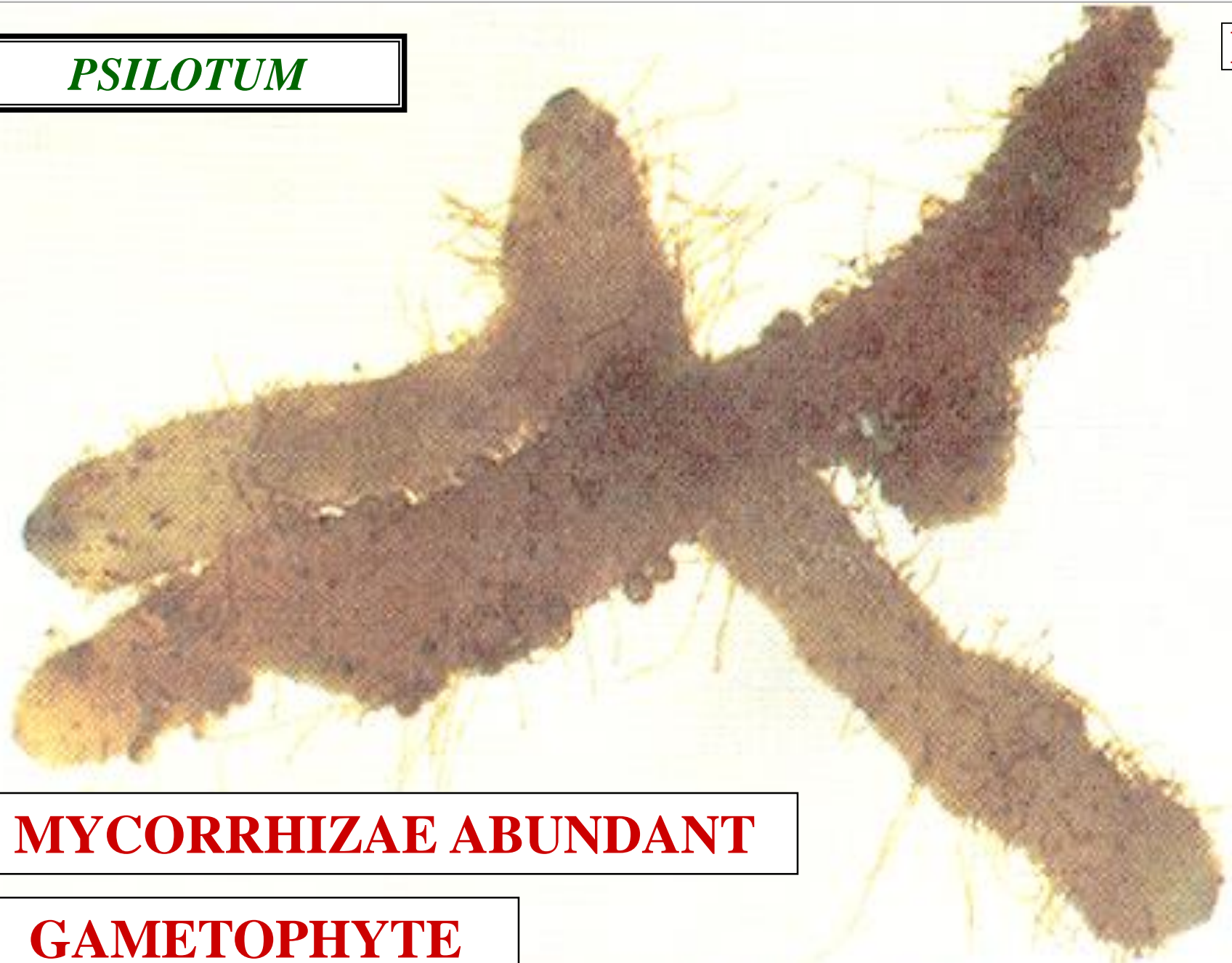


PSILOTUM

B

MYCORRHIZAE ABUNDANT

GAMETOPHYTE



PSILOTUM



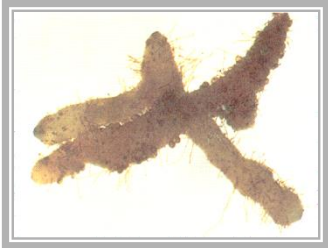
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GAMETOPHYTE



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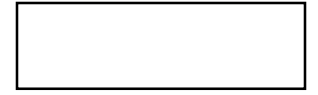
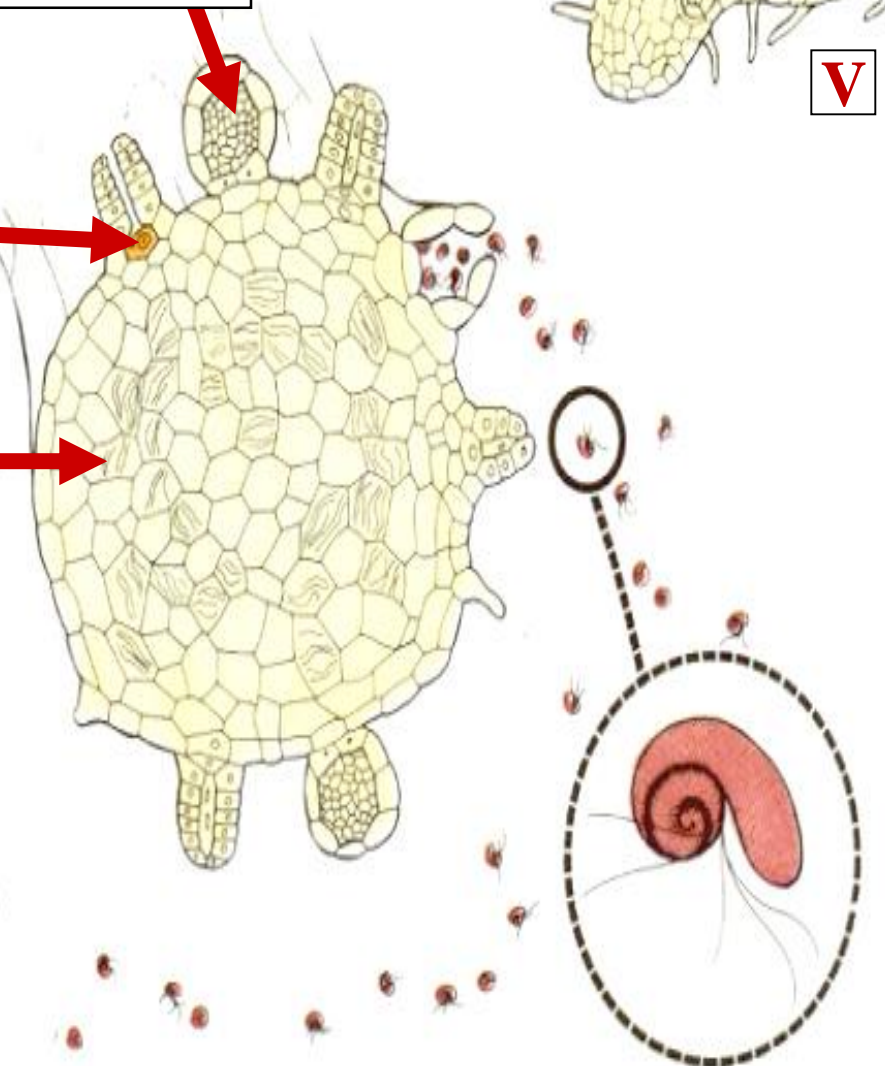
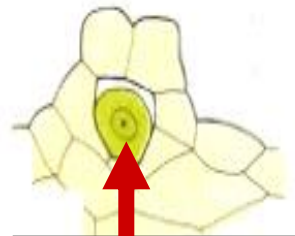
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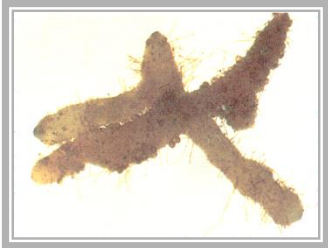
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ARCHEGONIUM

GAMETOPHYTE



PSILOTUM



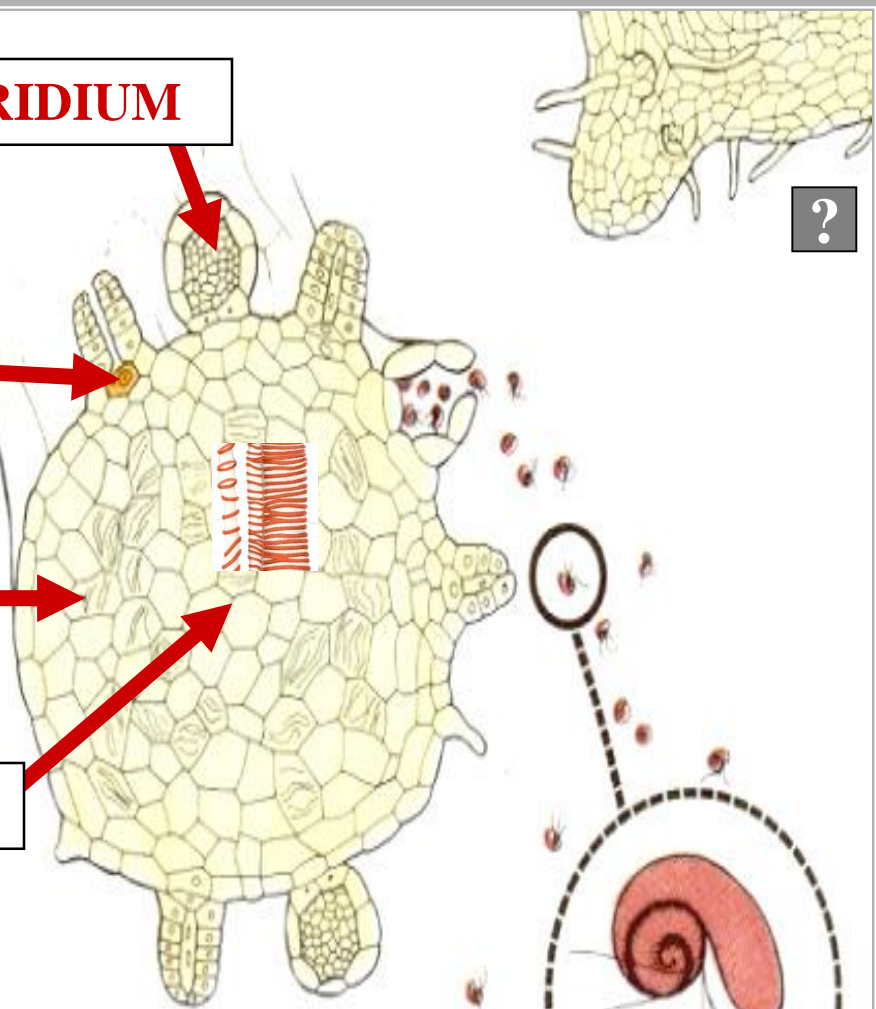
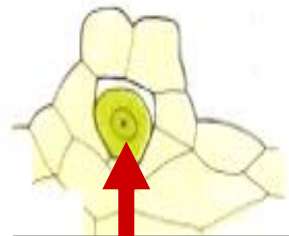
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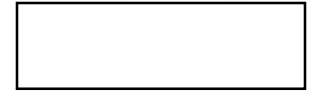
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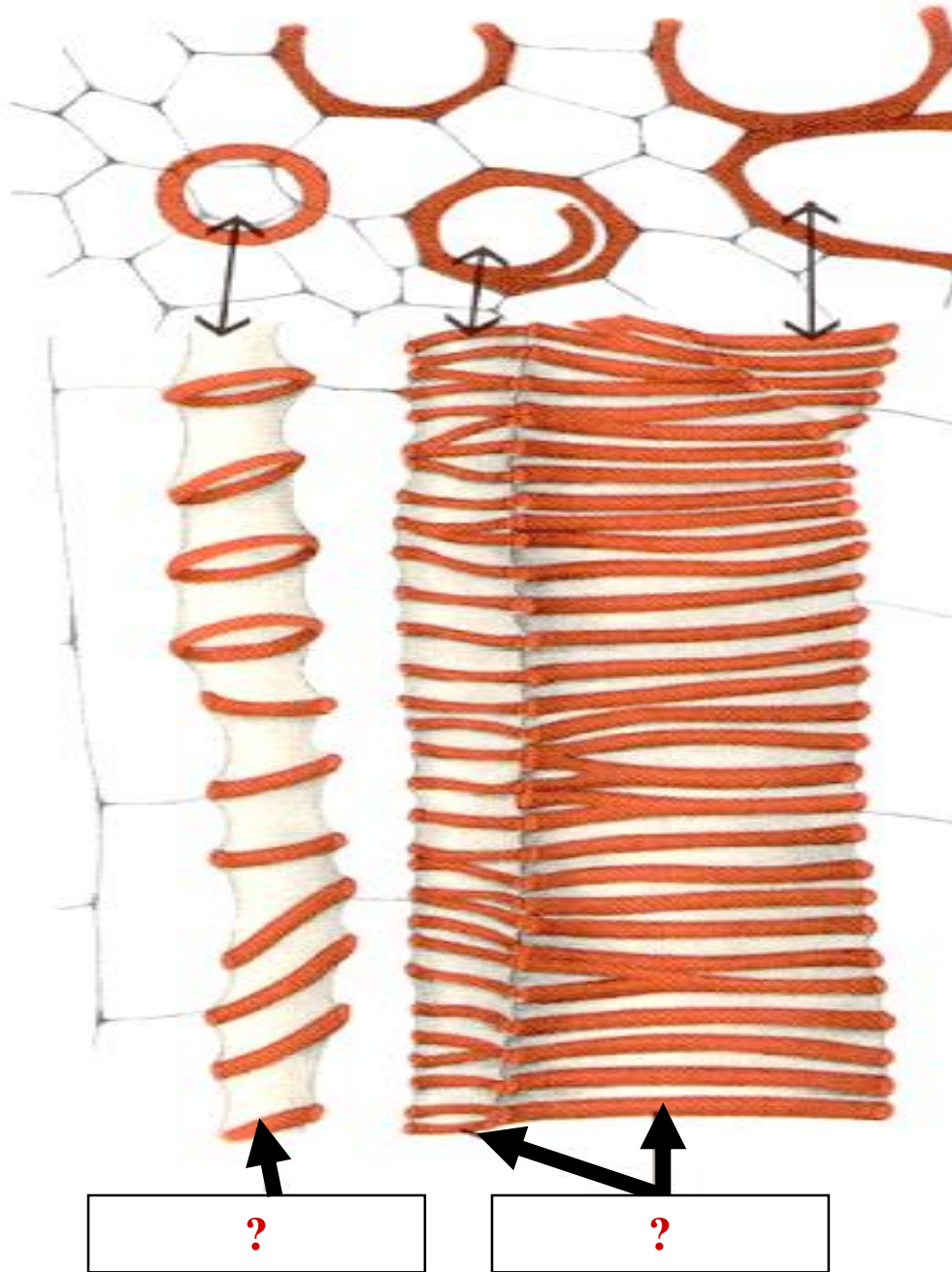
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VASCULAR TISSUE



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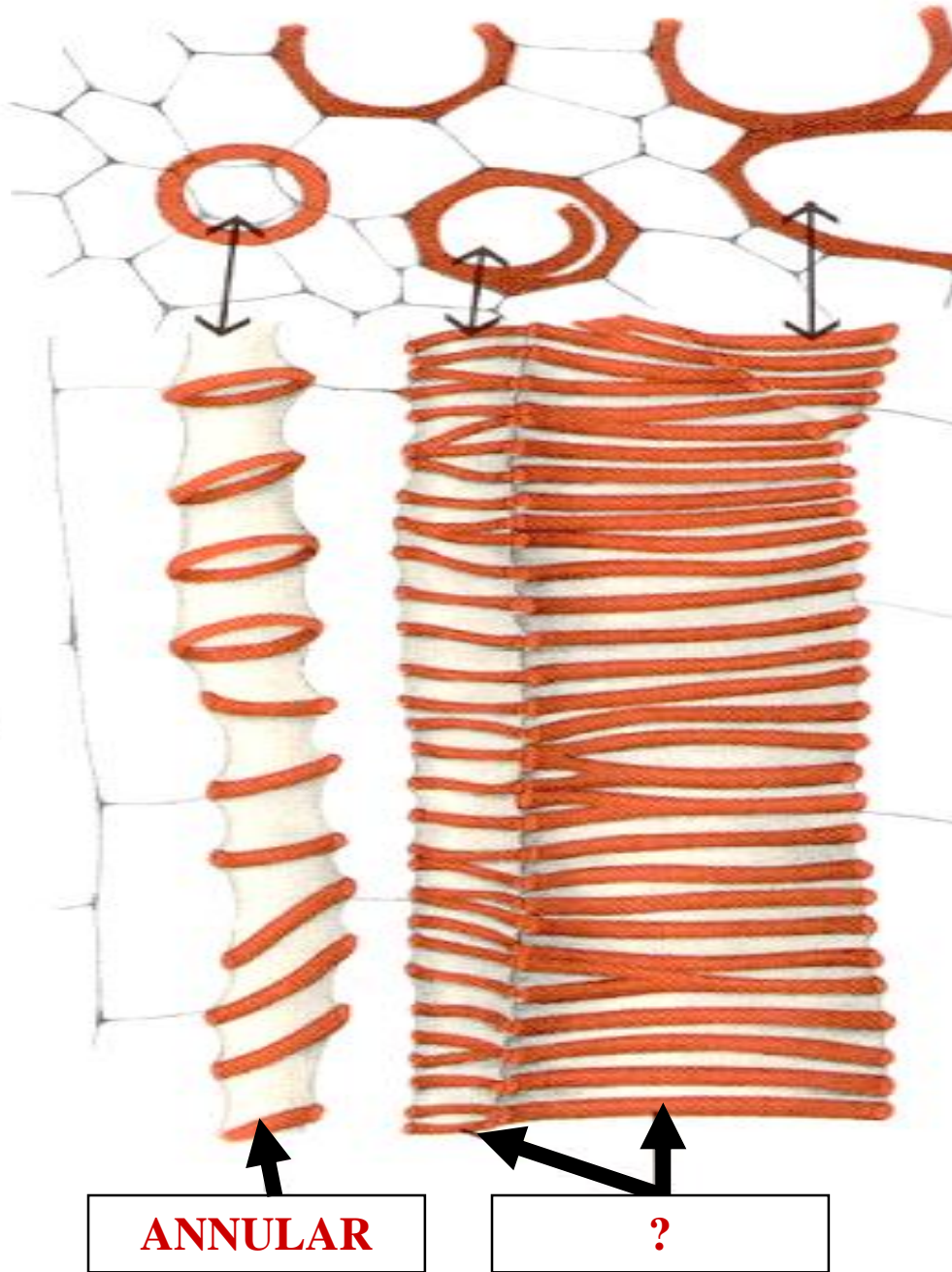


**XYLEM
TRACHEIDS**

**~2 CELL WALL
MATURATION**

?

