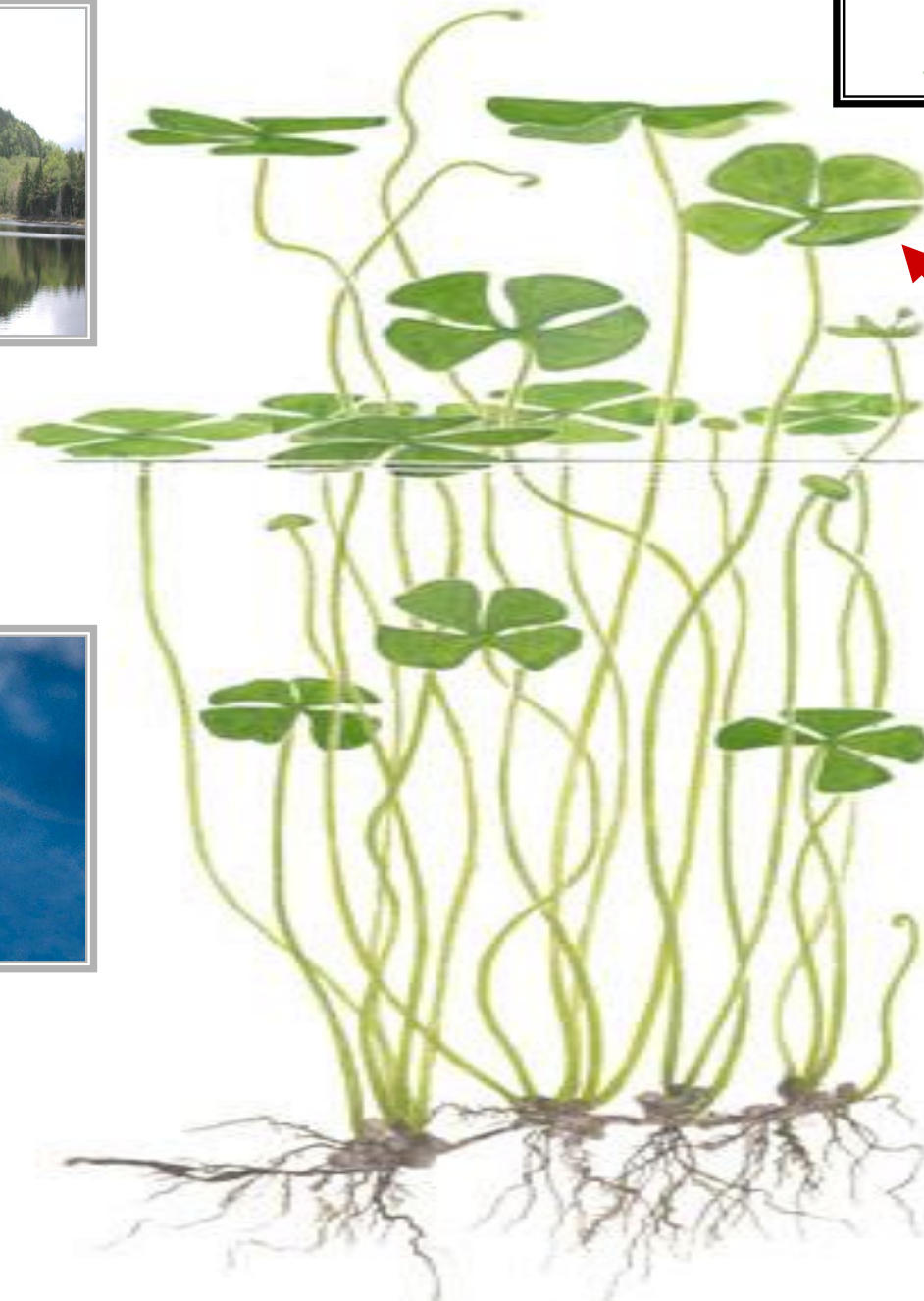
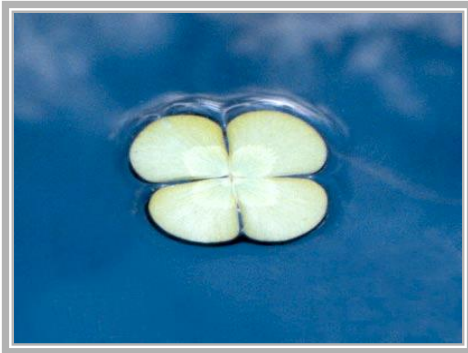


**ALTERNATE
PHYLLOTAXY**

RHIZOME



VERNATION



MARSILEA

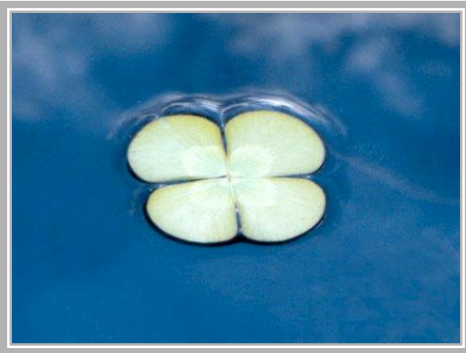
F

**FROND
VERNATION**

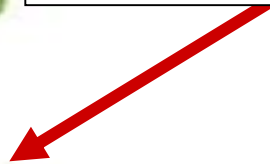




MARSILEA

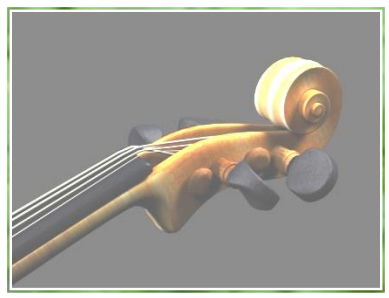


“FIDDLEHEAD”





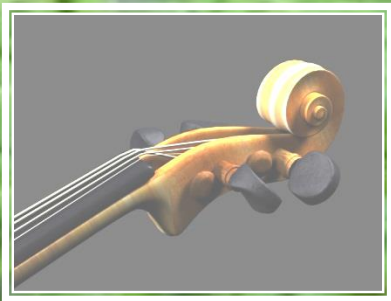
“FIDDLEHEAD”





“FIDDLEHEAD”

CROZIER

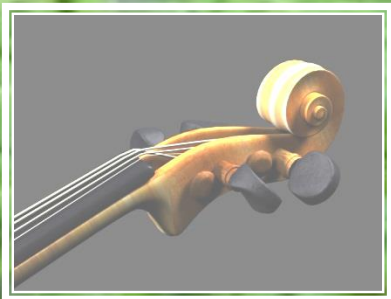




“FIDDLEHEAD”