?

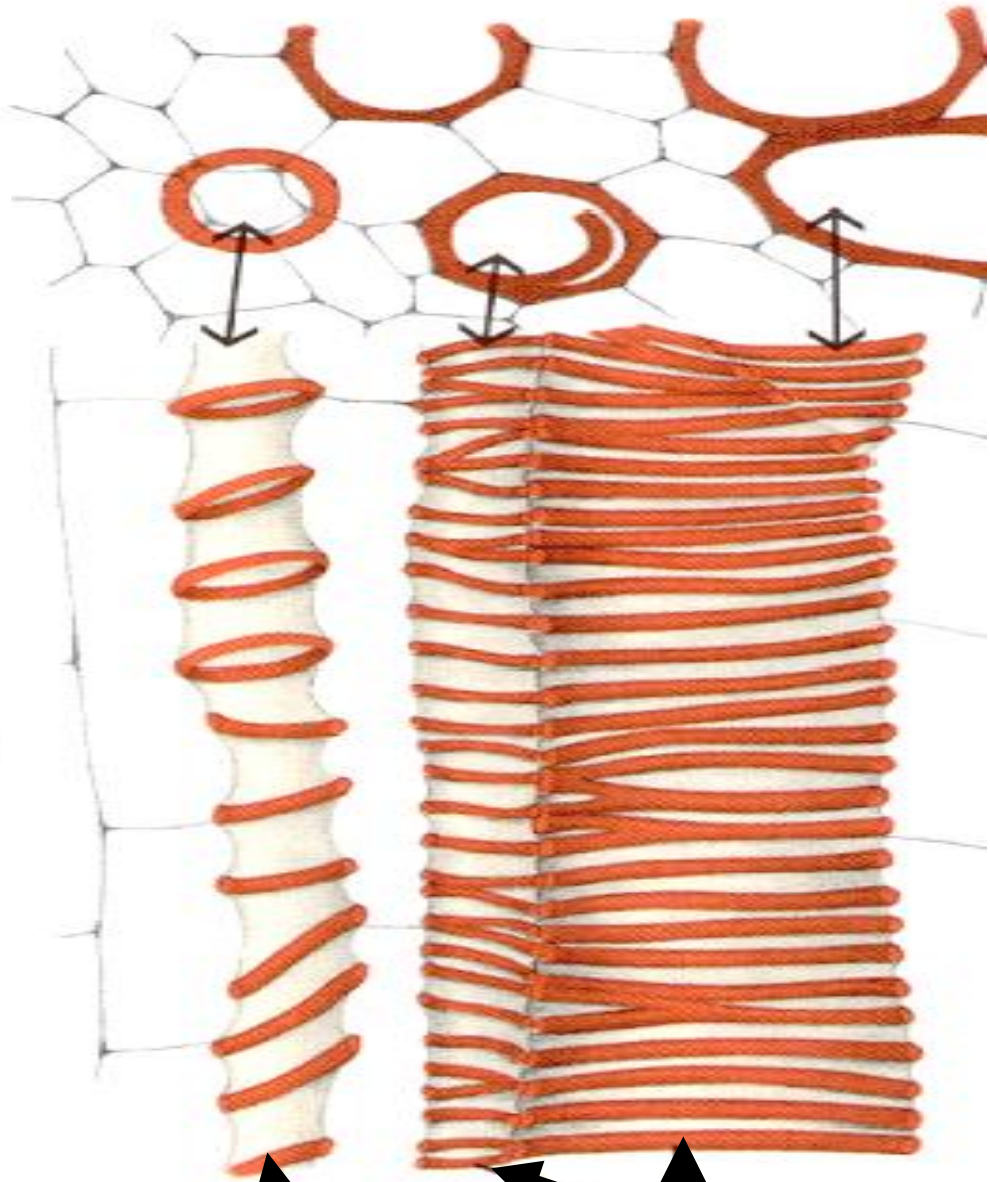


**XYLEM
TRACHEIDS**

**~2 CELL WALL
MATURATION**

ANNULAR

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**XYLEM
TRACHEIDS**

**~2 CELL WALL
MATURATION**

ANNULAR

HELICAL

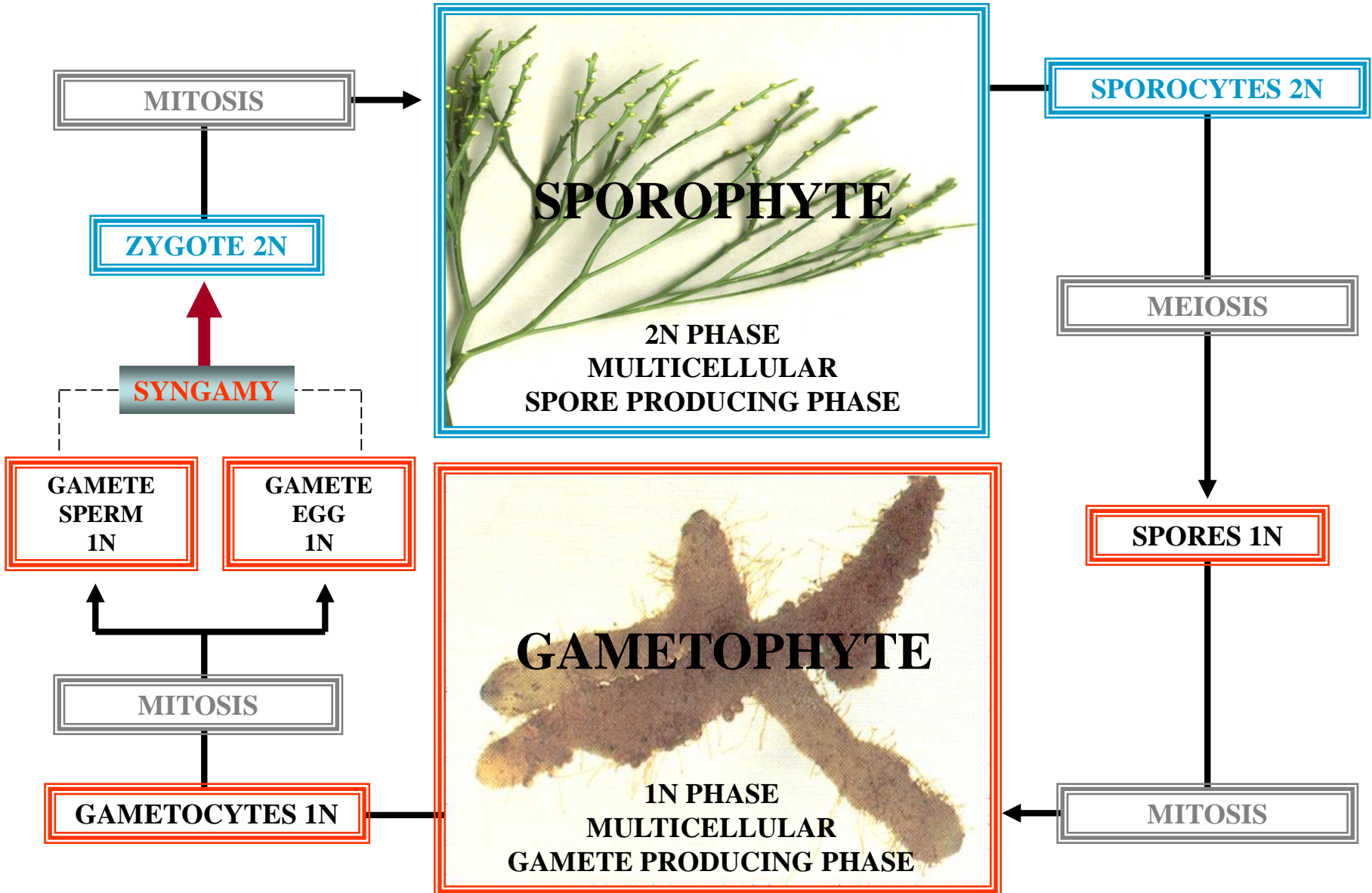
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**ONLY
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VASCULAR
GAMETOPHYTE**

GAMETOPHYTE



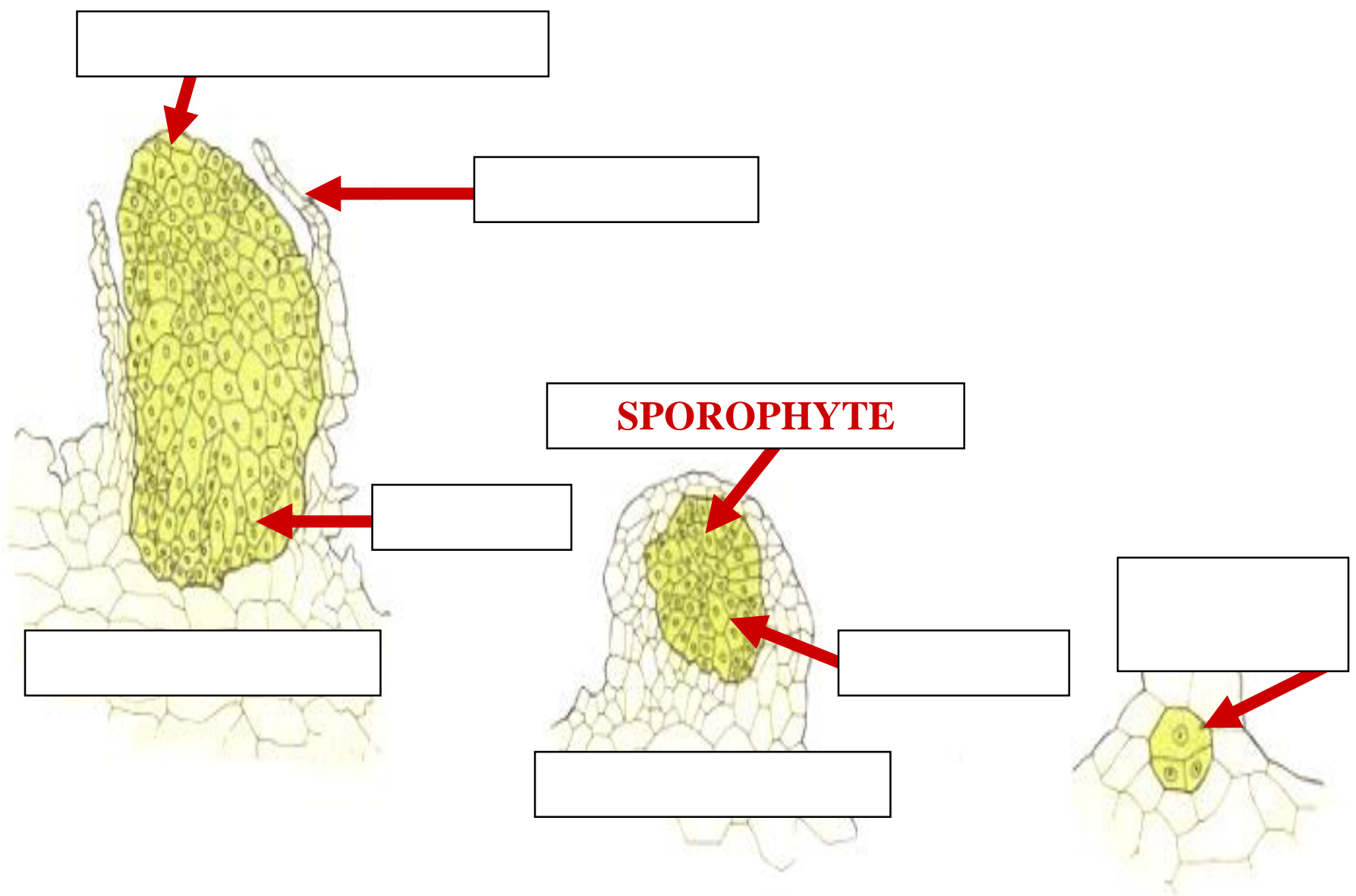
PSILOTALES LIFE CYCLE



REPRODUCTION

PSILOTUM

LIFE CYCLE



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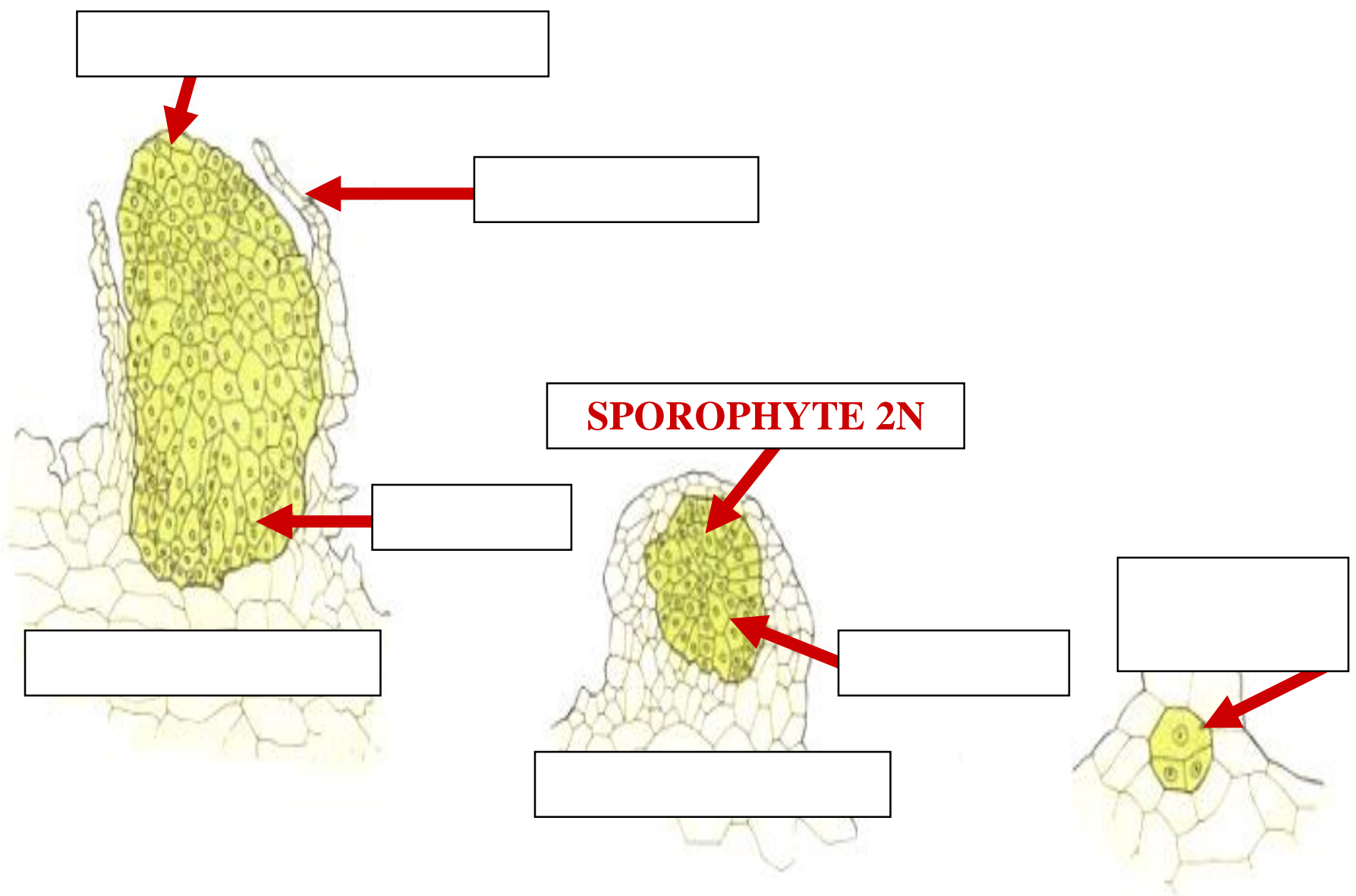
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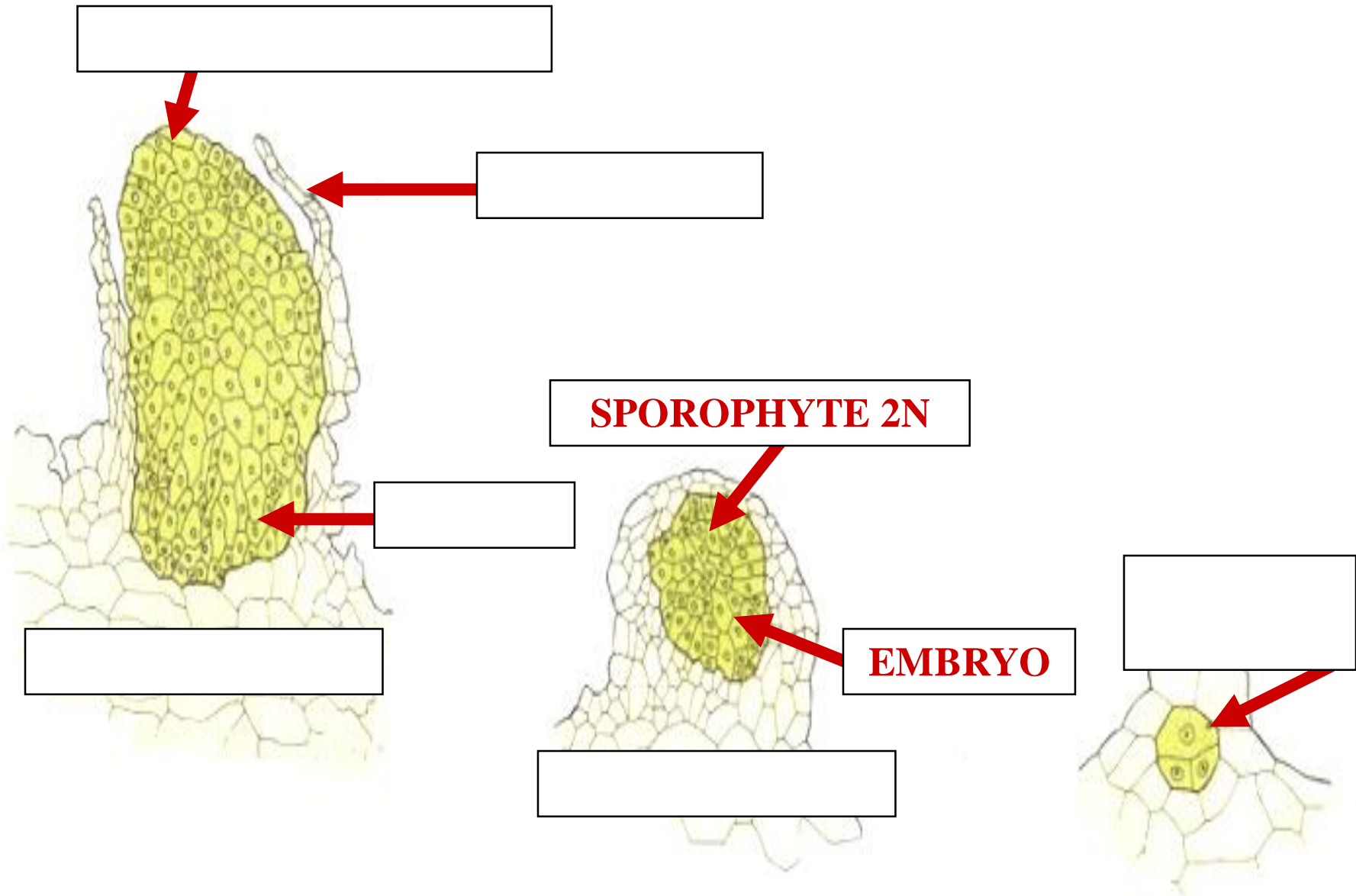
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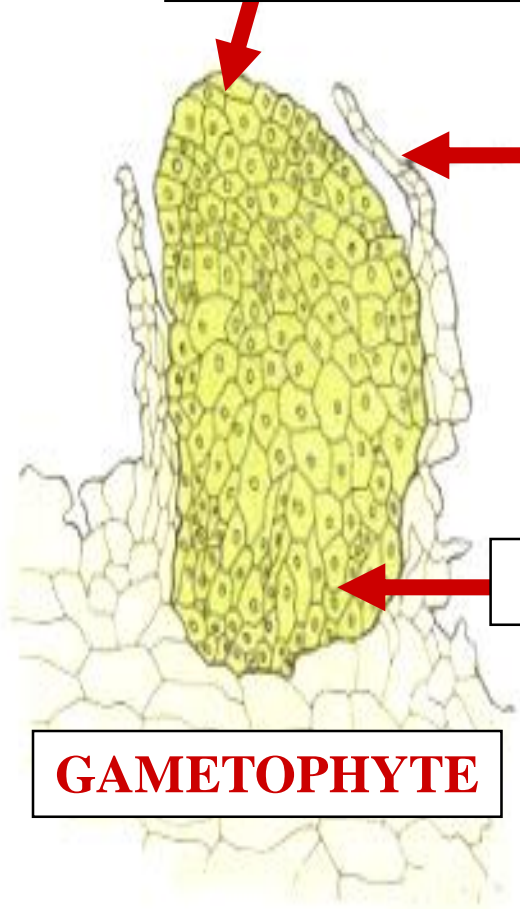
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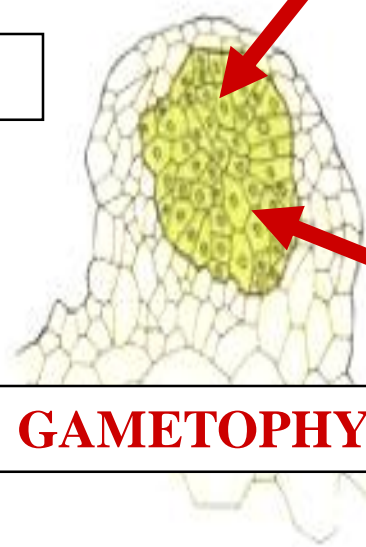
SPOROPHYTE 2N



YOUNG EMBRYO



SPOROPHYTE 2N

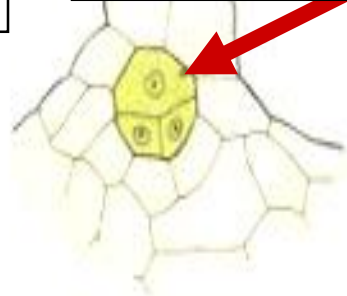
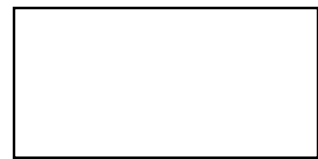


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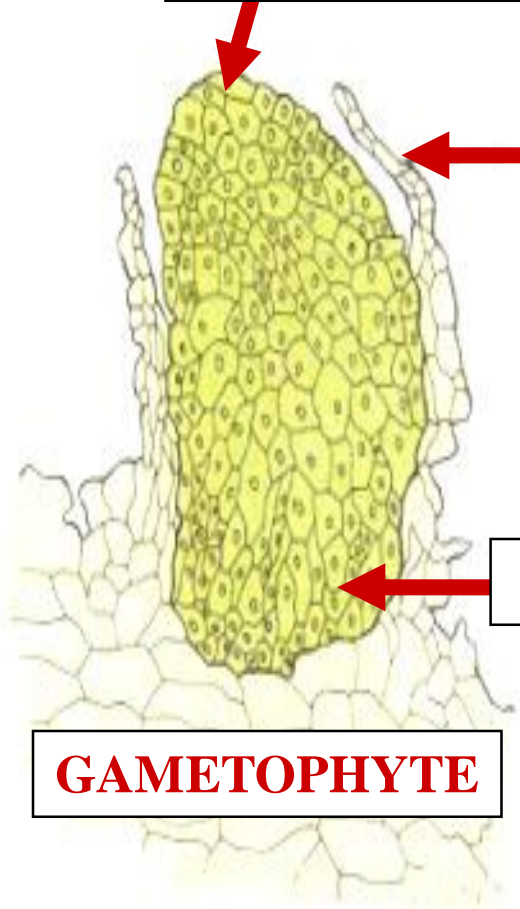


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GAMETOPHYTE

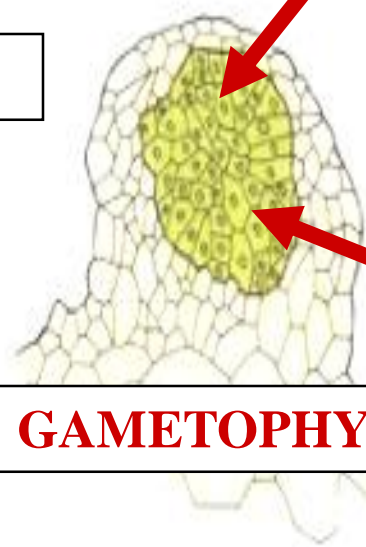


YOUNG EMBRYO



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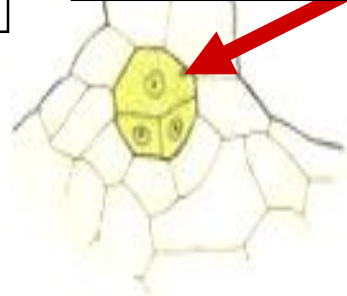
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GAMETOPHYTE

EMBRYO

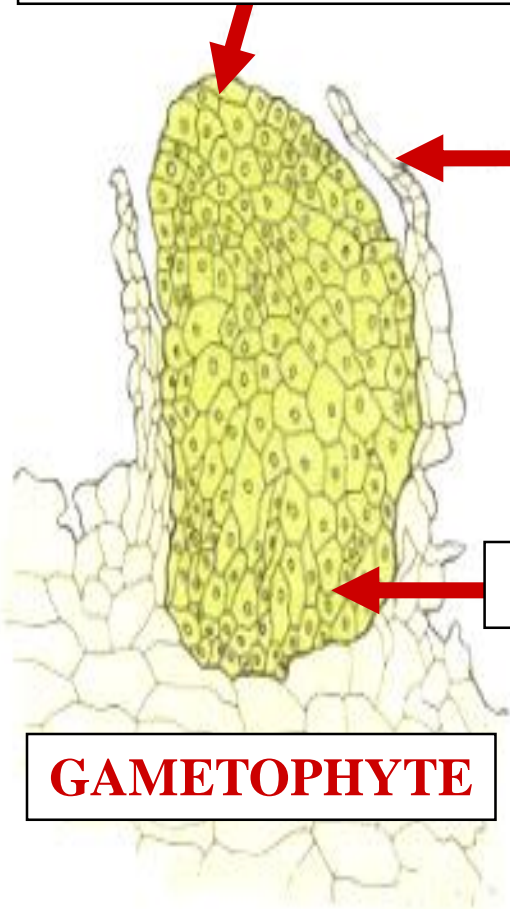
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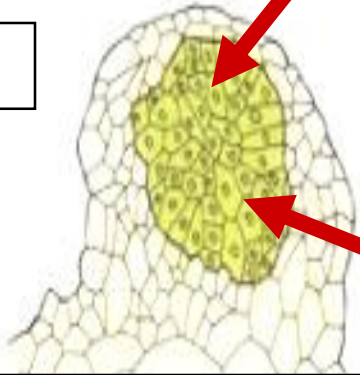
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SPOROPHYTE 2N

FOOT

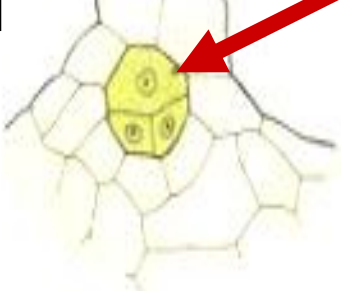


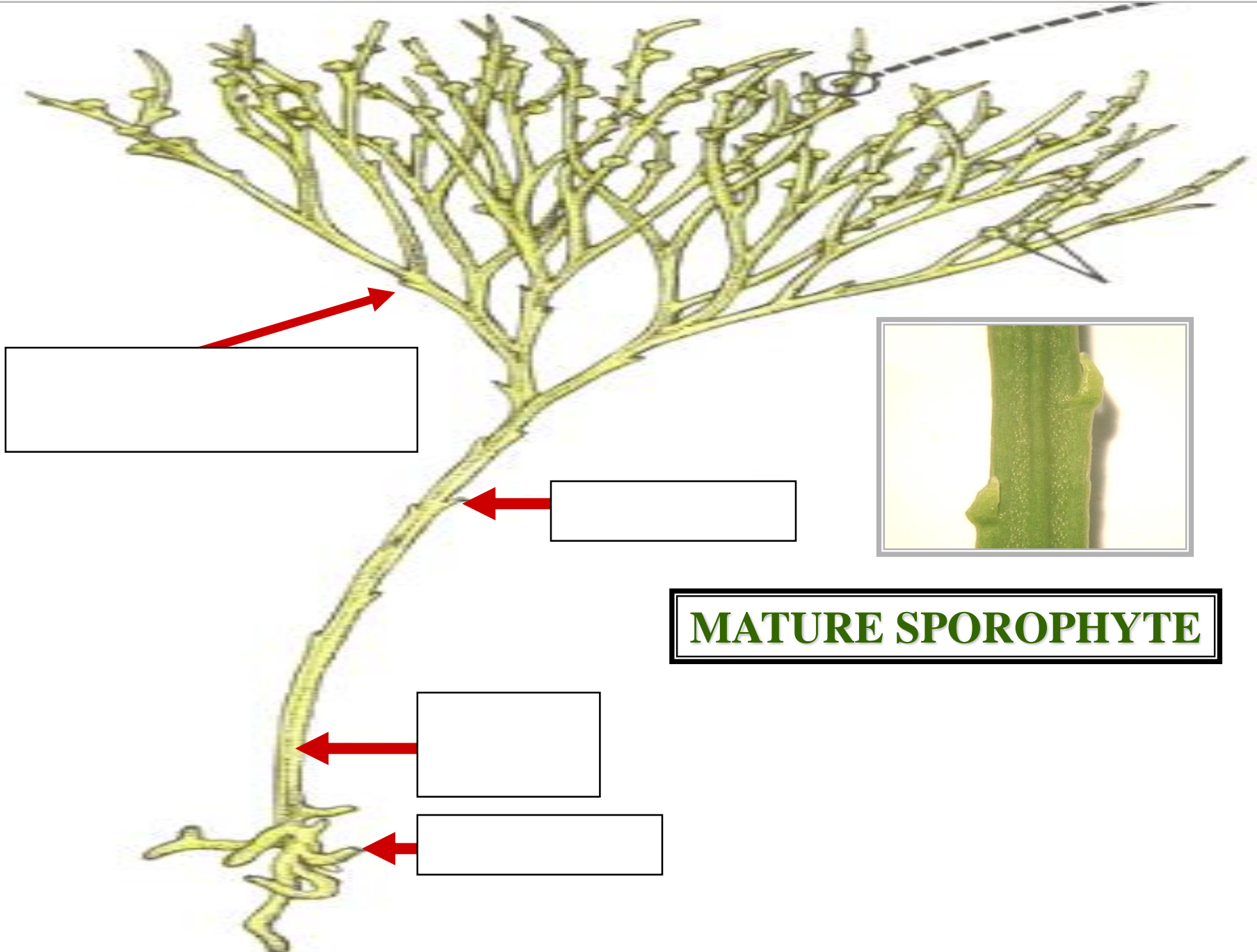
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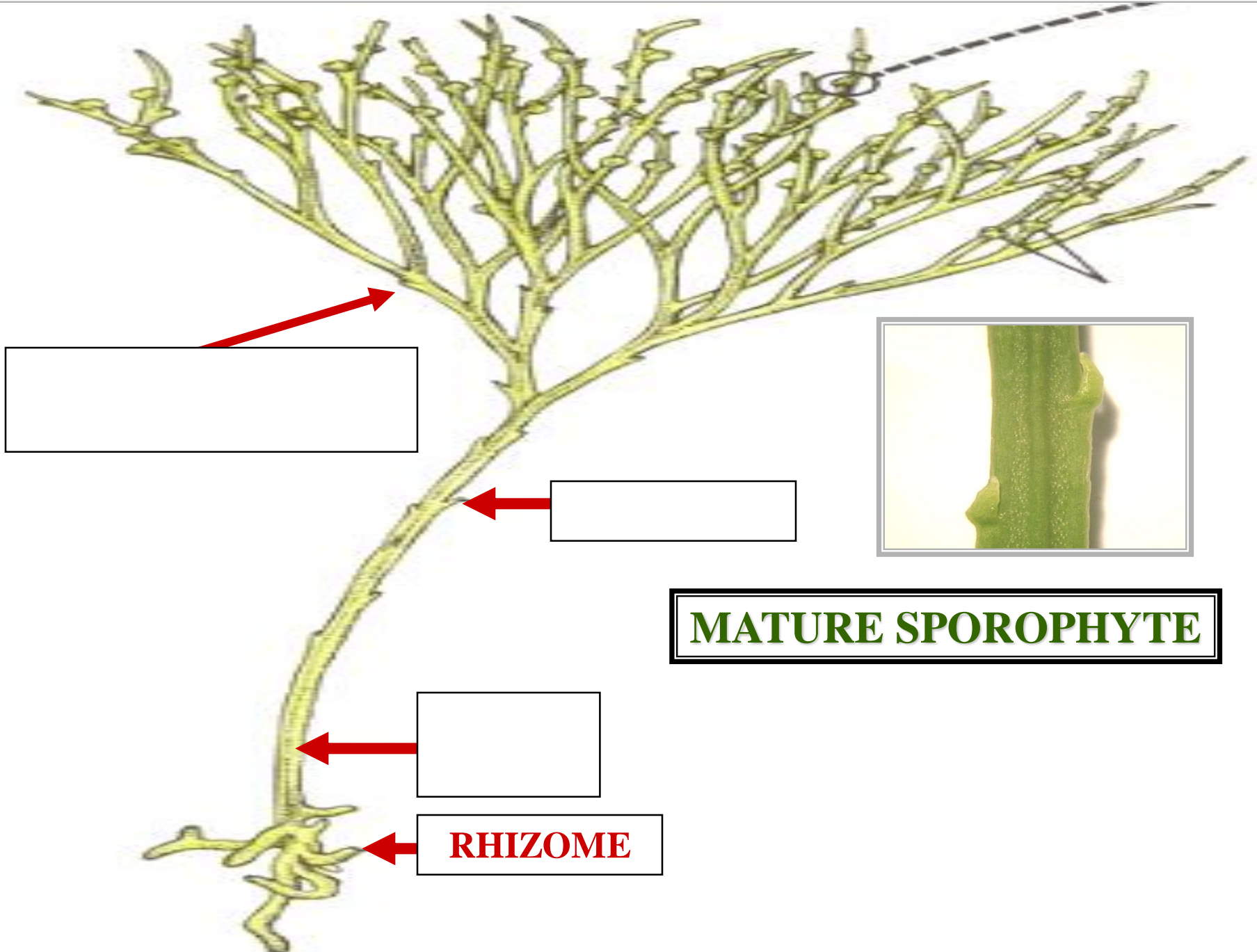
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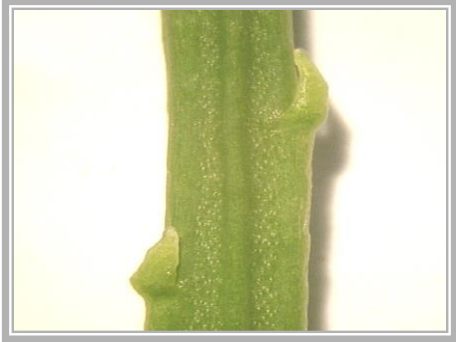