CROZIER

CIRCINATE VERNATION

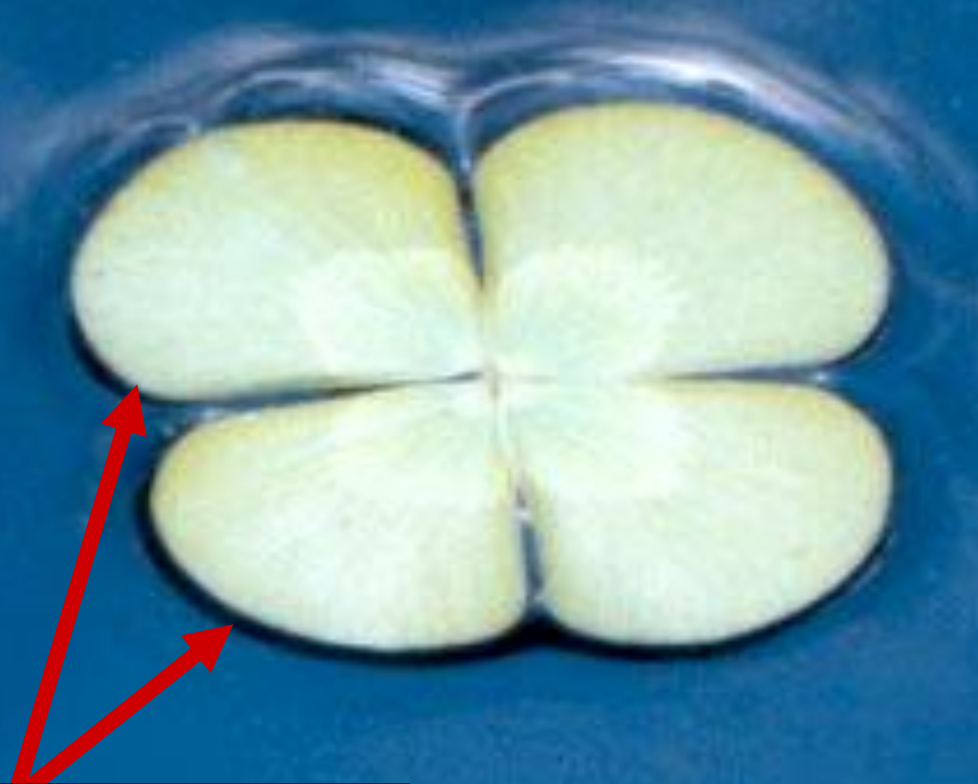




MORPHOLOGY

MARSILEA

P



FROND MORPHOLOGY

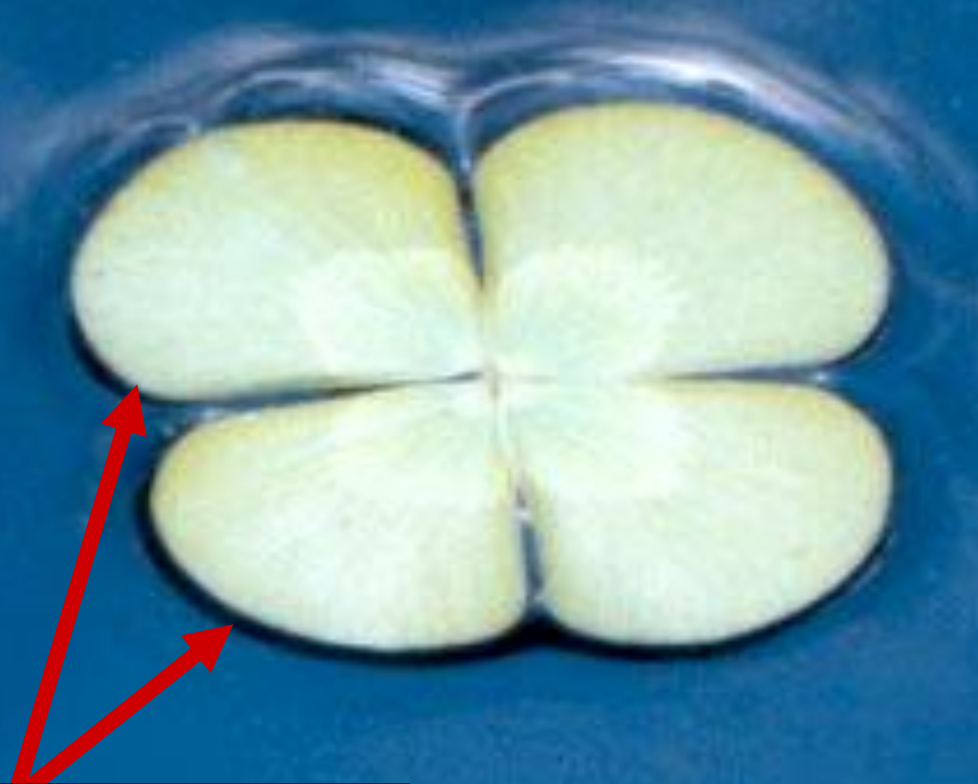
MARSILEA

C



CLOVER-LIKE PINNAE

MARSILEA

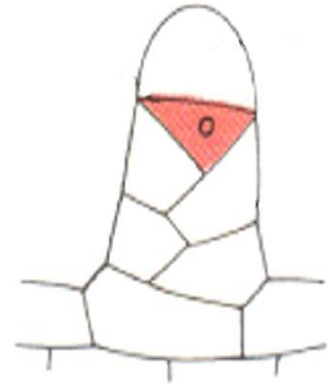
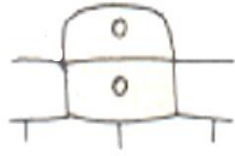
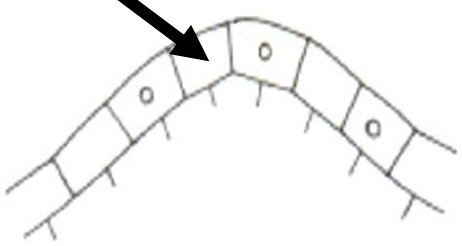


COMPOUND FROND

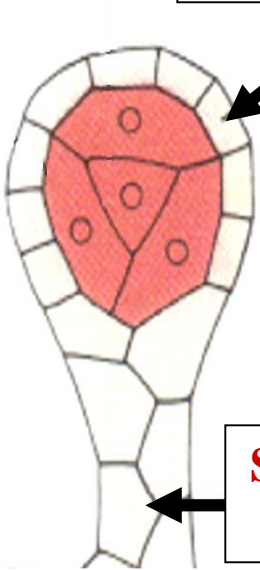


SPORANGIUM

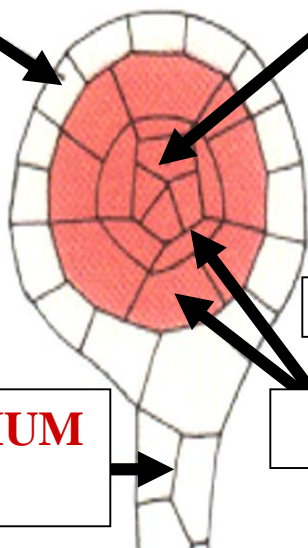
CELL INITIAL



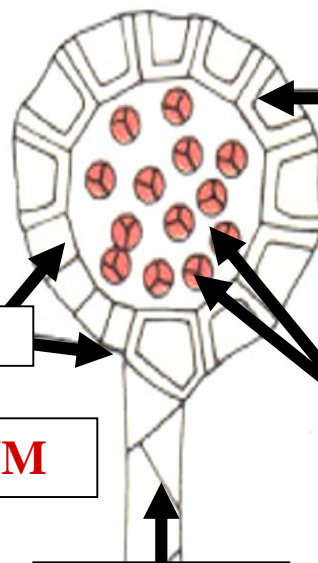
SPORANGIUM WALL



SPOROCYTES



SMALL SIZE



ANNULUS

THIN WALL

STOMIUM

FEW SPORES

SPORANGIUM STALK

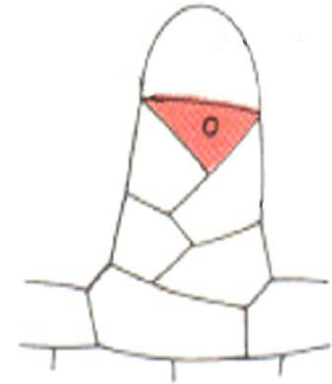
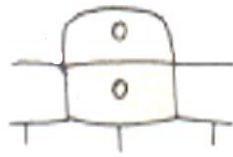
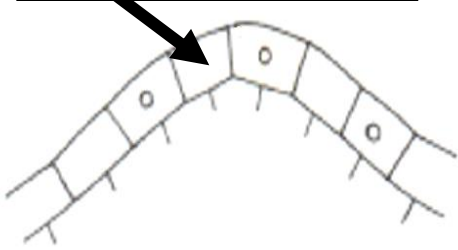
TAPETUM

STALK

L.S.



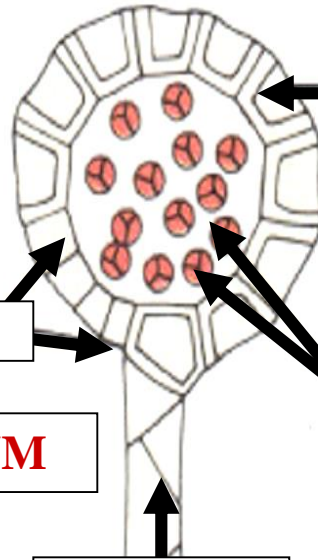
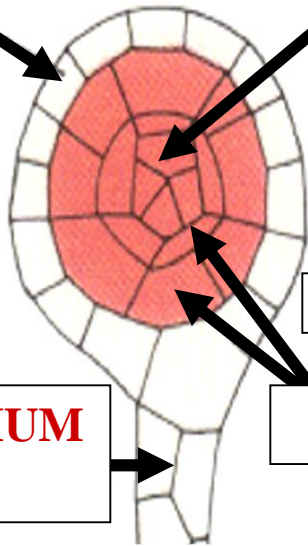
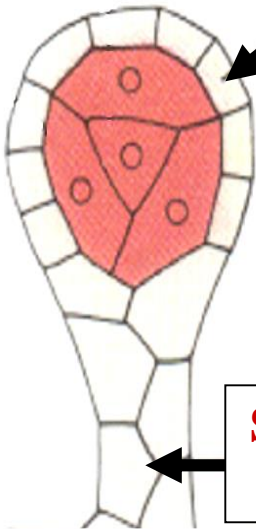
CELL INITIAL



SPORANGIUM WALL

SPOROCYTES

SMALL SIZE



ANNULUS

THIN WALL

STOMIUM

FEW SPORES

SPORANGIUM STALK

TAPETUM

STALK

LEPTOSPORANGIUM

L.S.



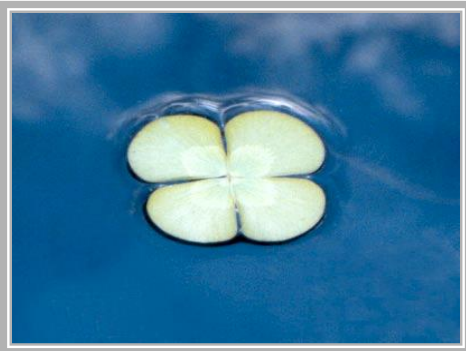
SPORANGIUM POSITION

ALABAMA LAKE OR ALABAMA POND



MARSILEA

F



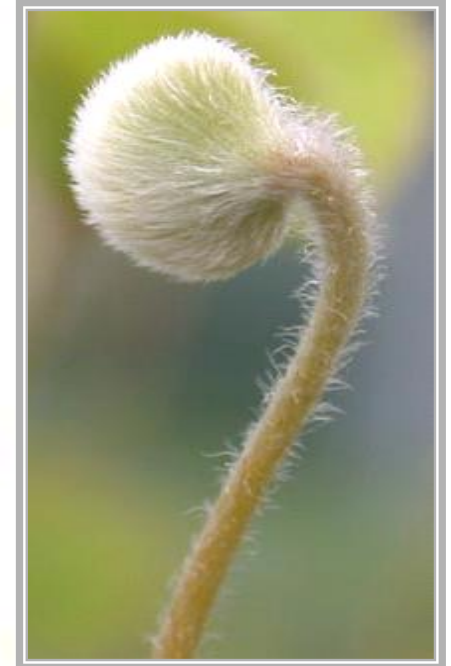
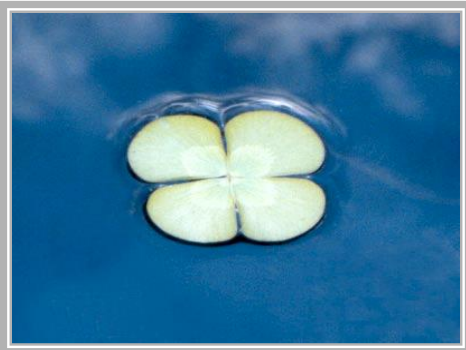
**MODIFIED
PINNA
BEARS
SPORANGIA**

ALABAMA LAKE OR ALABAMA POND



MARSILEA

?



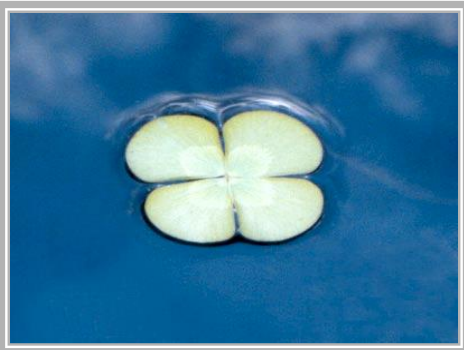
FOLIAR

ALABAMA LAKE OR ALABAMA POND



MARSILEA

S

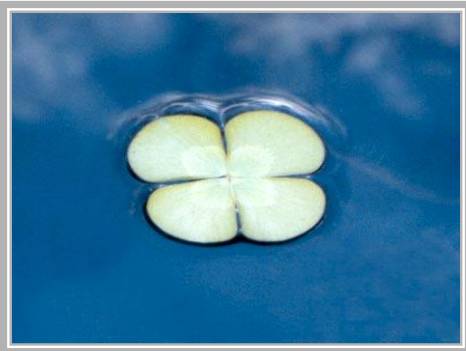


?