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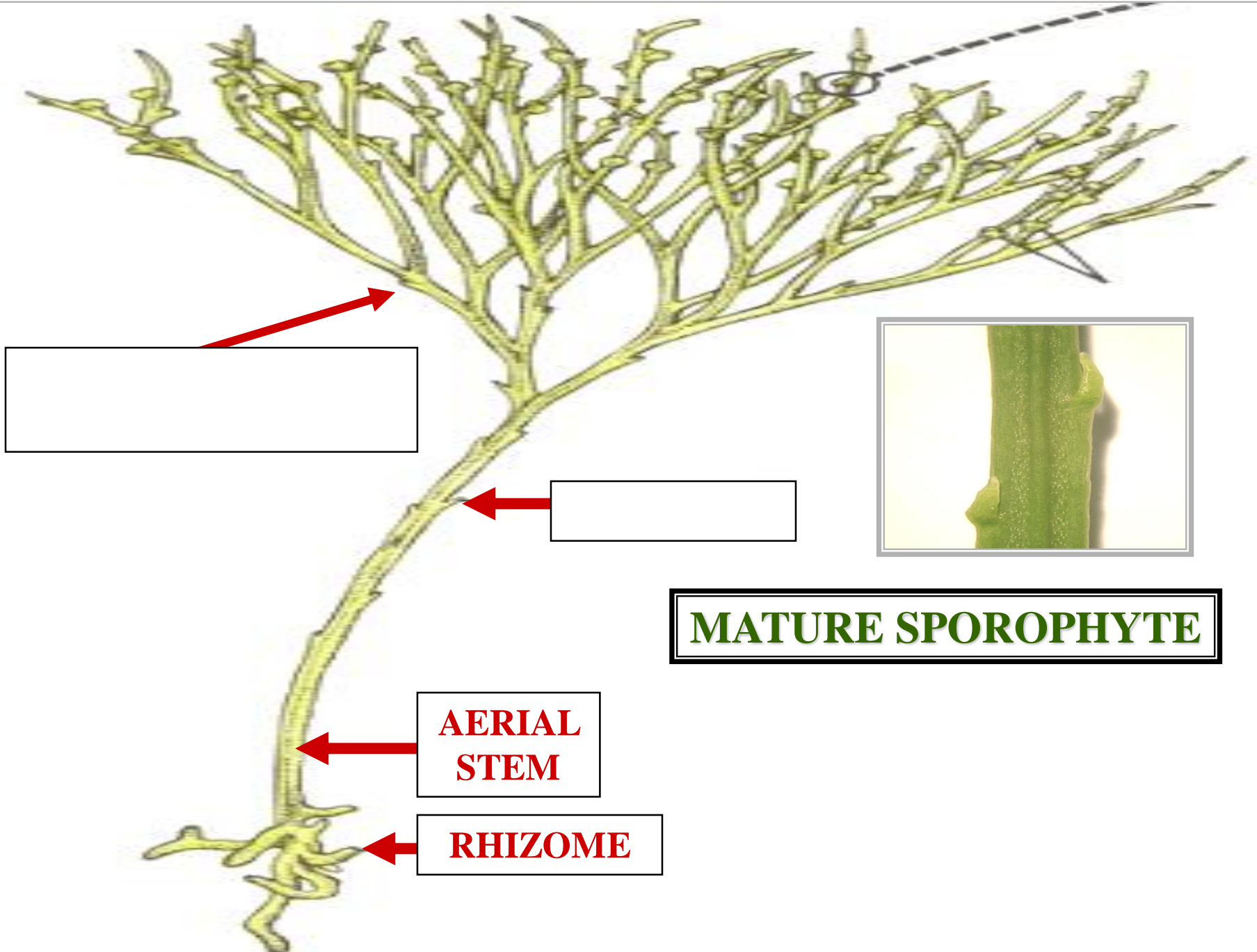
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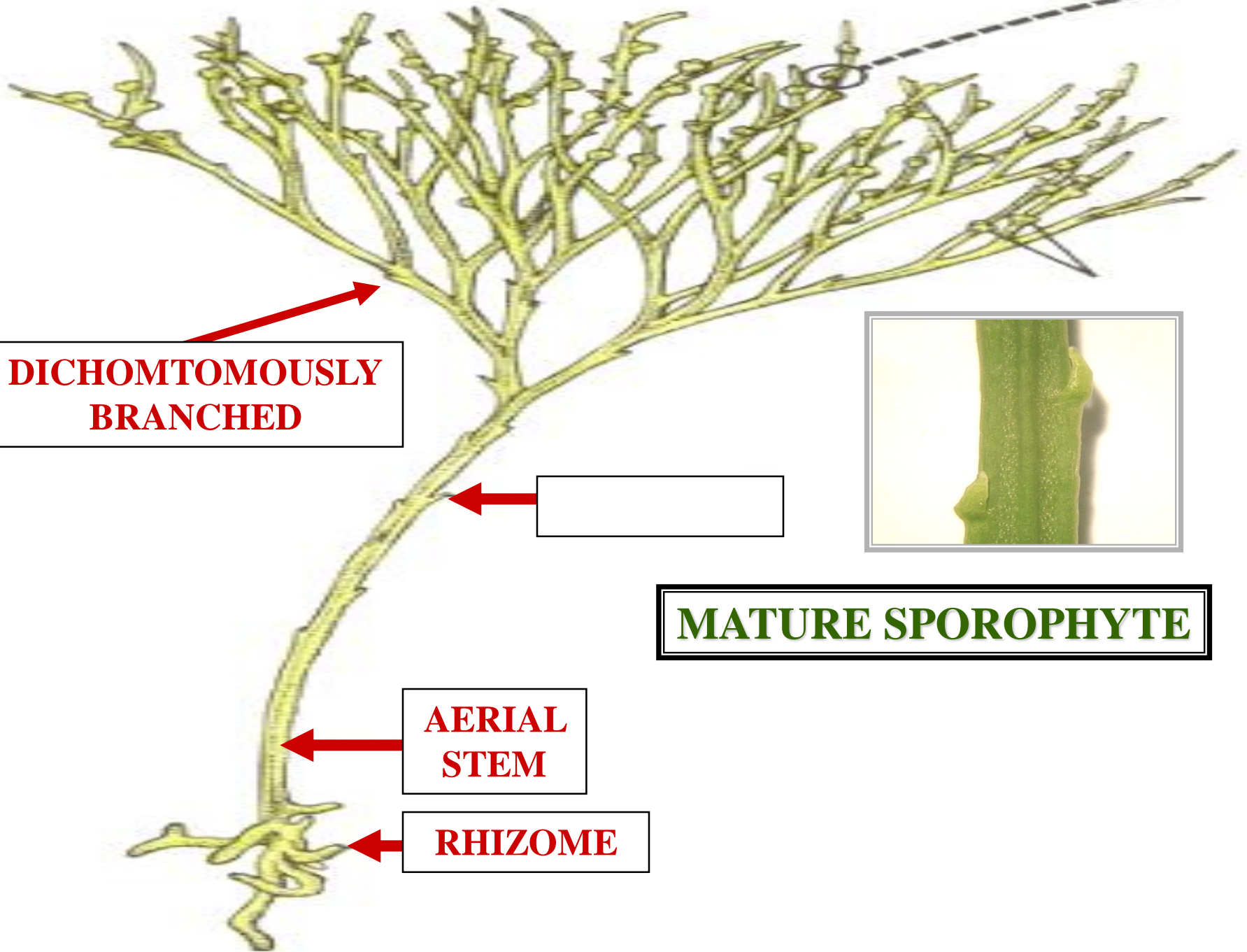
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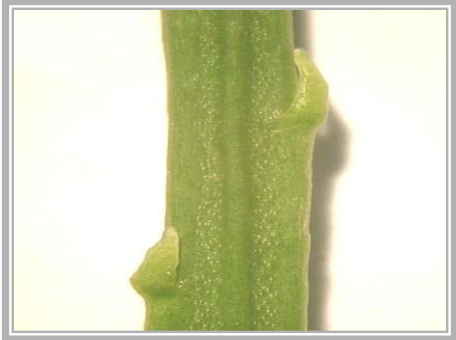
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**AERIAL
STEM**

RHIZOME



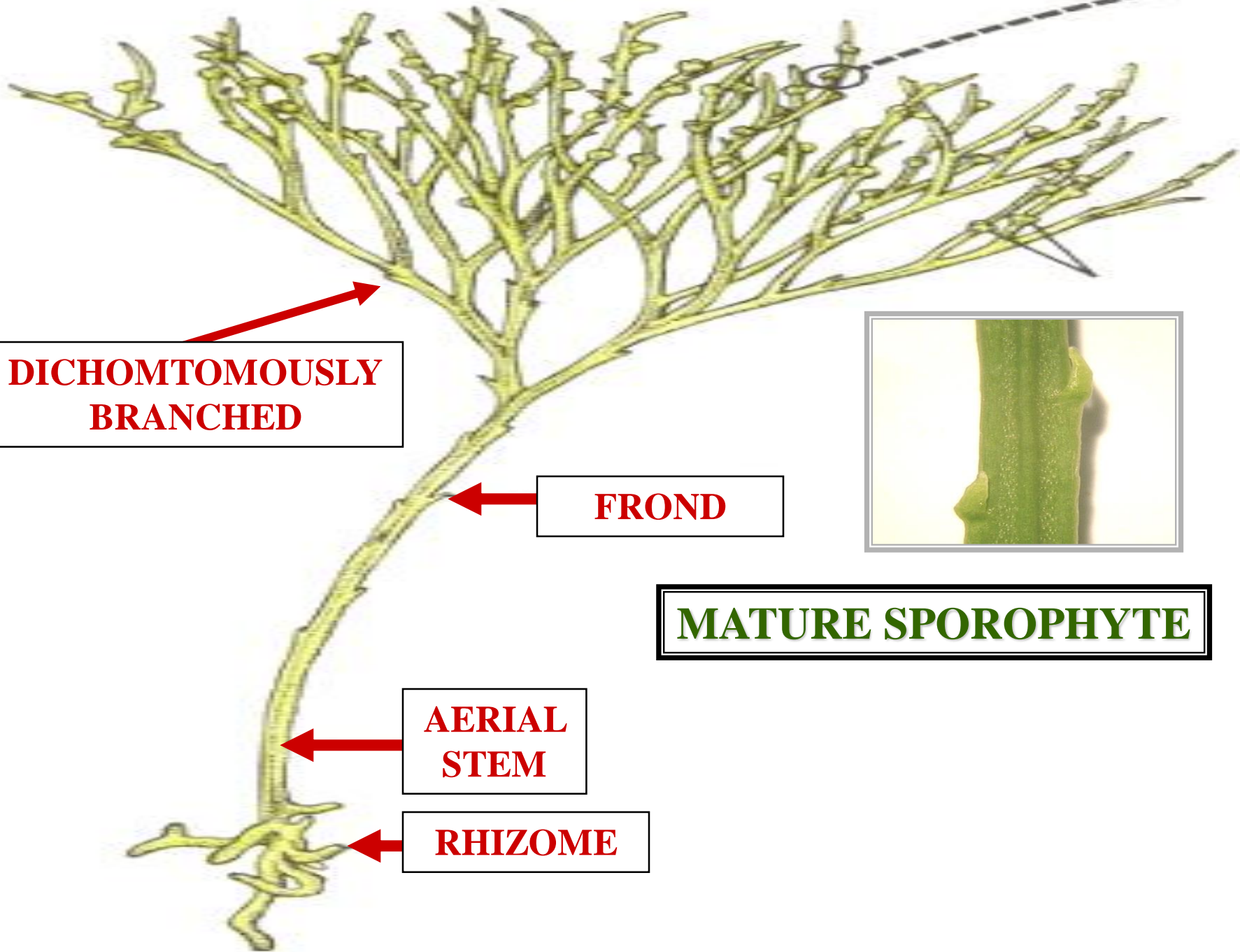
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BRANCHED**



MATURE SPOROPHYTE

**AERIAL
STEM**

RHIZOME



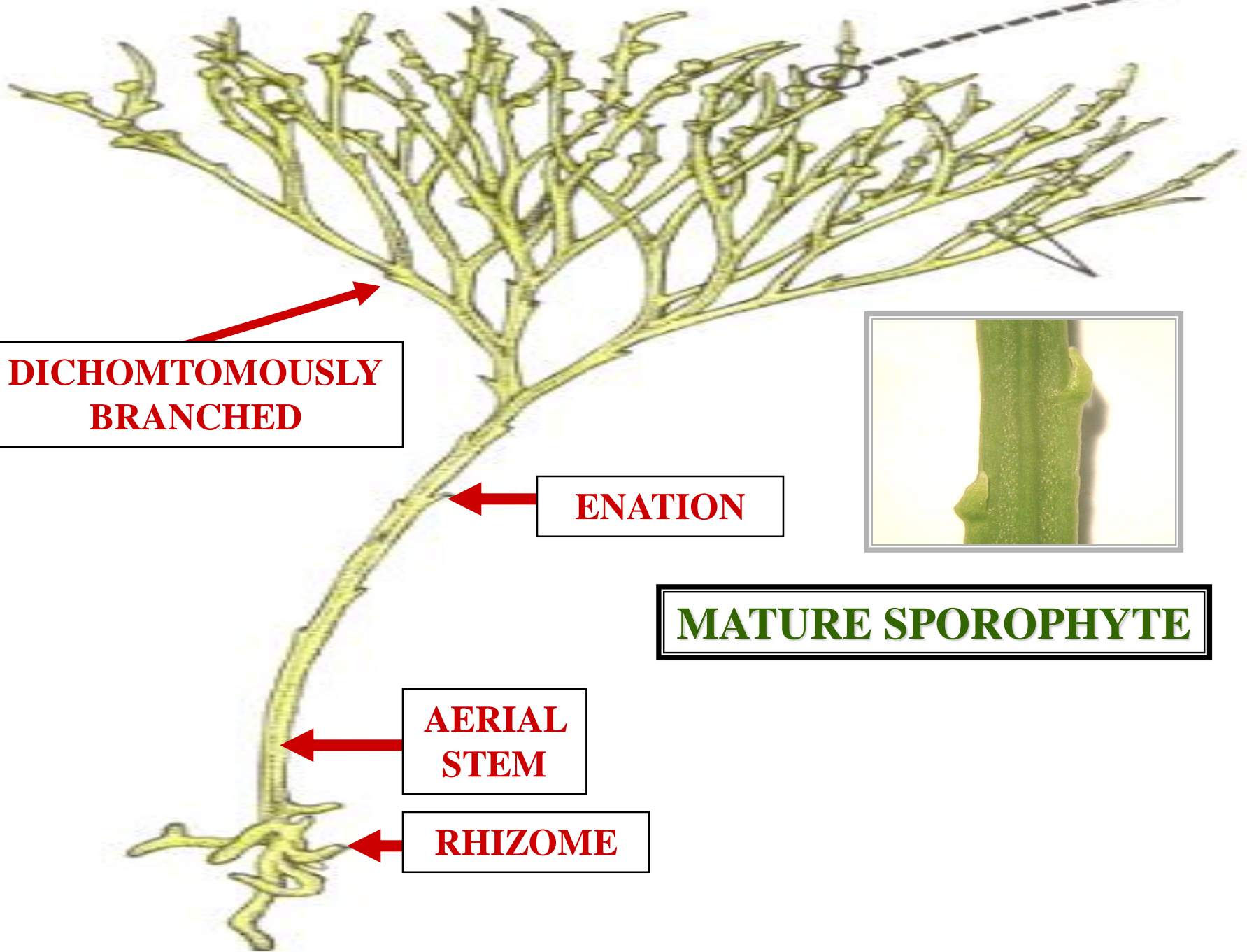
**DICHOTOMOUSLY
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FROND

MATURE SPOROPHYTE

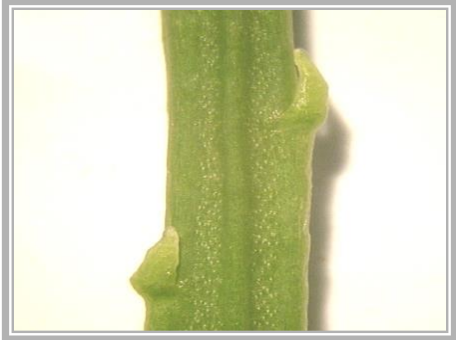
**AERIAL
STEM**

RHIZOME



**DICHOTOMOUSLY
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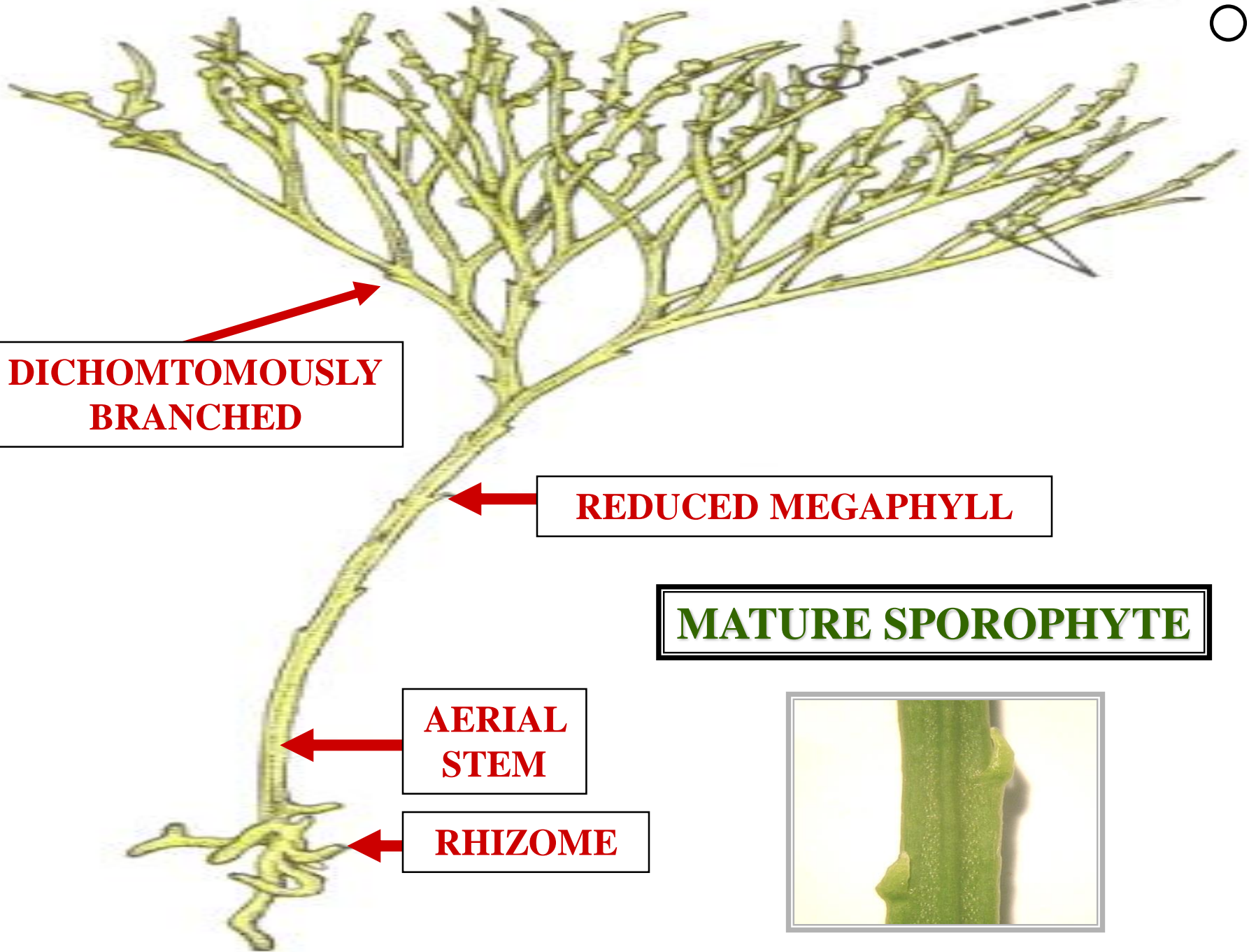
ENATION



MATURE SPOROPHYTE

**AERIAL
STEM**

RHIZOME



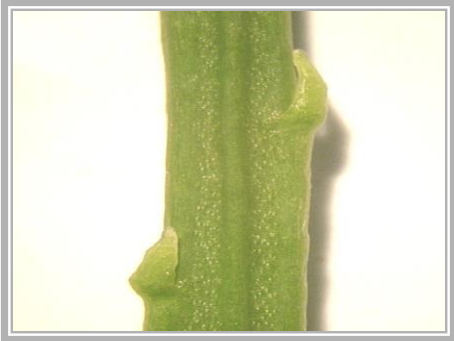
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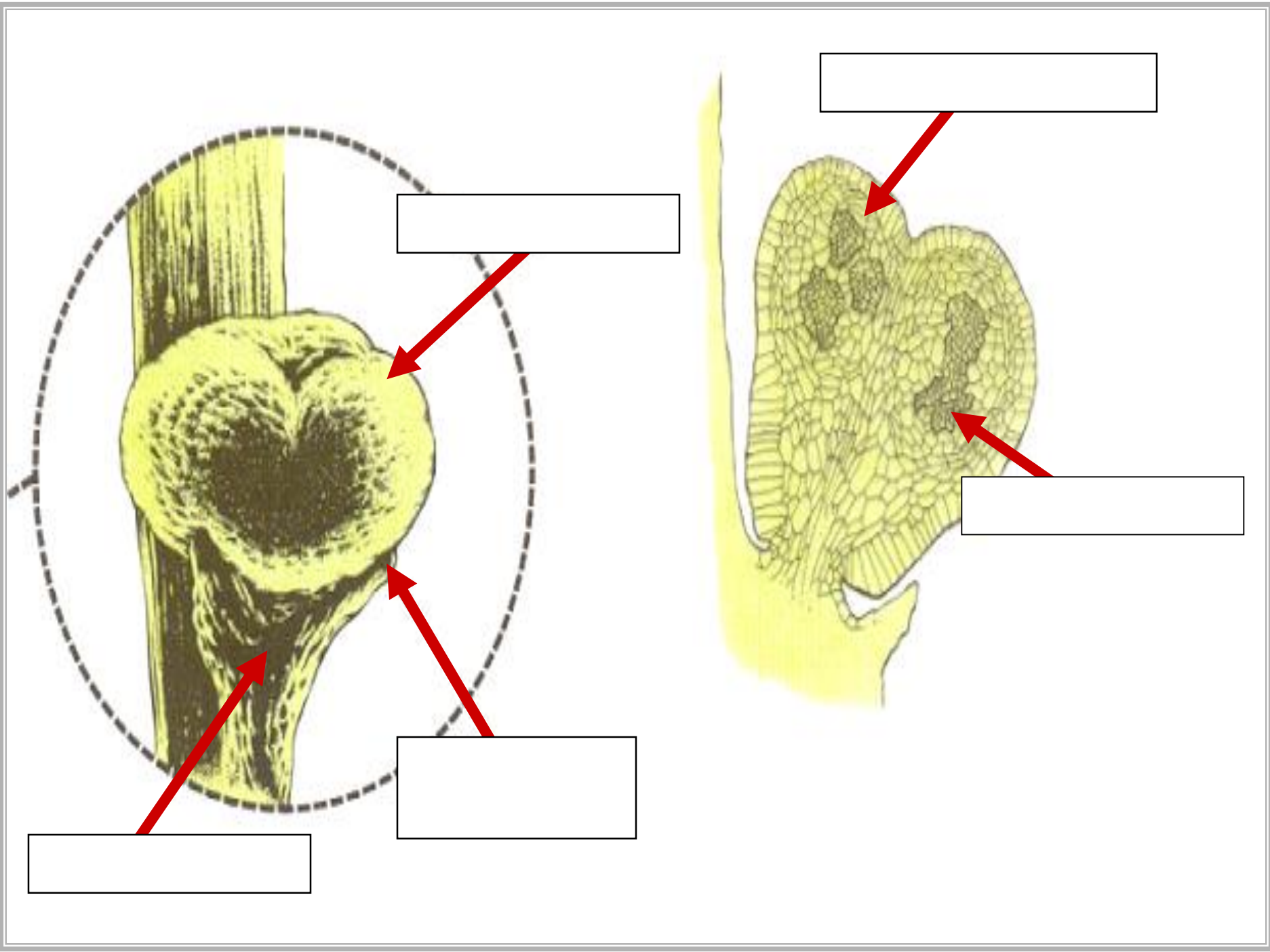
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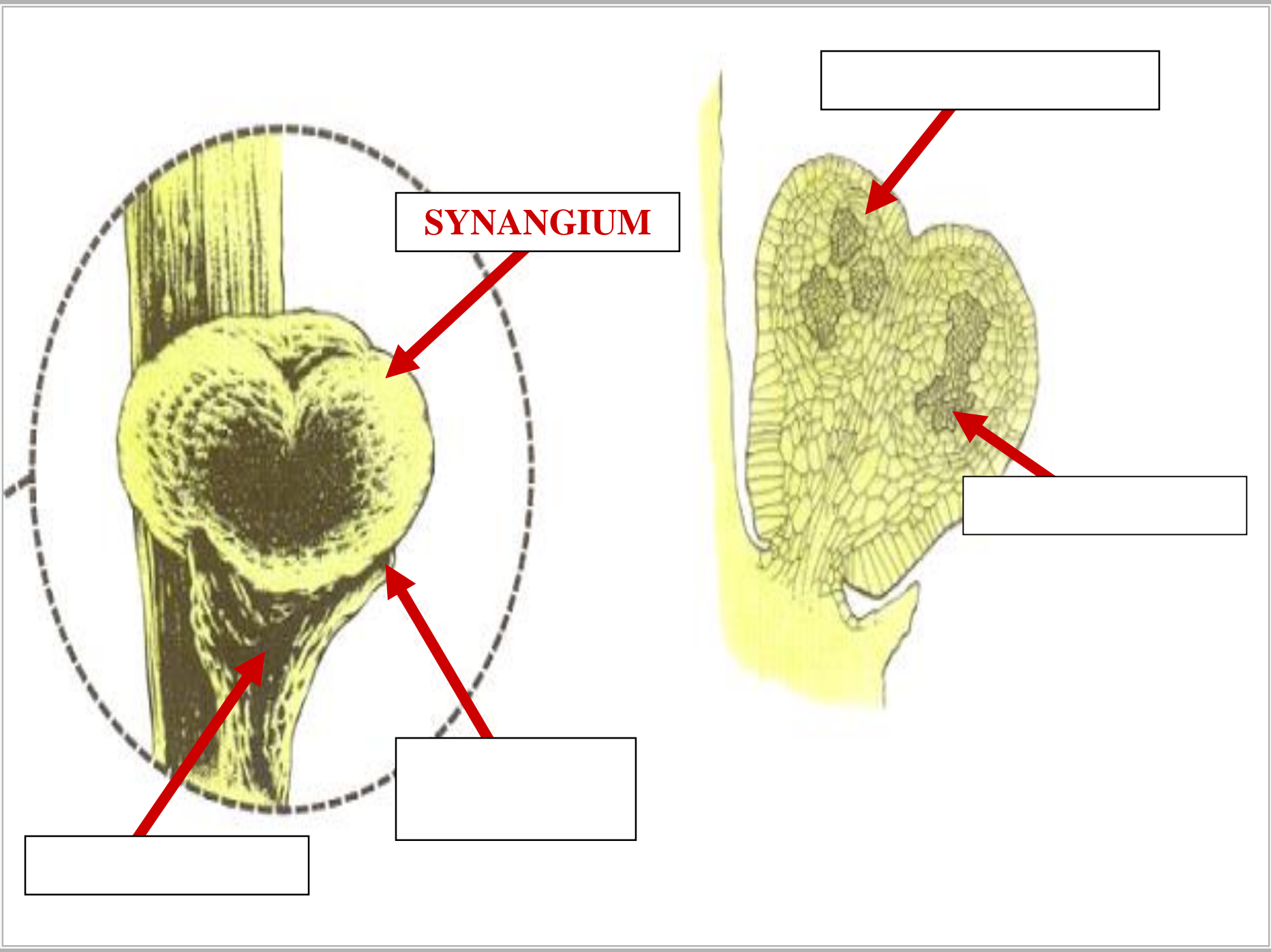
MATURE SPOROPHYTE