ALABAMA LAKE OR ALABAMA POND



MARSILEA



SPOROCARP

SPOROCARP

SPOROCARP

**MARSILEALES
SPOROCARP**



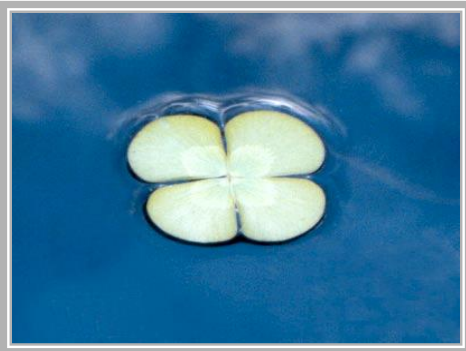
MODIFIED PINNA

**MARSILEALES
SPOROCARP**

ALABAMA LAKE OR ALABAMA POND



MARSILEA



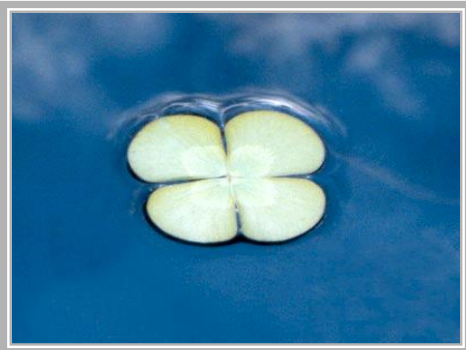
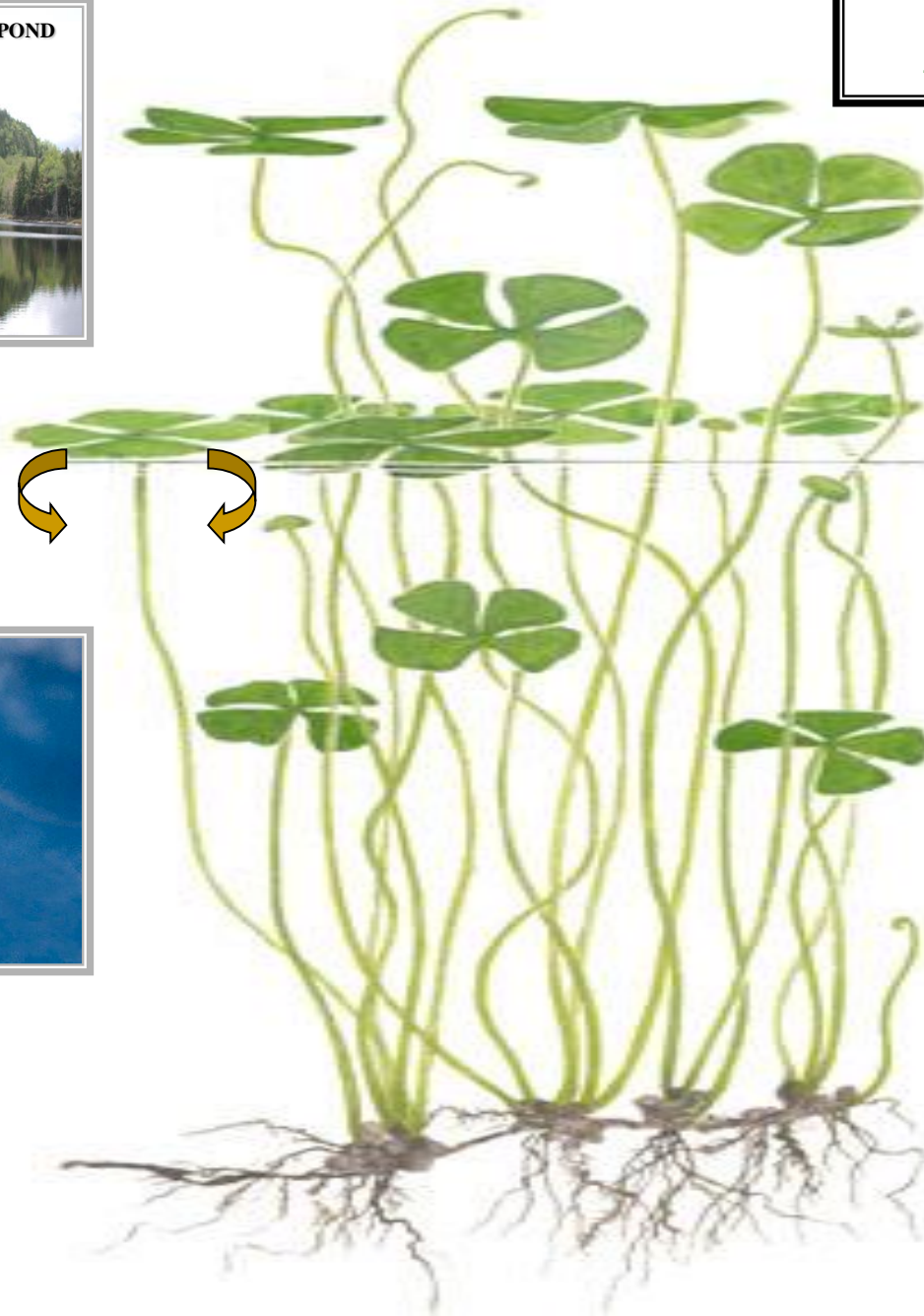
**SPOROCARP
MODIFIED
PINNA**

ALABAMA LAKE OR ALABAMA POND



MARSILEA

EN

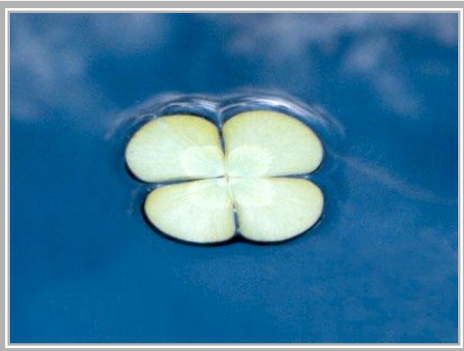
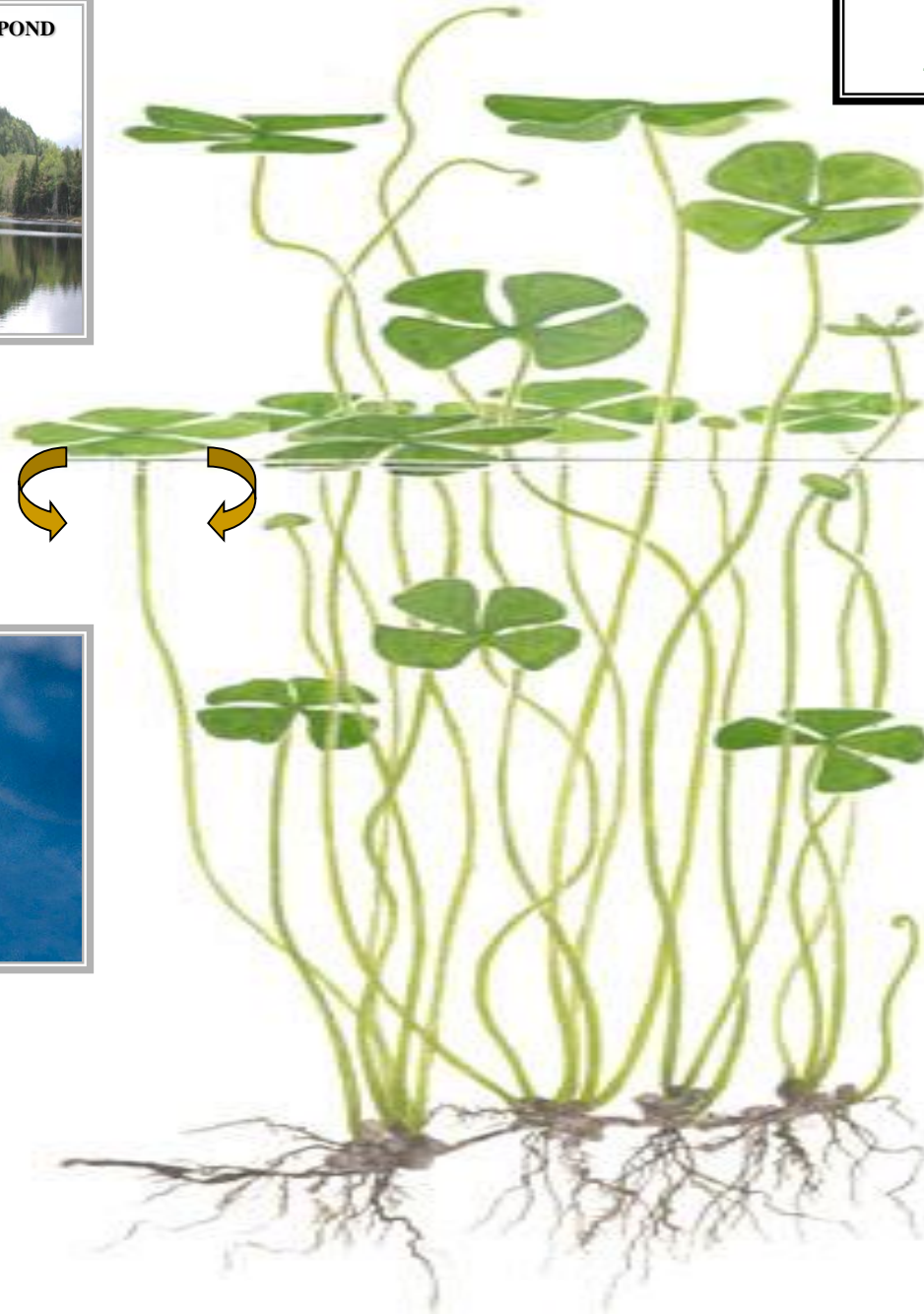


**SPOROCARP
MODIFIED
PINNA**

ALABAMA LAKE OR ALABAMA POND



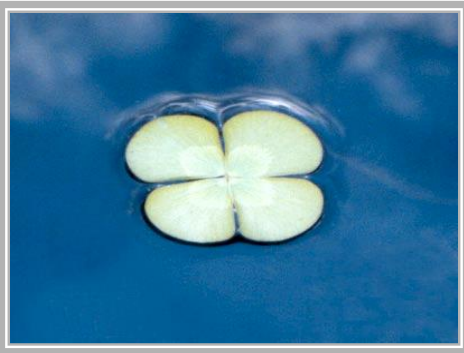
MARSILEA



**SPOROCARP
ENCLOSED
SPORANGIA**



MARSILEA

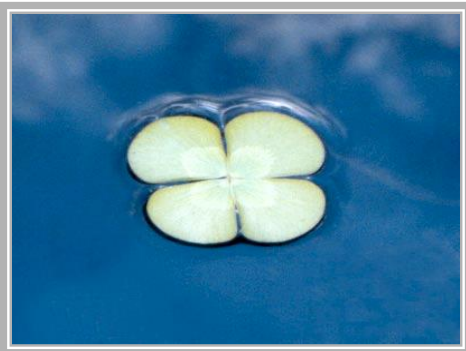


**SPOROCARP
DROUGHT
RESISTANT**

ALABAMA LAKE OR ALABAMA POND



MARSILEA

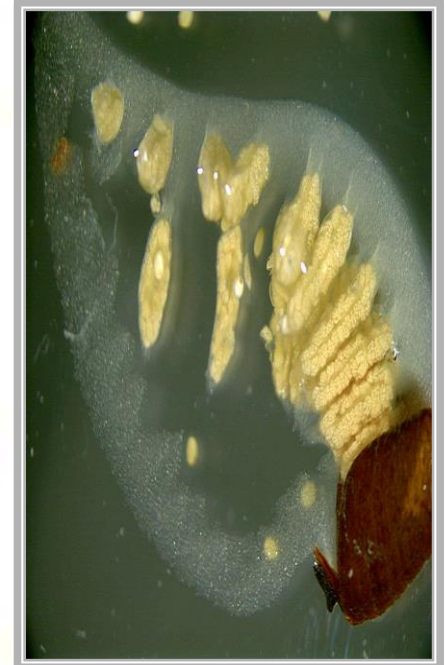
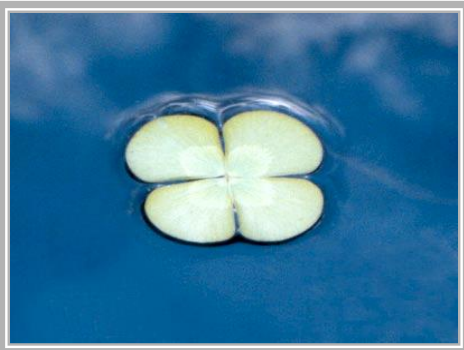


**SPOROCARP
"GERMINATES"**

ALABAMA LAKE OR ALABAMA POND



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**SPOROCARP
"GERMINATES"**



SPOROCARP STRUCTURE

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SPOROCARP

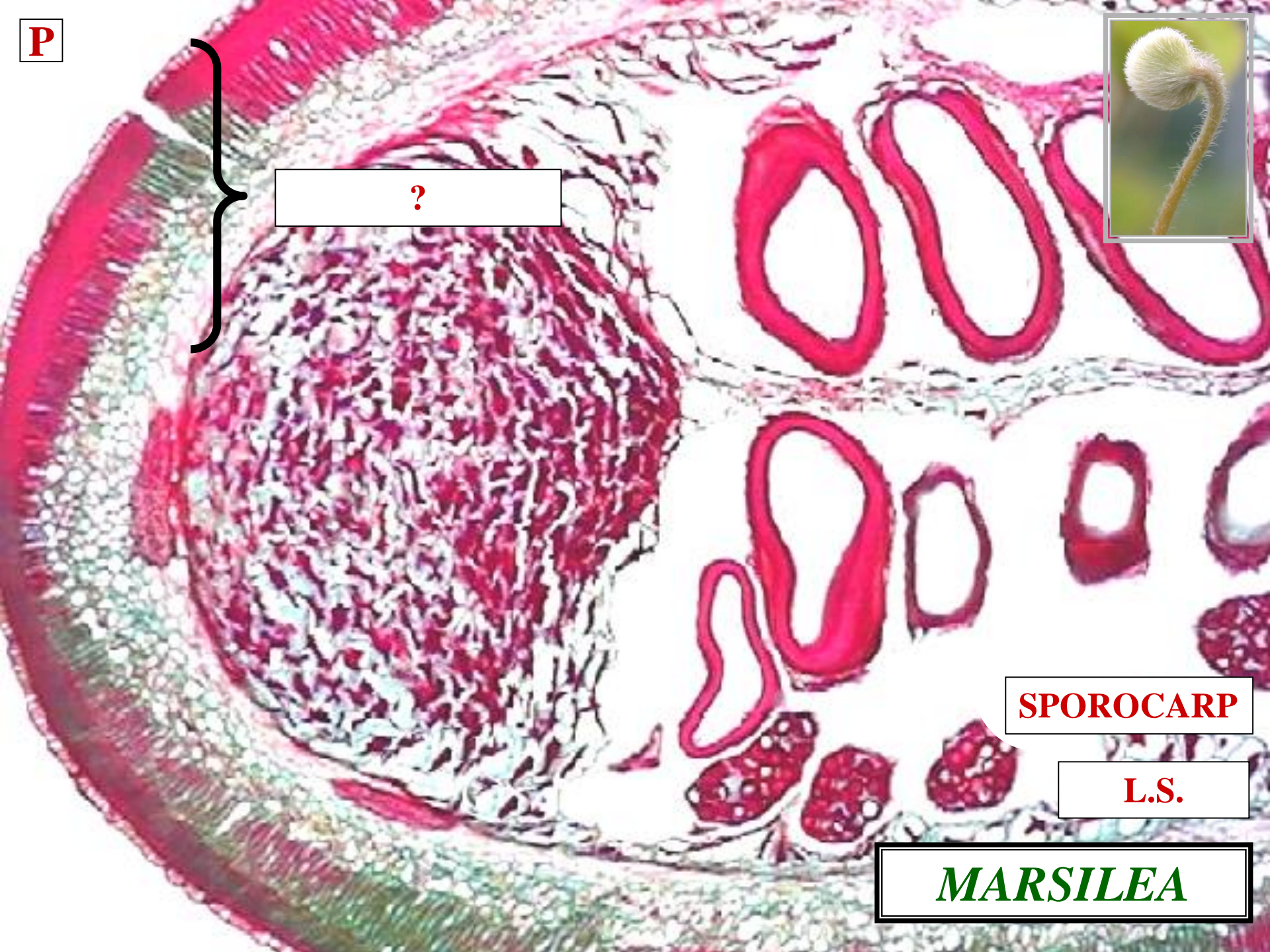
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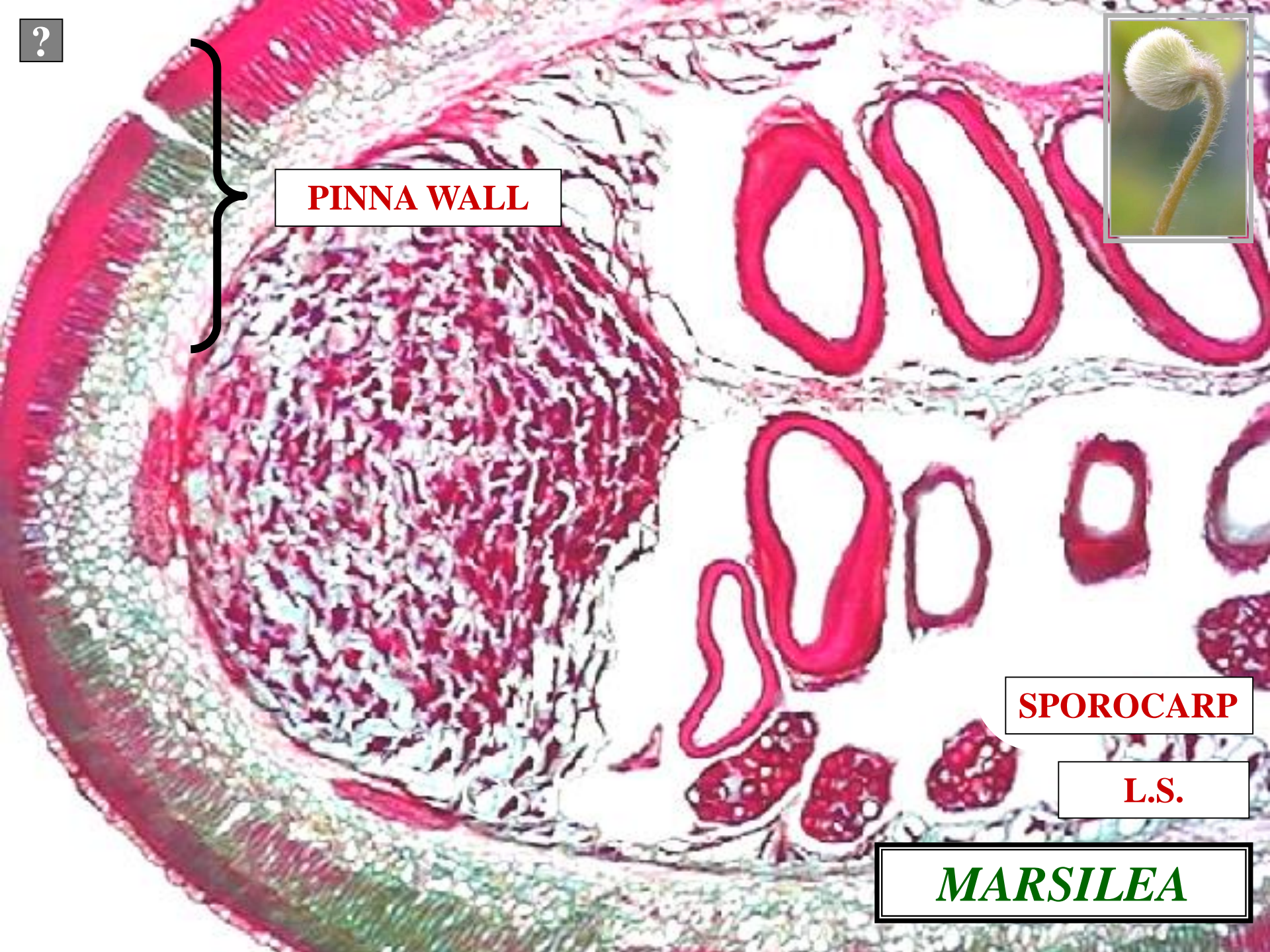