**AERIAL
STEM**

RHIZOME







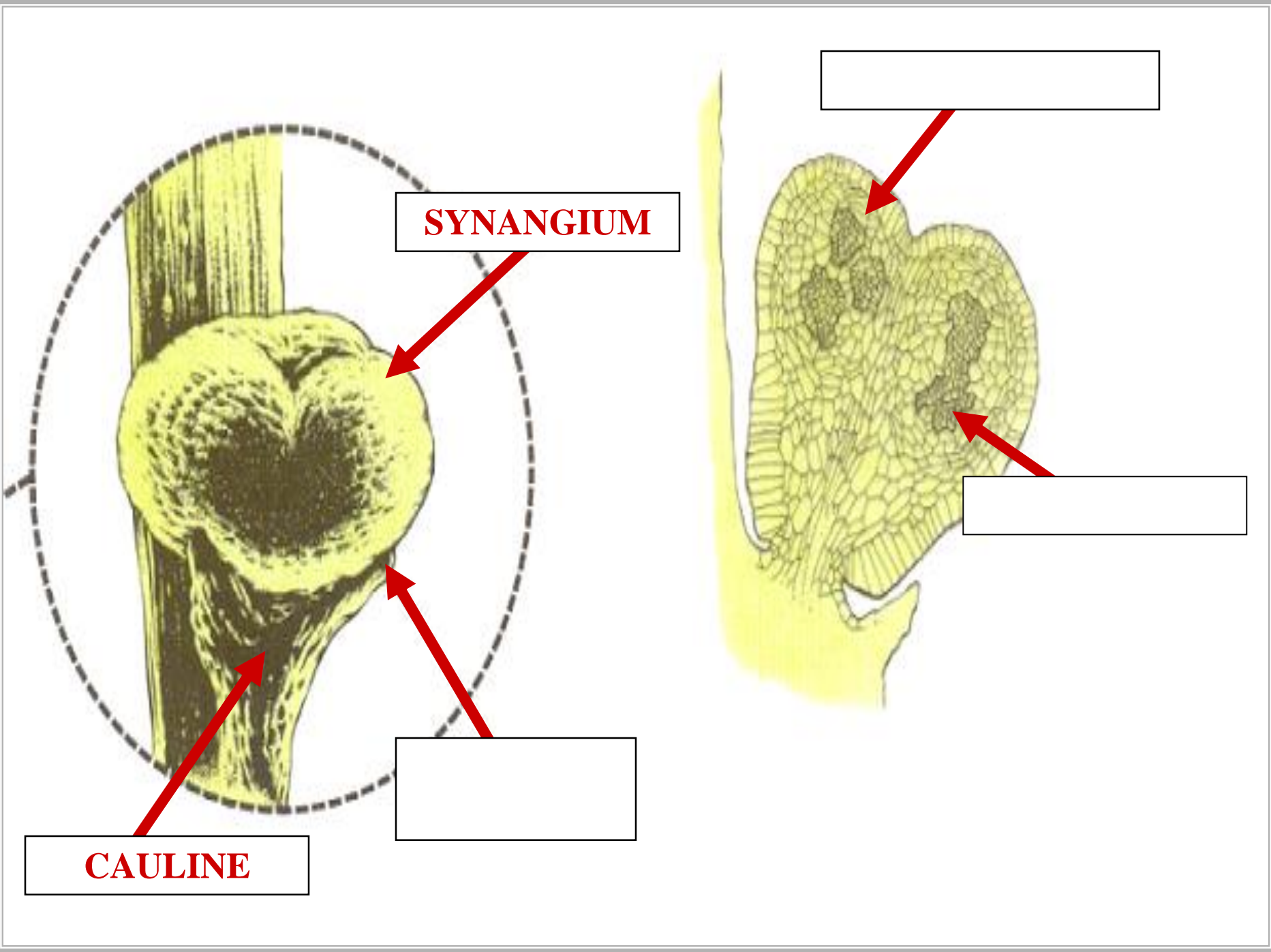
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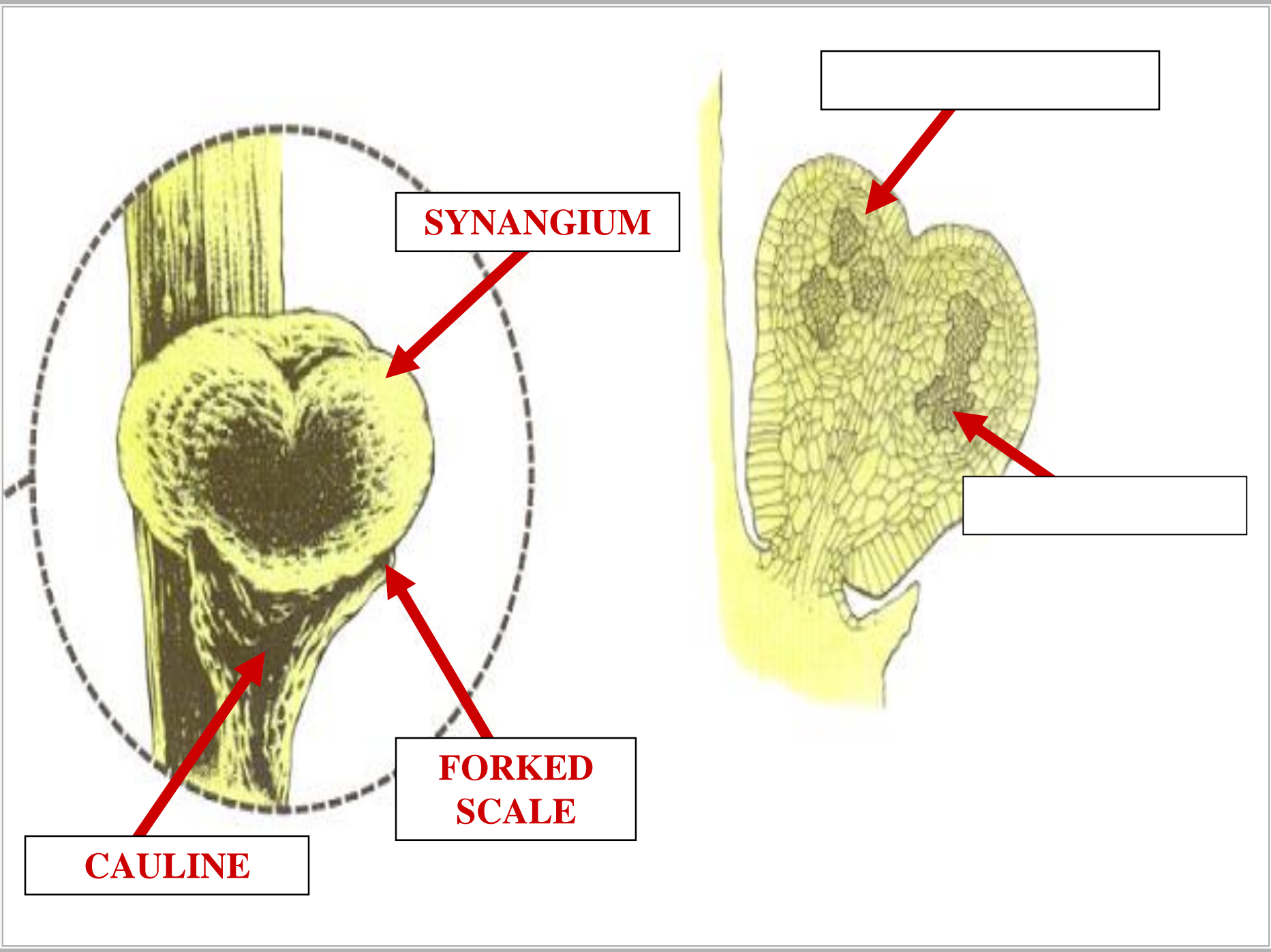
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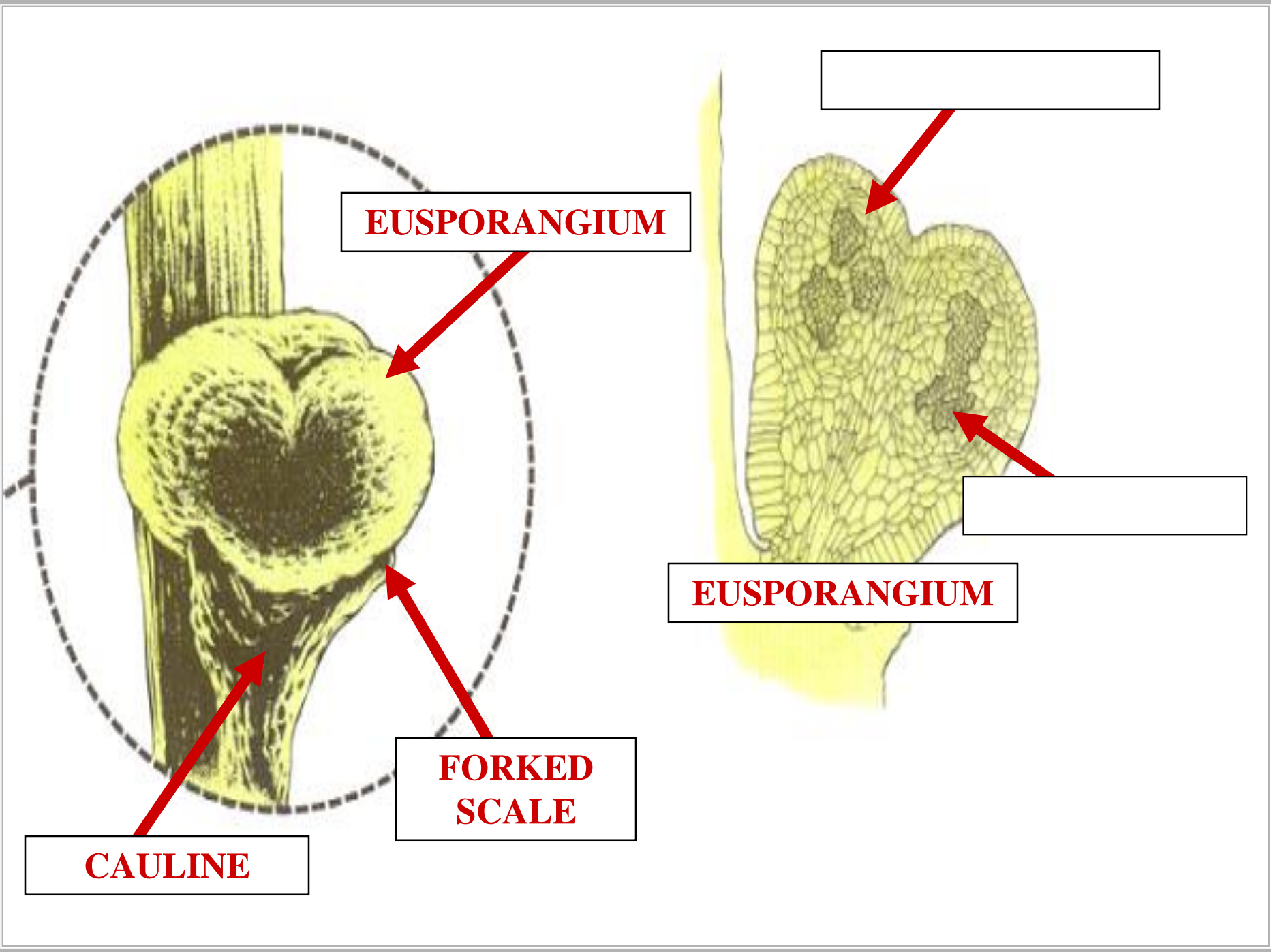
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FORKED SCALE

CAULINE

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EUSPORANGIUM

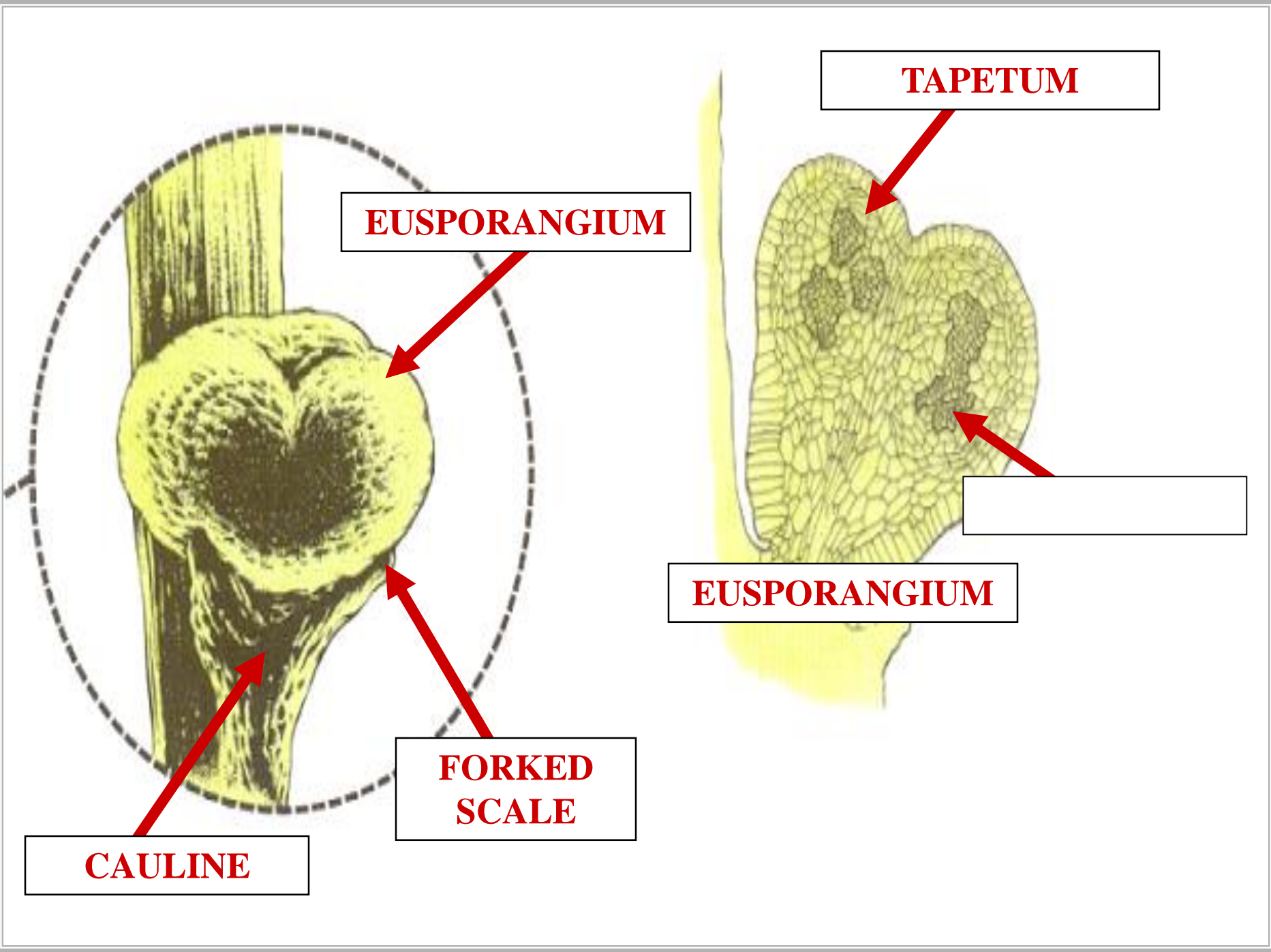
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EUSPORANGIUM



EUSPORANGIUM

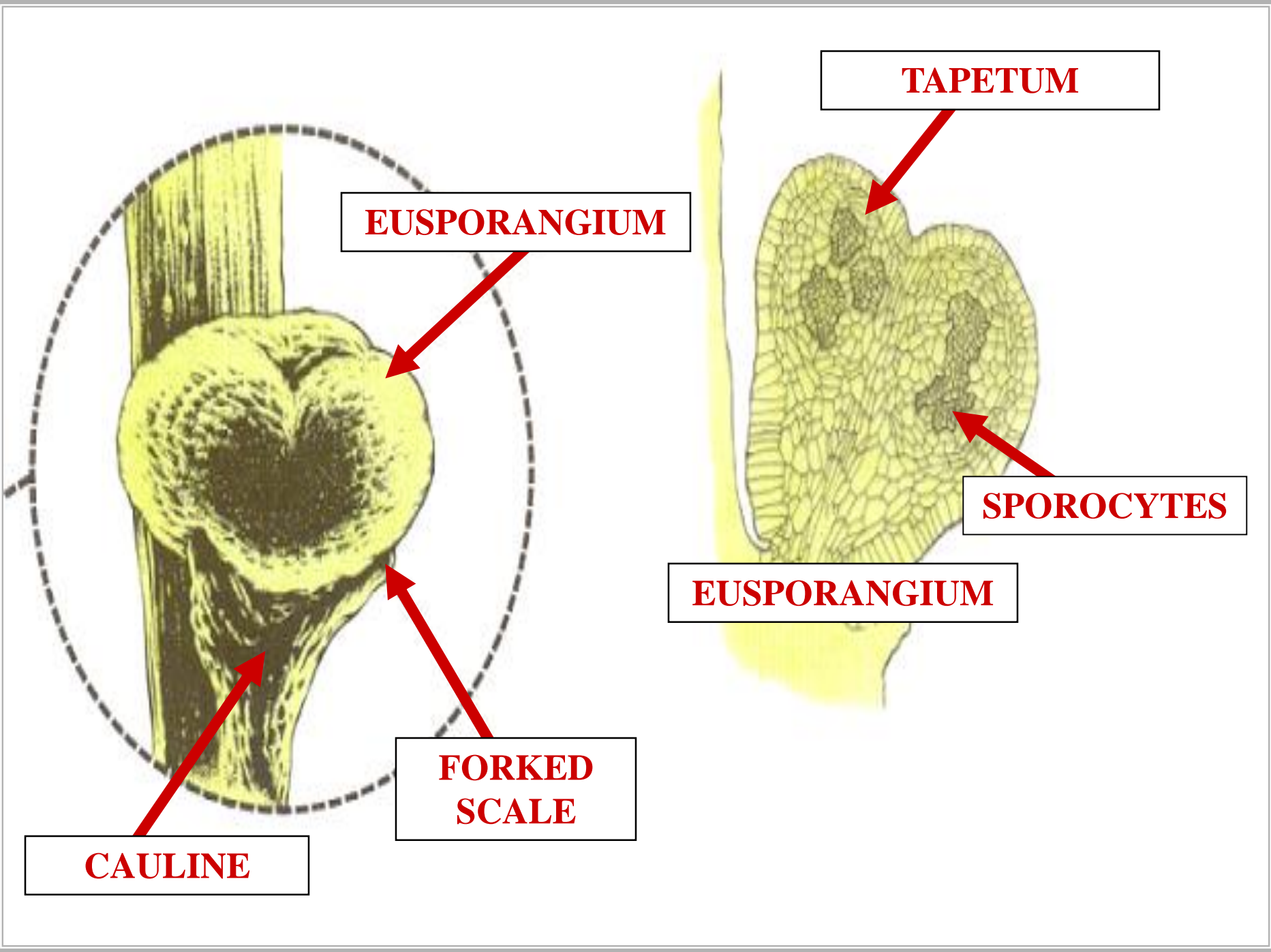
TAPETUM

CAULINE

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EUSPORANGIUM



EUSPORANGIUM

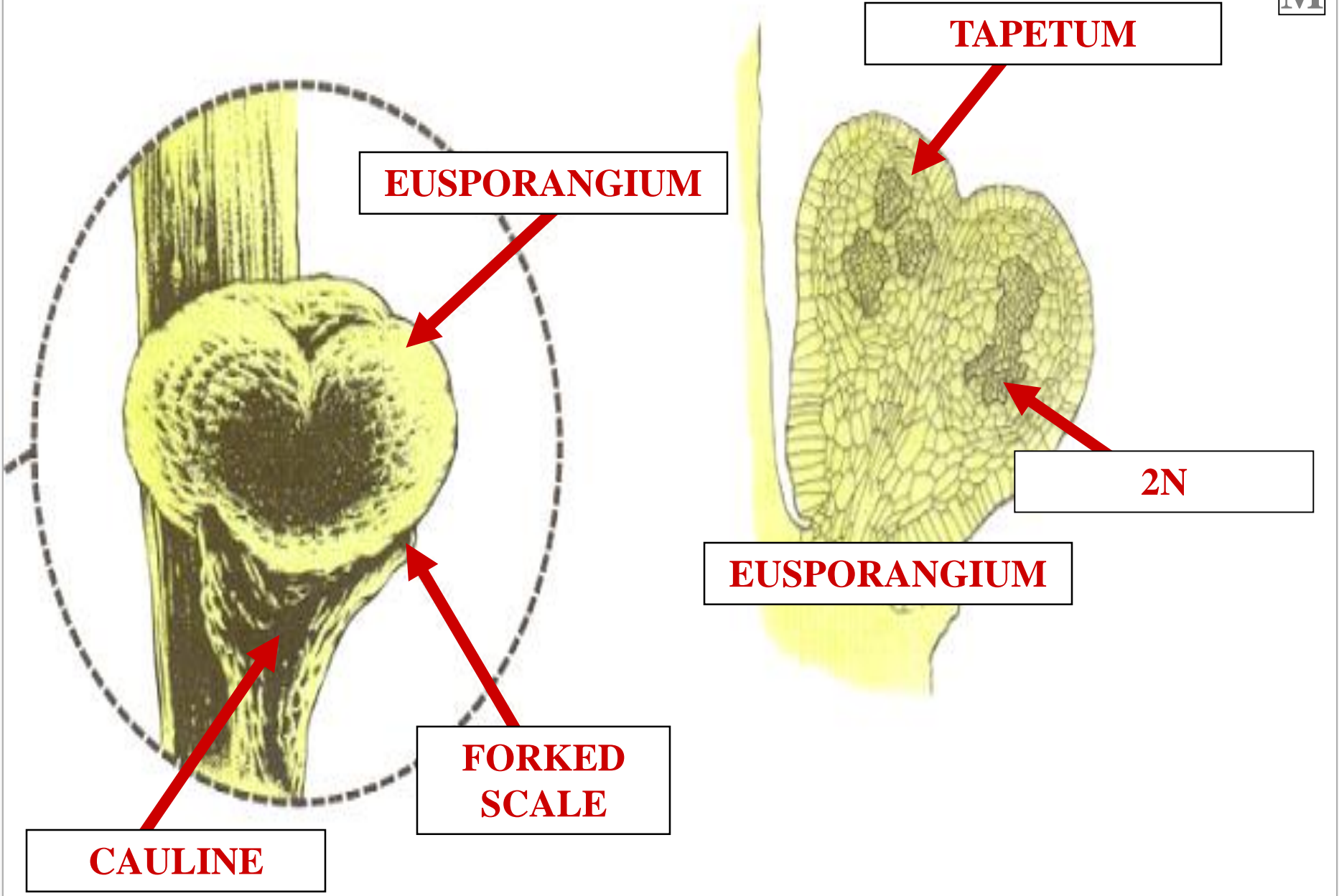
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SPOROCYTES