PINNA WALL

SPOROCARP

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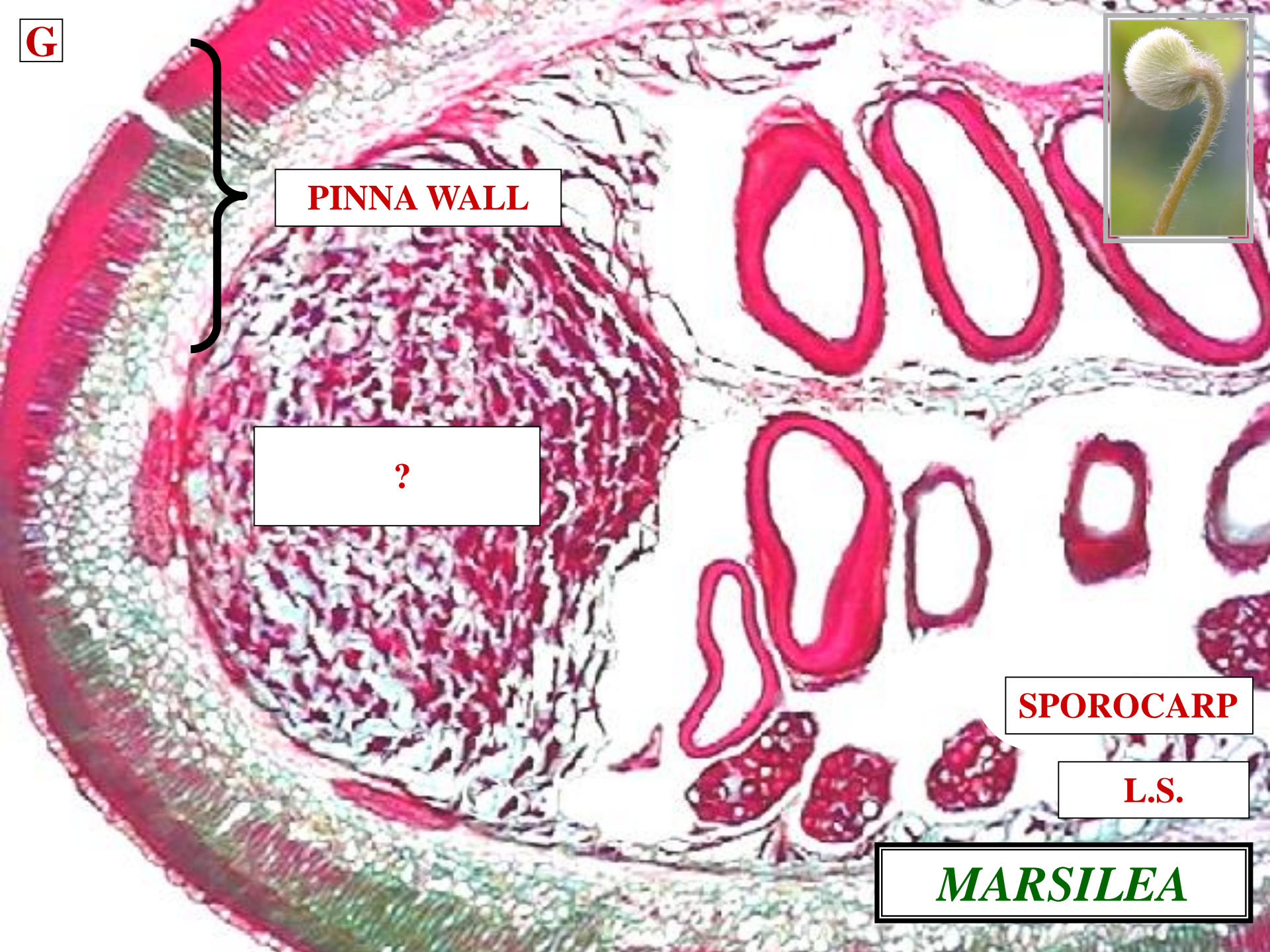
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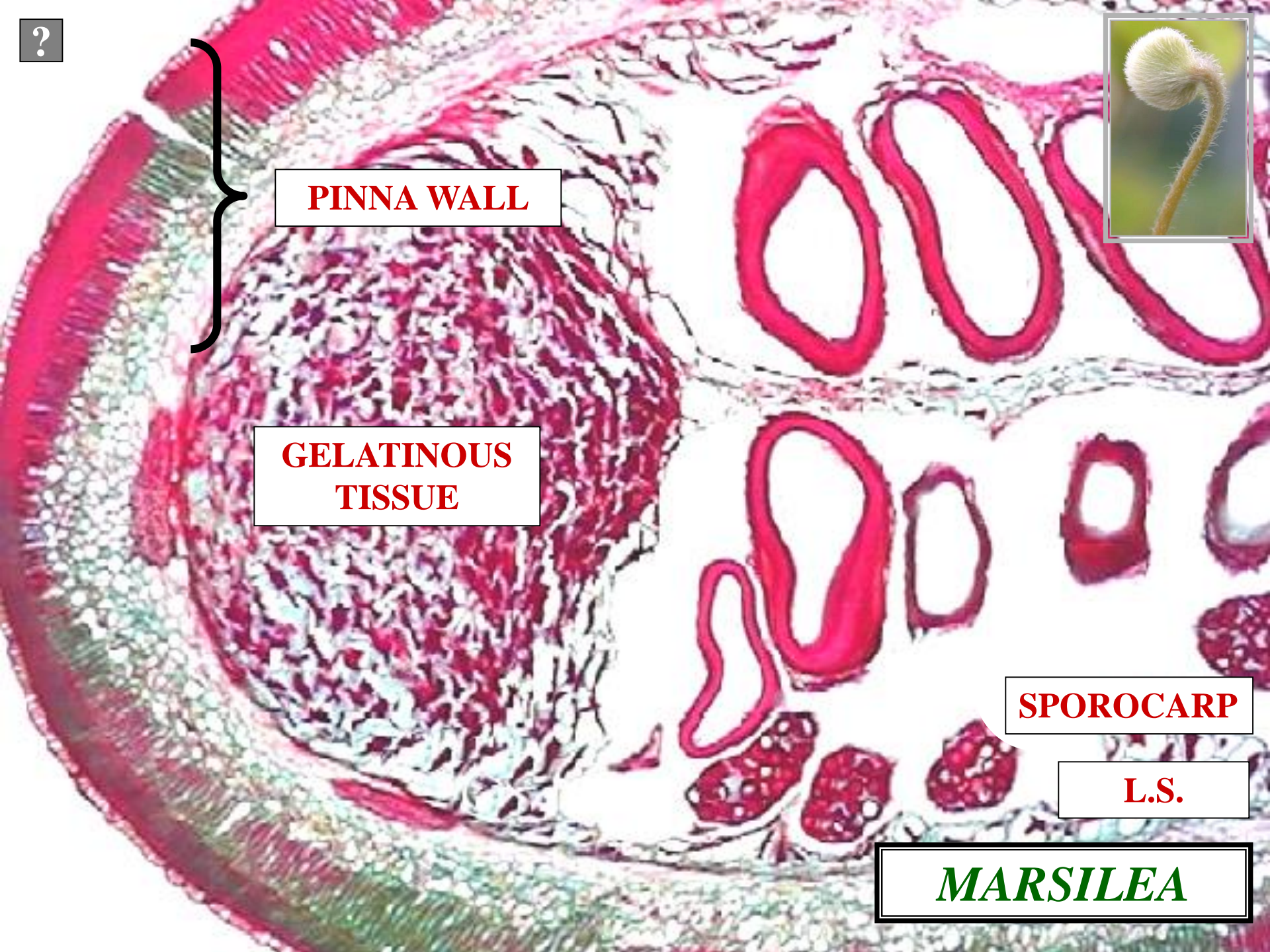
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GELATINOUS TISSUE

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PINNA WALL

GELATINOUS TISSUE

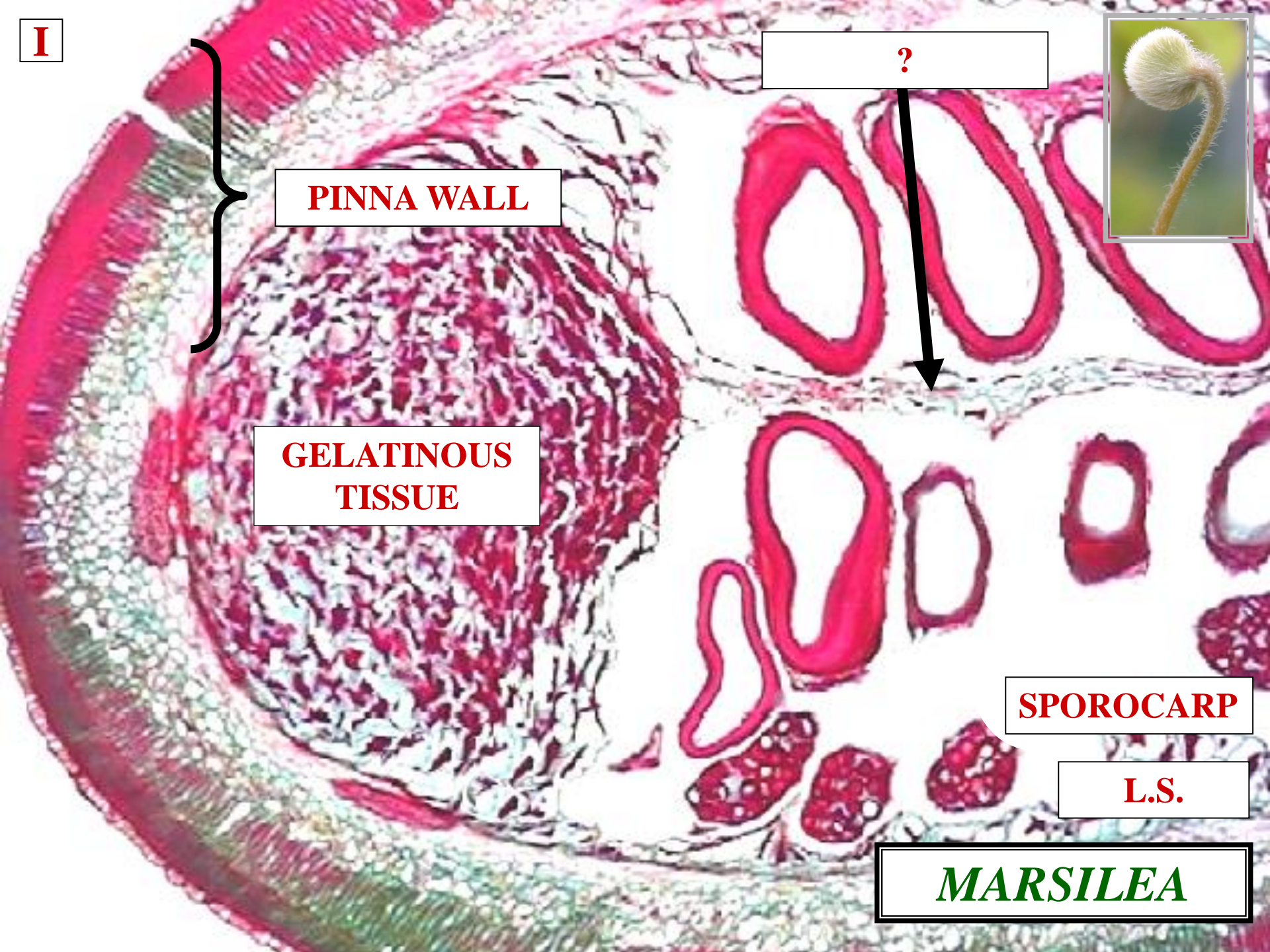
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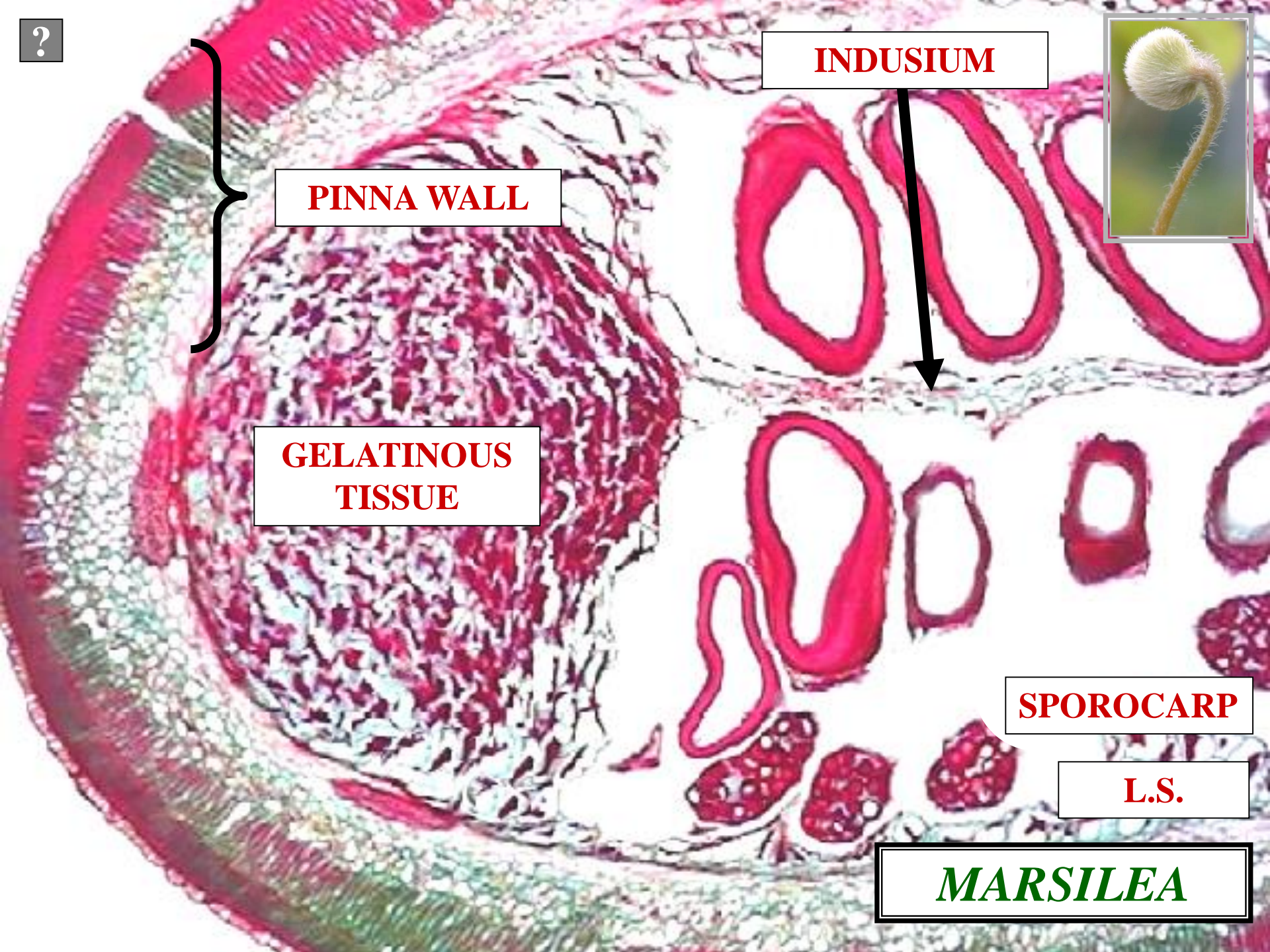
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INDUSIUM



PINNA WALL

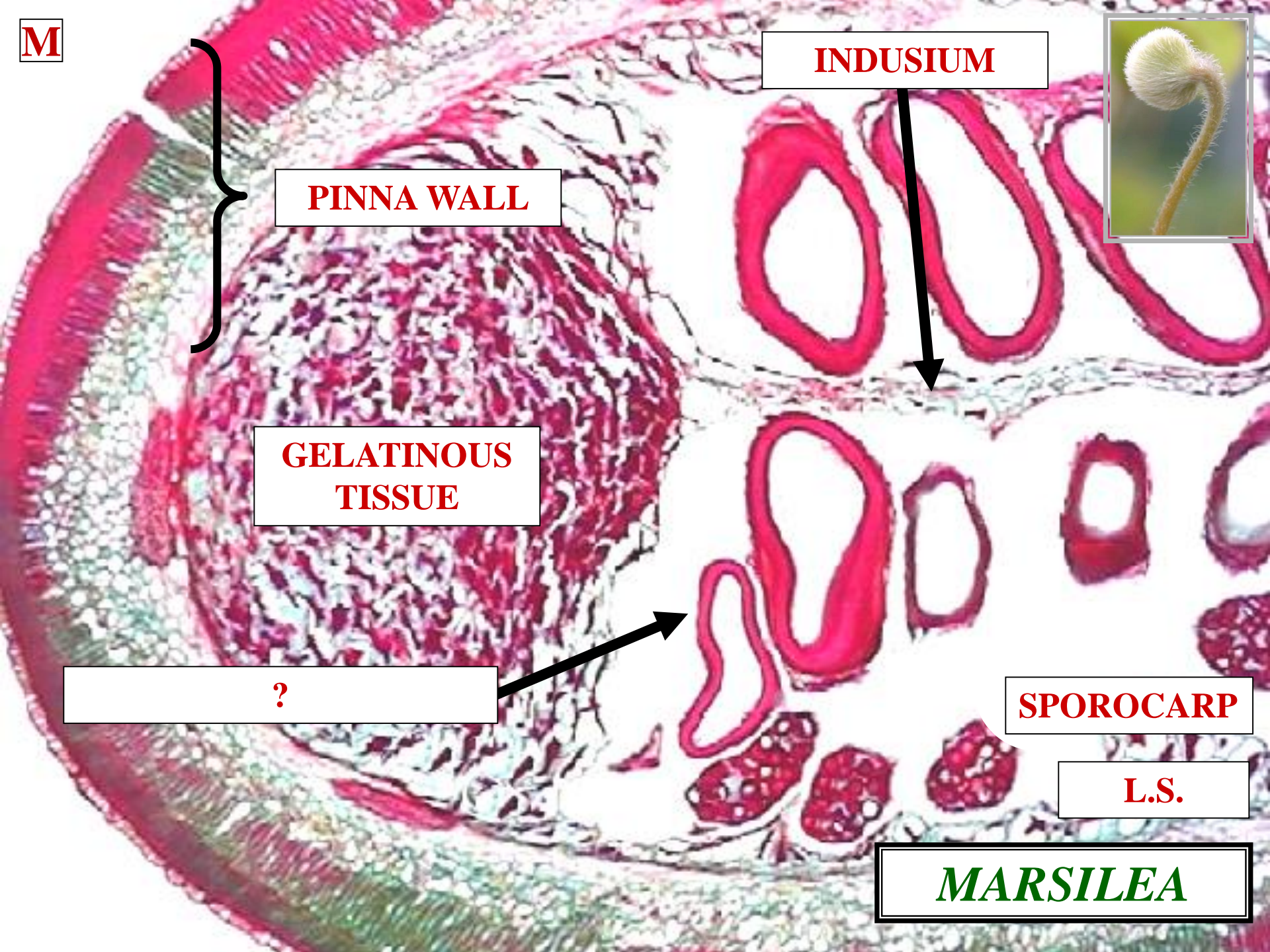
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TISSUE**

SPOROCARP

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INDUSIUM



PINNA WALL

**GELATINOUS
TISSUE**

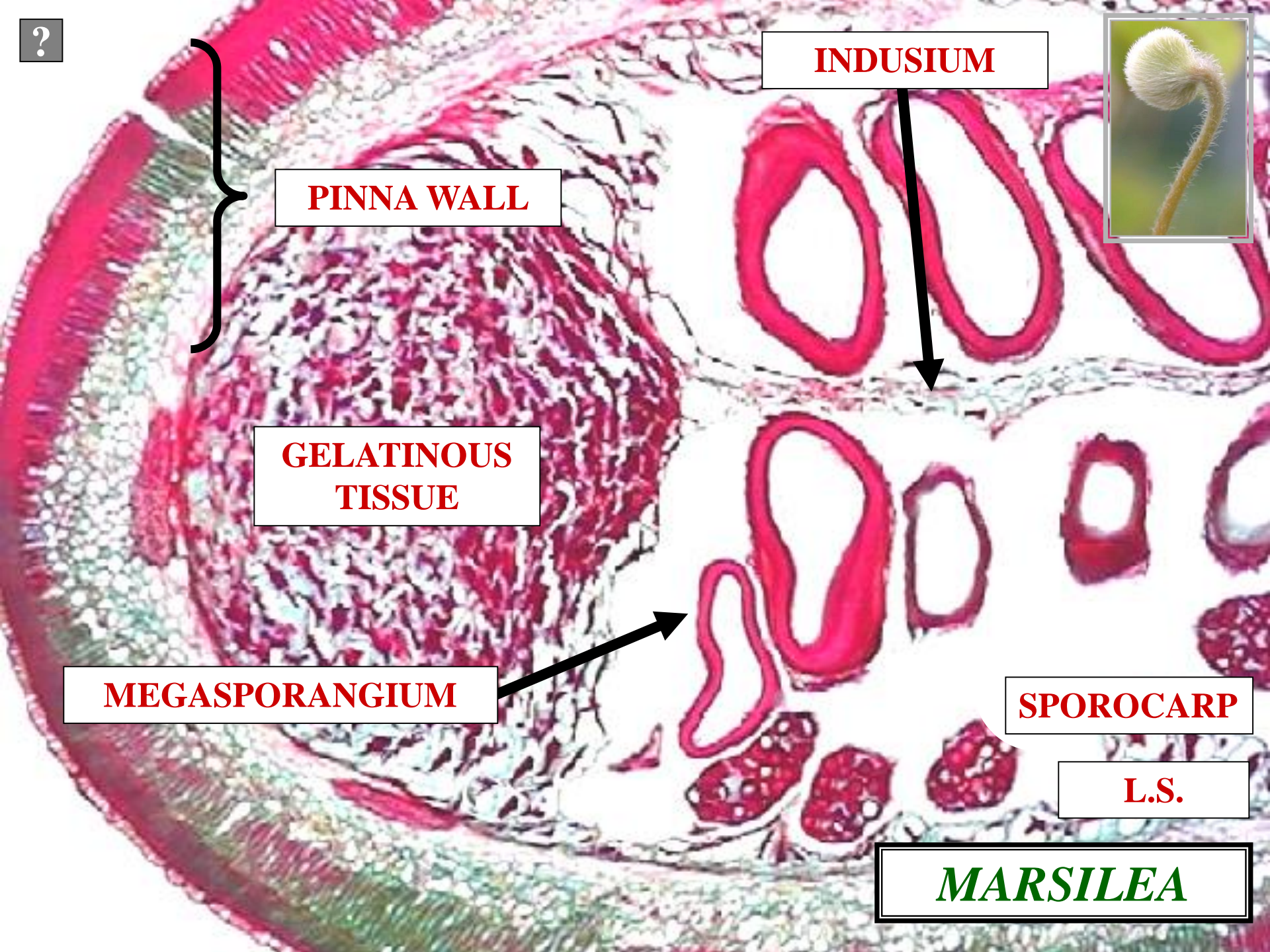
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INDUSIUM