EUSPORANGIUM

**FORKED
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CAULINE



CAULINE

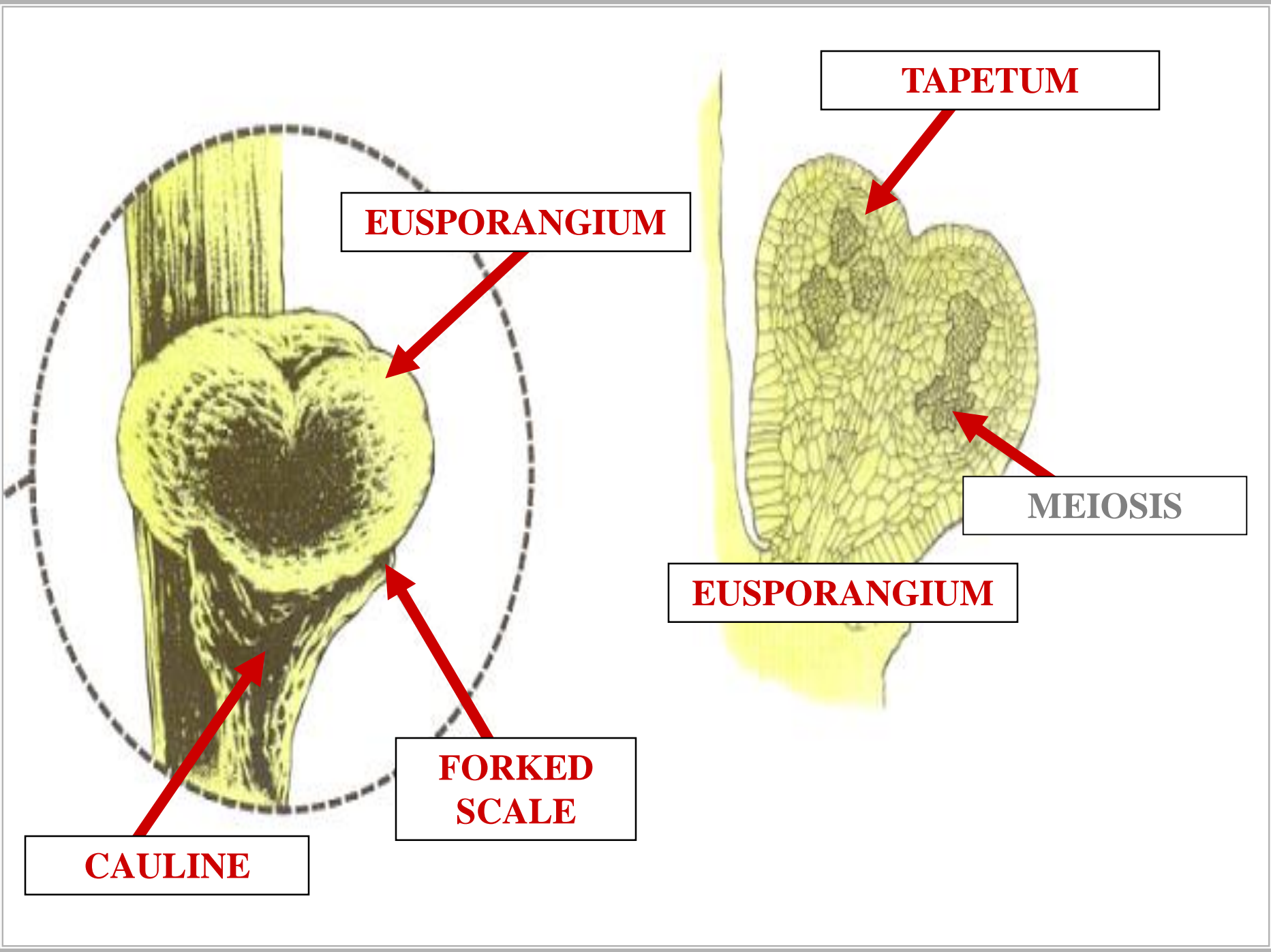
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**FORKED
SCALE**

TAPETUM

2N

EUSPORANGIUM



TAPETUM

EUSPORANGIUM

MEIOSIS

EUSPORANGIUM

**FORKED
SCALE**

CAULINE

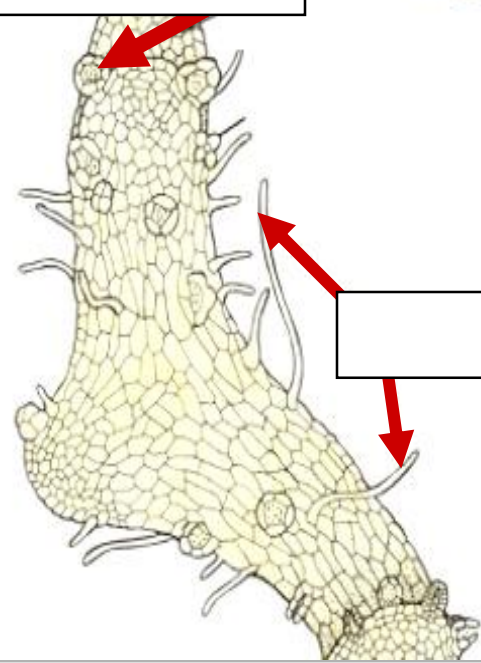
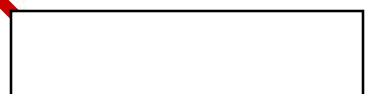
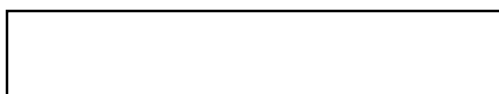
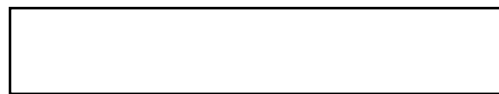
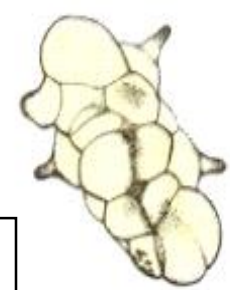
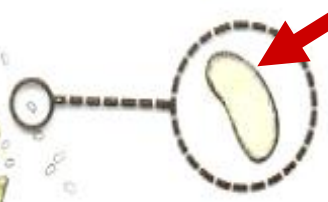
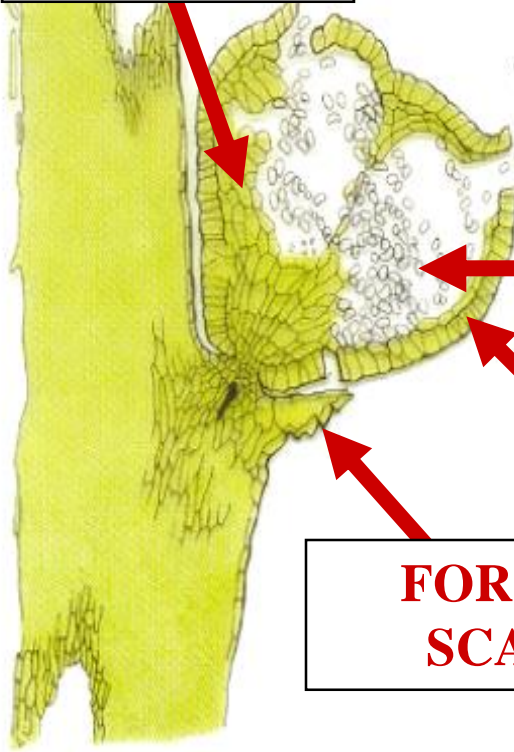
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ISOSPORE

ISOSPORES

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**FORKED
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TAPETUM

1N

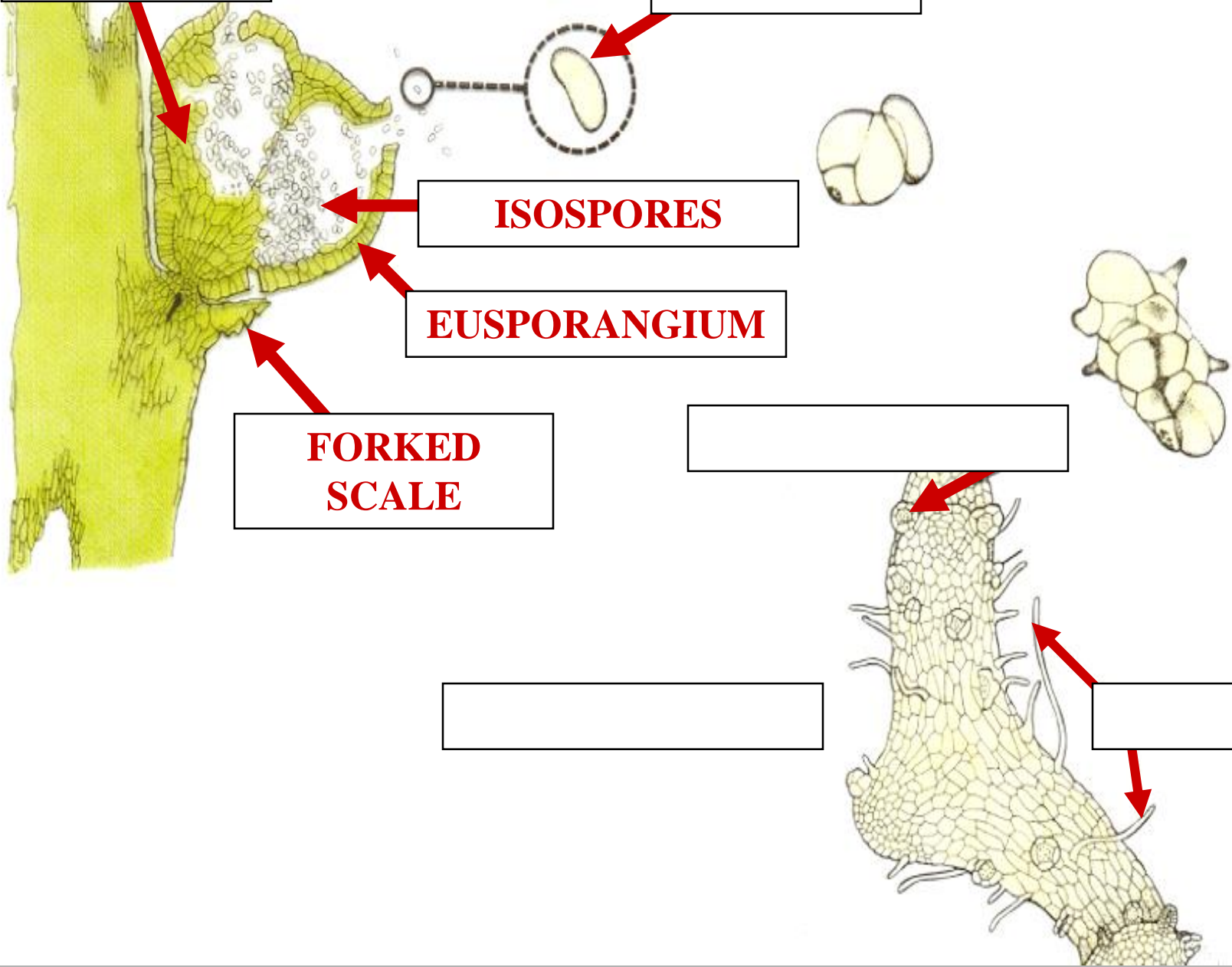
ISOSPORES

EUSPORANGIUM

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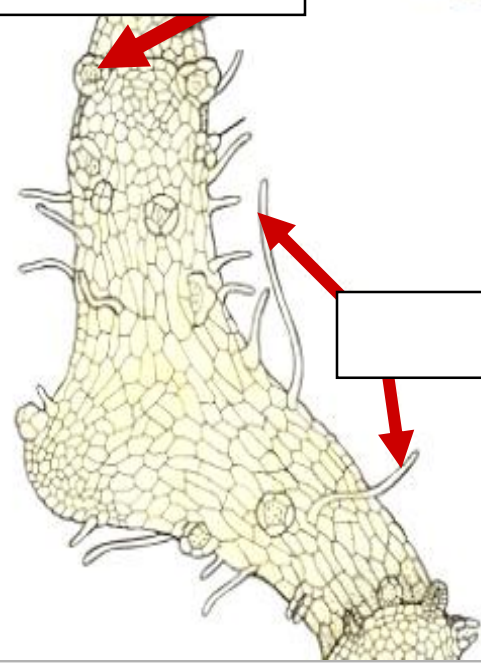
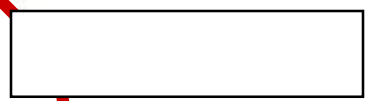
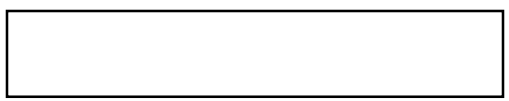
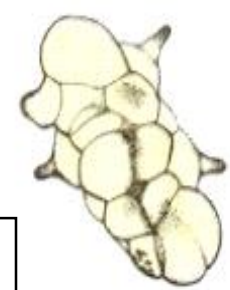
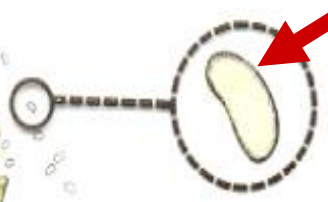
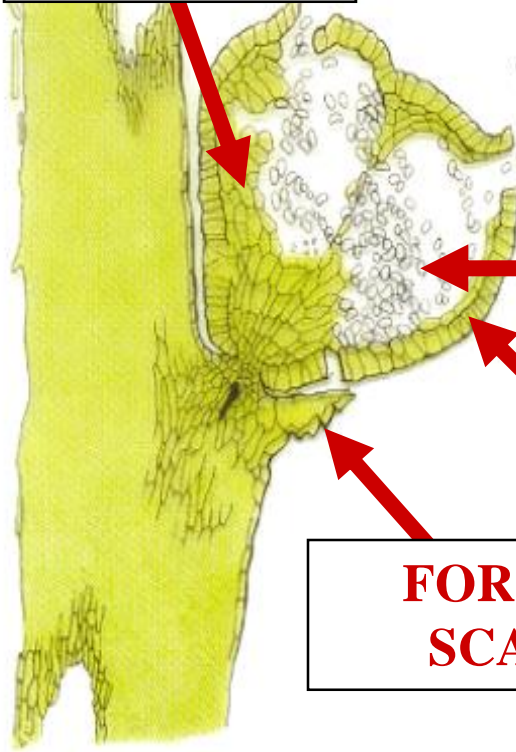
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MITOSIS