PINNA WALL

**GELATINOUS
TISSUE**

MEGASPORANGIUM

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INDUSIUM



PINNA WALL

GELATINOUS TISSUE

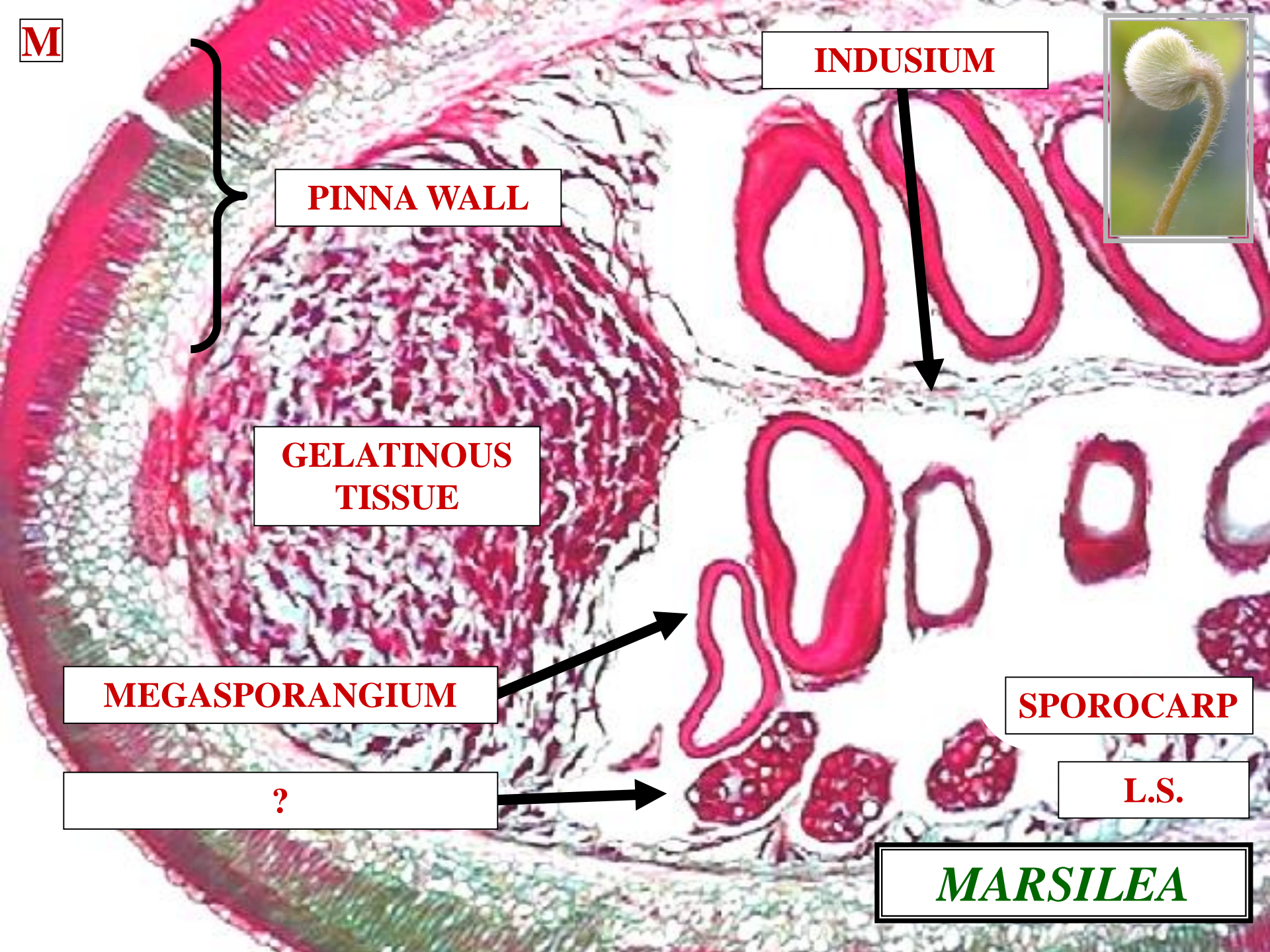
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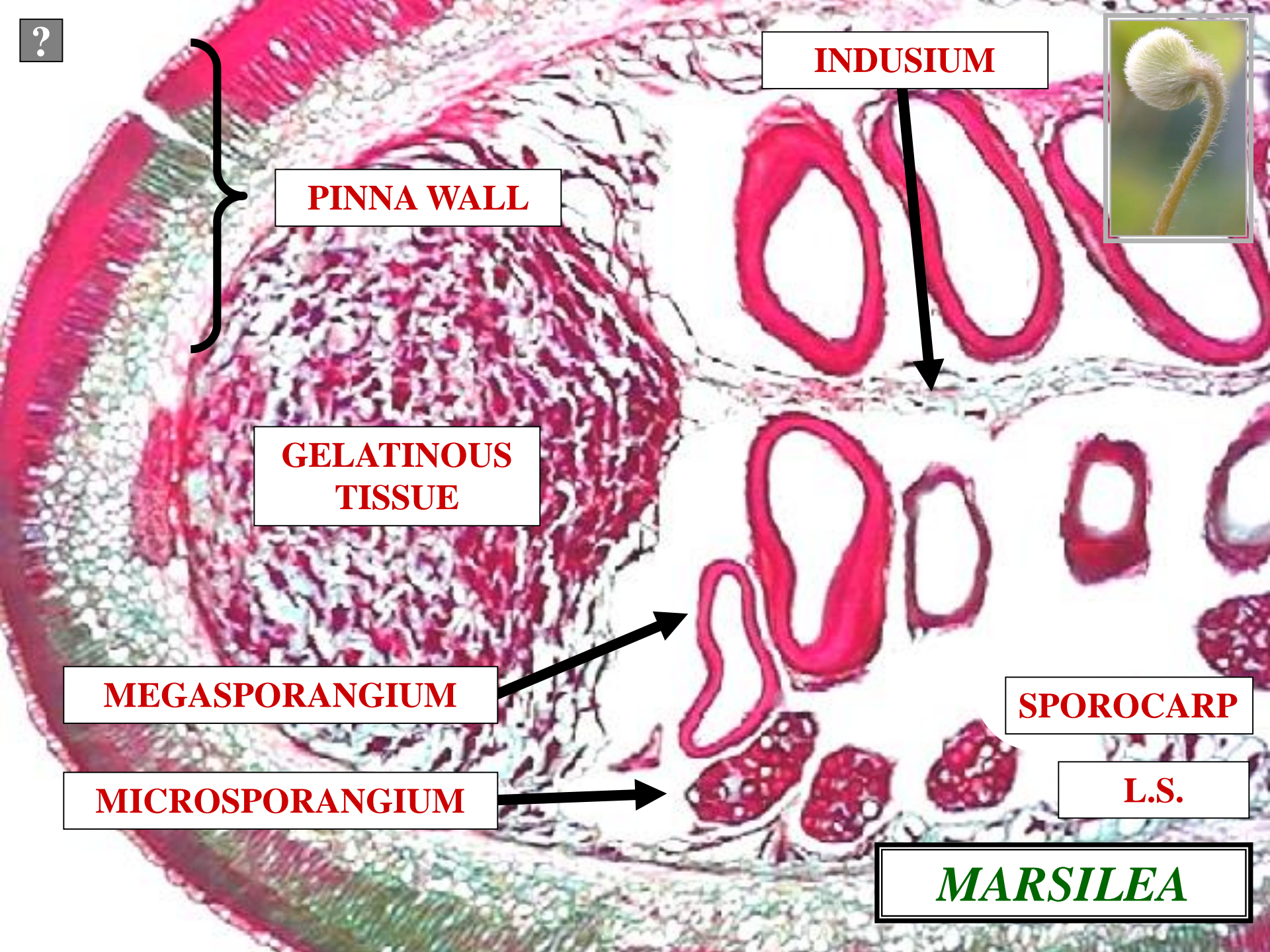
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INDUSIUM

PINNA WALL

**GELATINOUS
TISSUE**

MEGASPORANGIUM

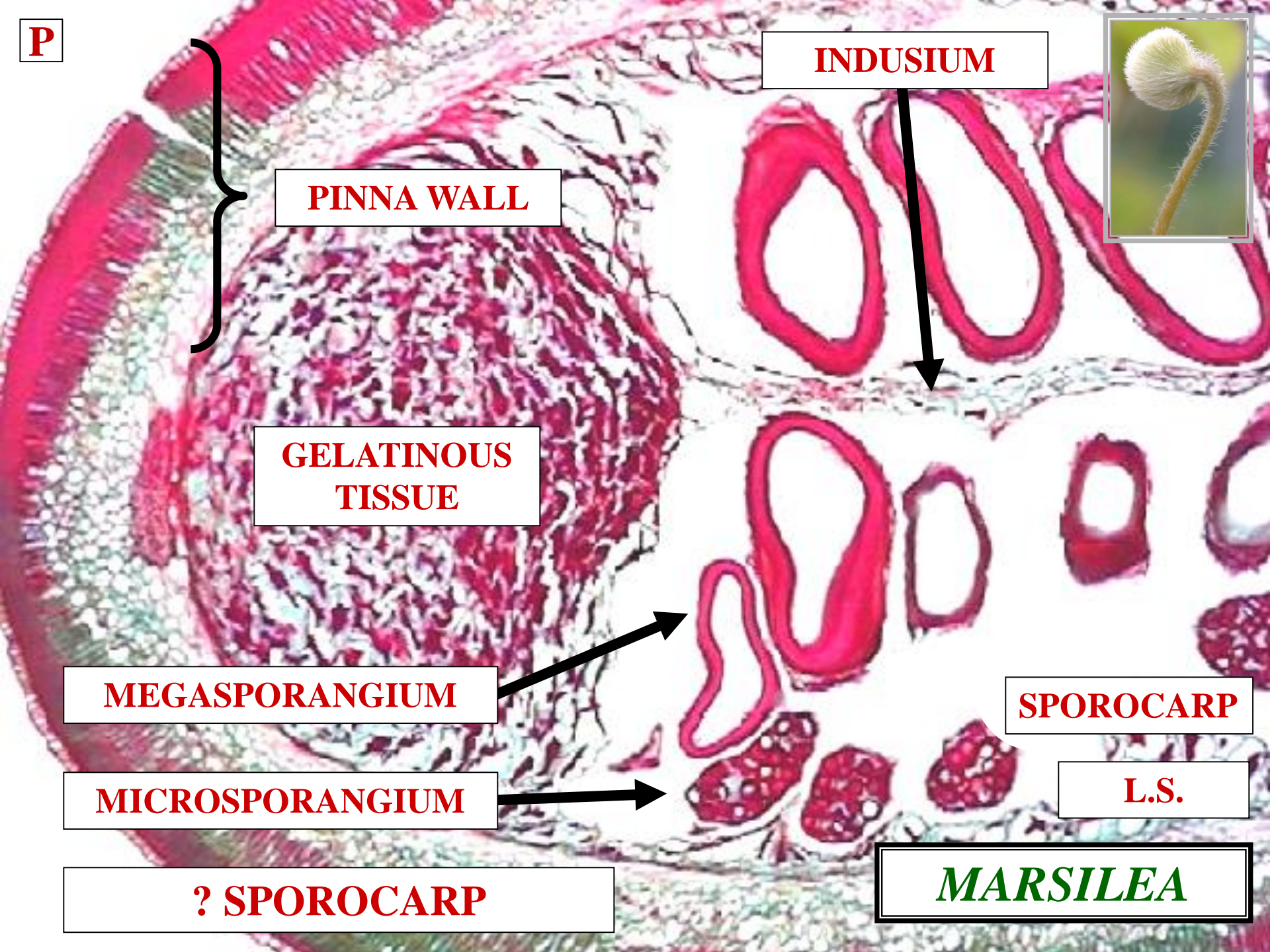
MICROSPORANGIUM

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INDUSIUM



PINNA WALL

GELATINOUS TISSUE

MEGASPORANGIUM

MICROSPORANGIUM

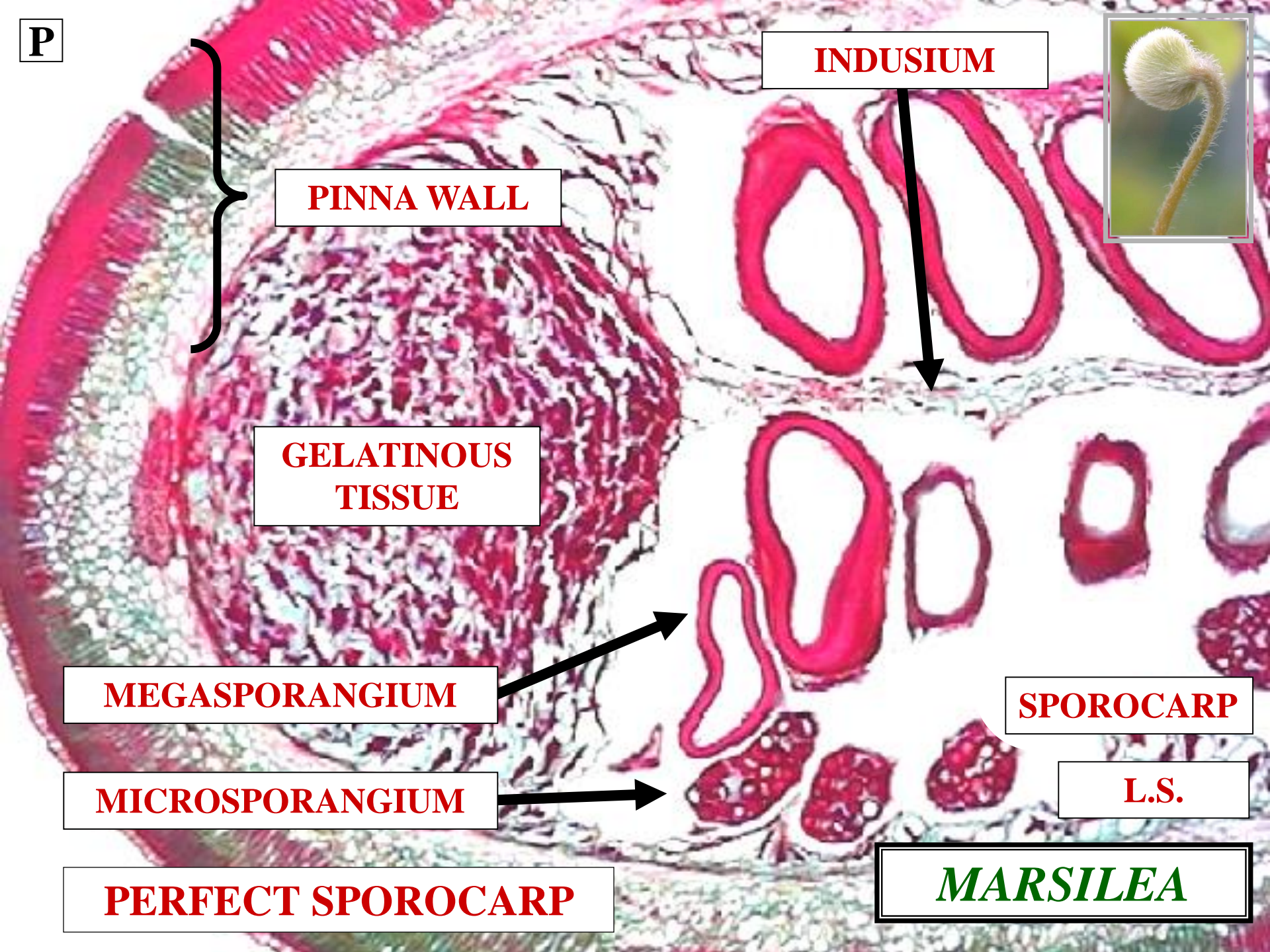
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INDUSIUM

PINNA WALL

GELATINOUS TISSUE

MEGASPORANGIUM

MICROSPORANGIUM

PERFECT SPOROCCARP

SPOROCCARP

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MARSILEA

**PERFECT
SPOROCARP**

MARSILEALES
PERFECT SPOROCARP
MICROSPORANGIA
&
MEGASPORANGIA
PRESENT

MARSILEALES
PERFECT SPOROCARP





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INDUSIUM

PINNA WALL

GELATINOUS TISSUE

MEGASPORANGIUM

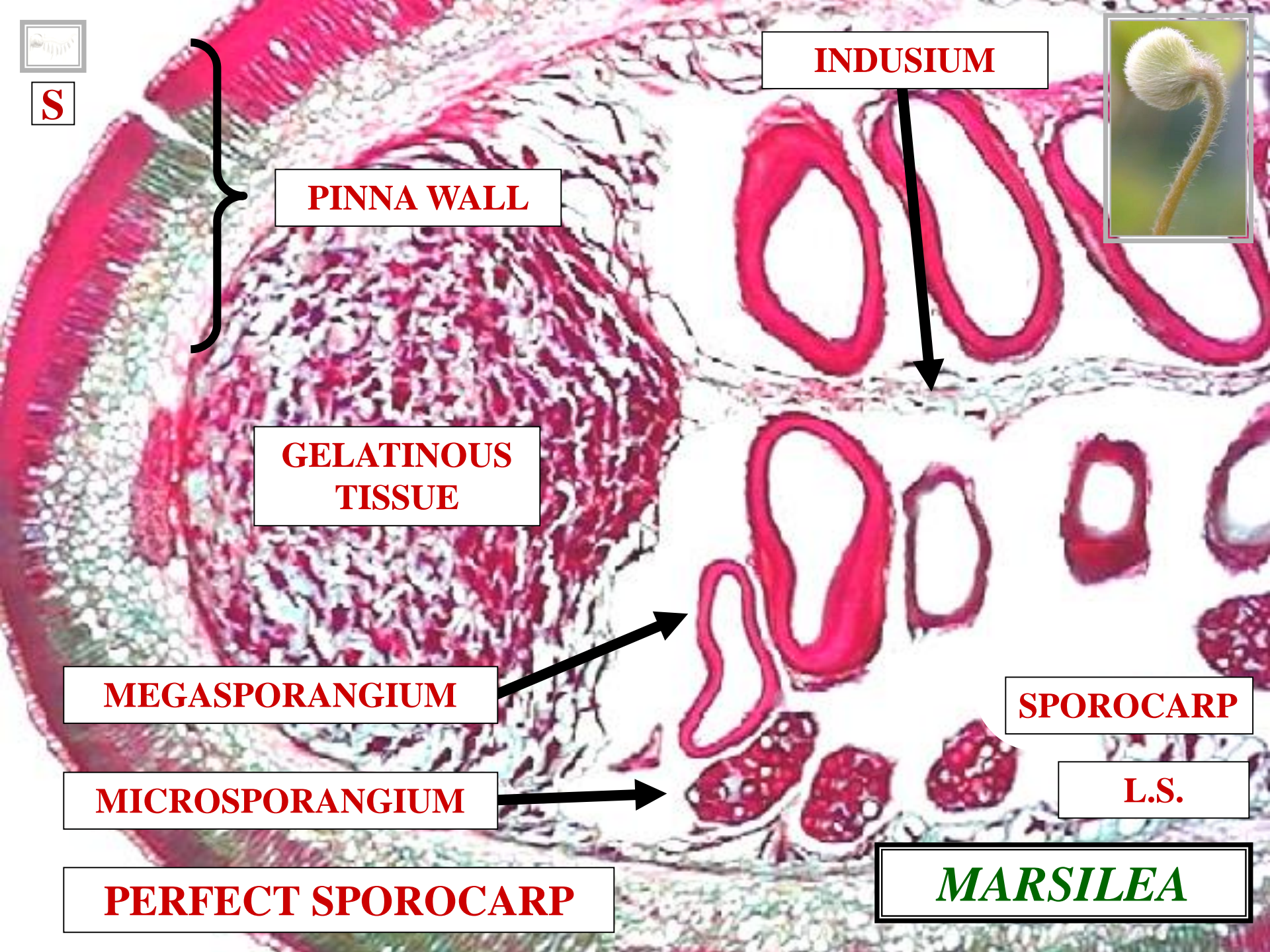
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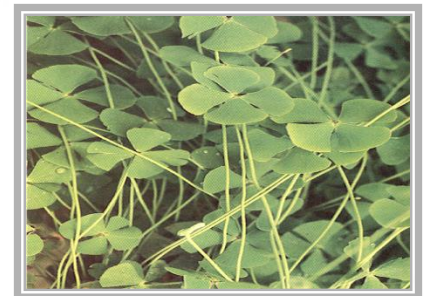
**SPOROCARP
"GERMINATION"**

SOROPHORE

SPOROCARP



LEPTOSPORANGIA



MARSILEA