ISOSPORES

EUSPORANGIUM

**FORKED
SCALE**



TAPETUM

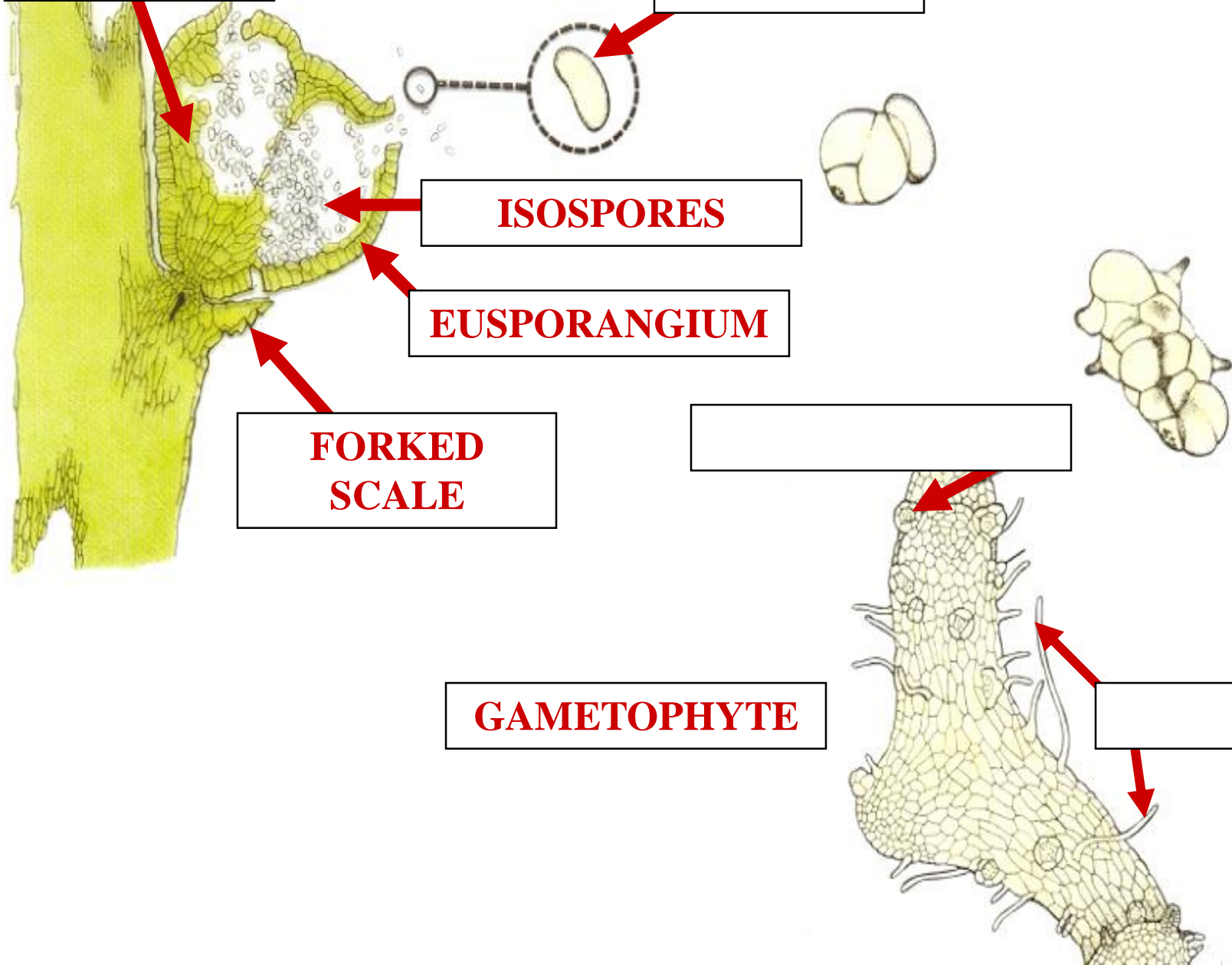
MITOSIS

ISOSPORES

EUSPORANGIUM

**FORKED
SCALE**

GAMETOPHYTE



TAPETUM

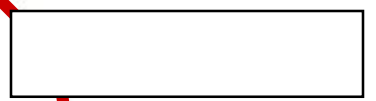
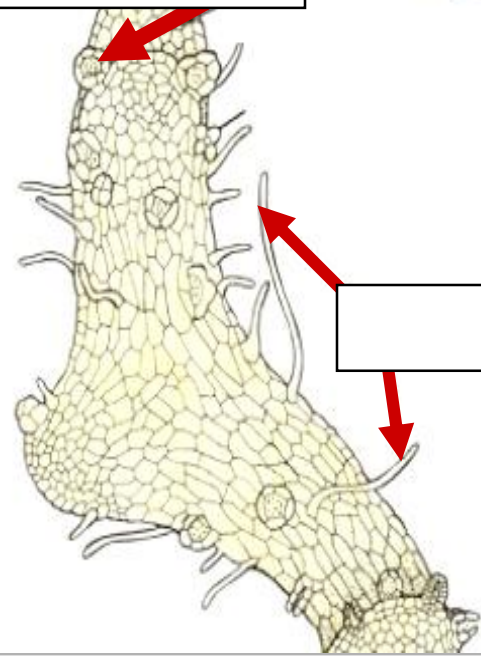
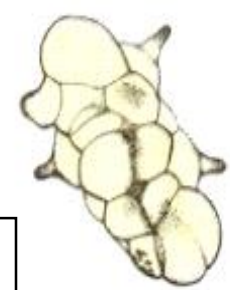
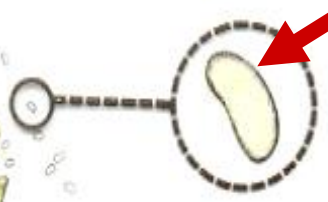
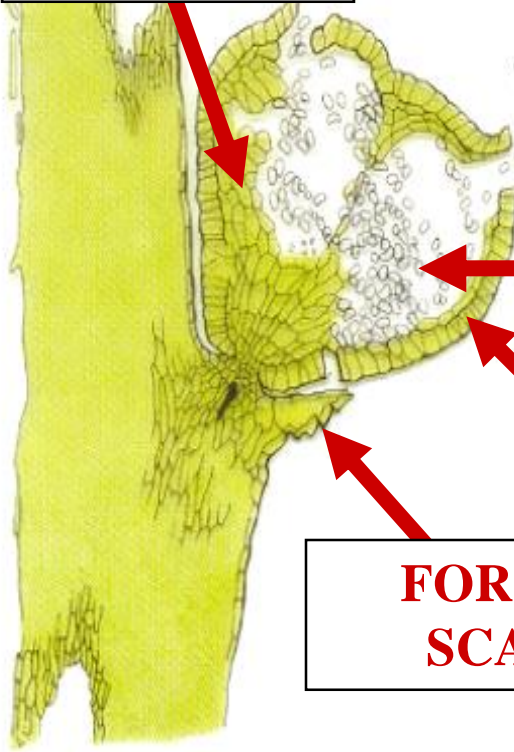
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ISOSPORES

EUSPORANGIUM

**FORKED
SCALE**

1N



TAPETUM

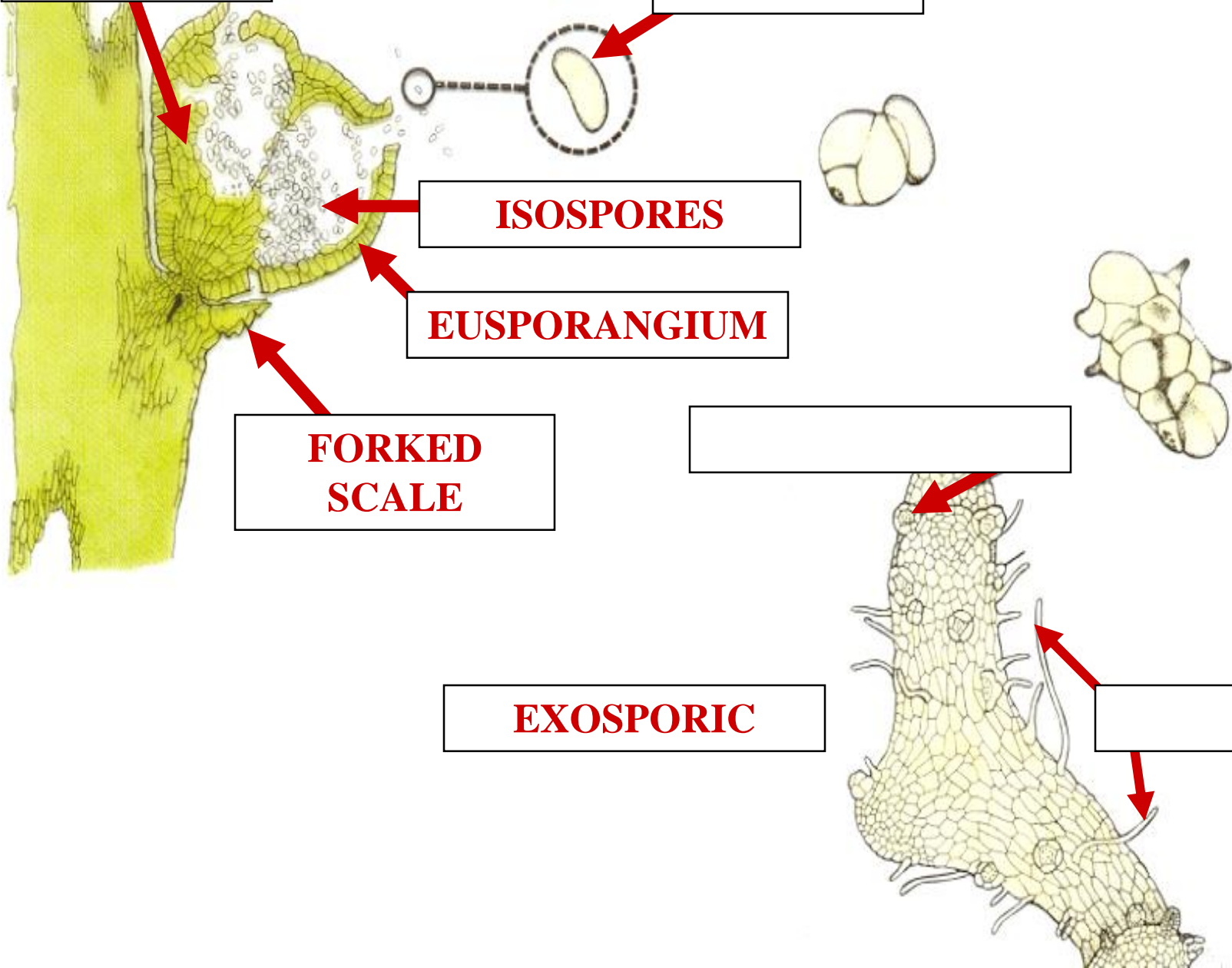
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ISOSPORES

EUSPORANGIUM

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EXOSPORIC



TAPETUM

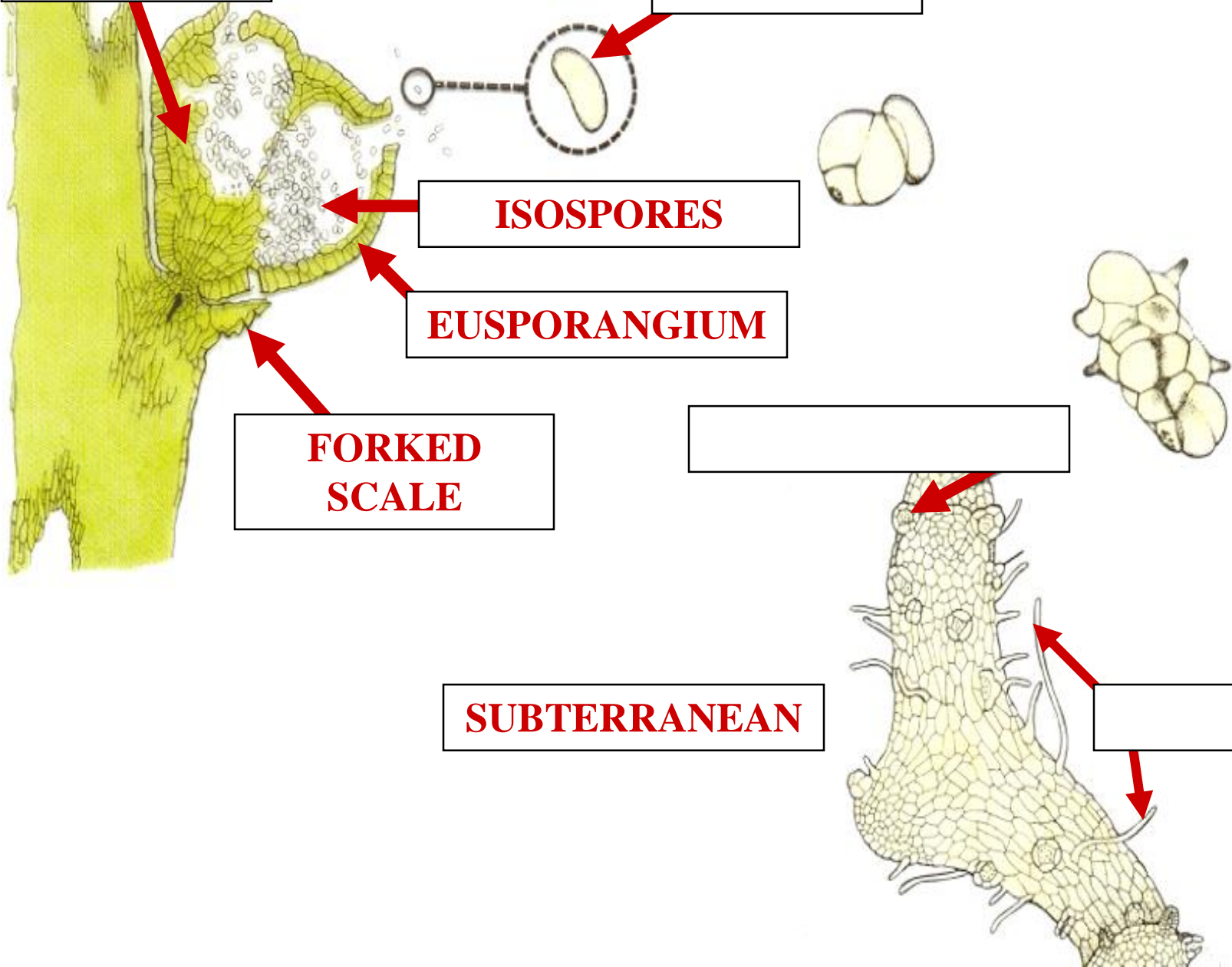
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ISOSPORES

EUSPORANGIUM

**FORKED
SCALE**

SUBTERRANEAN



TAPETUM

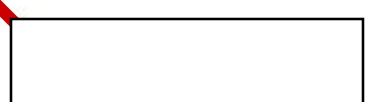
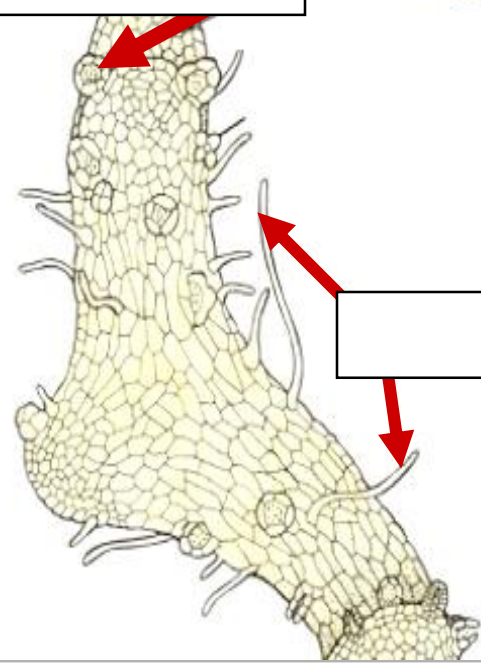
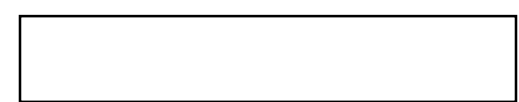
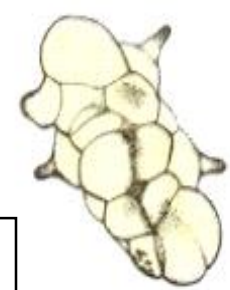
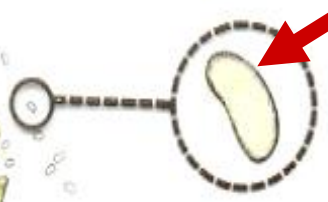
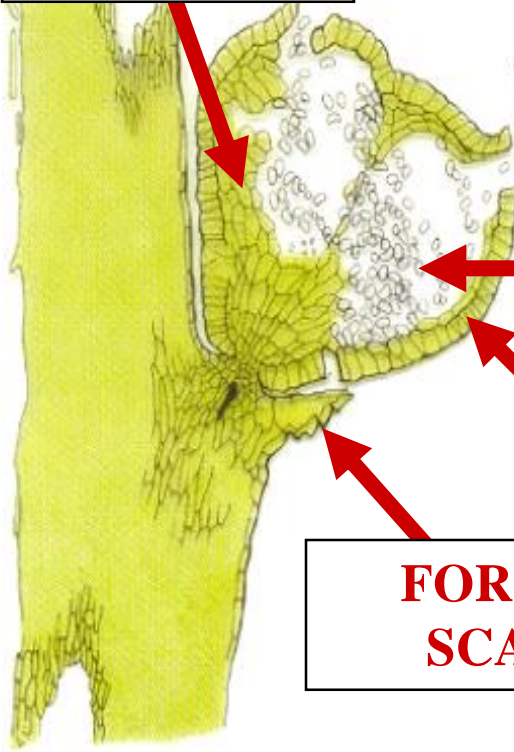
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ISOSPORES

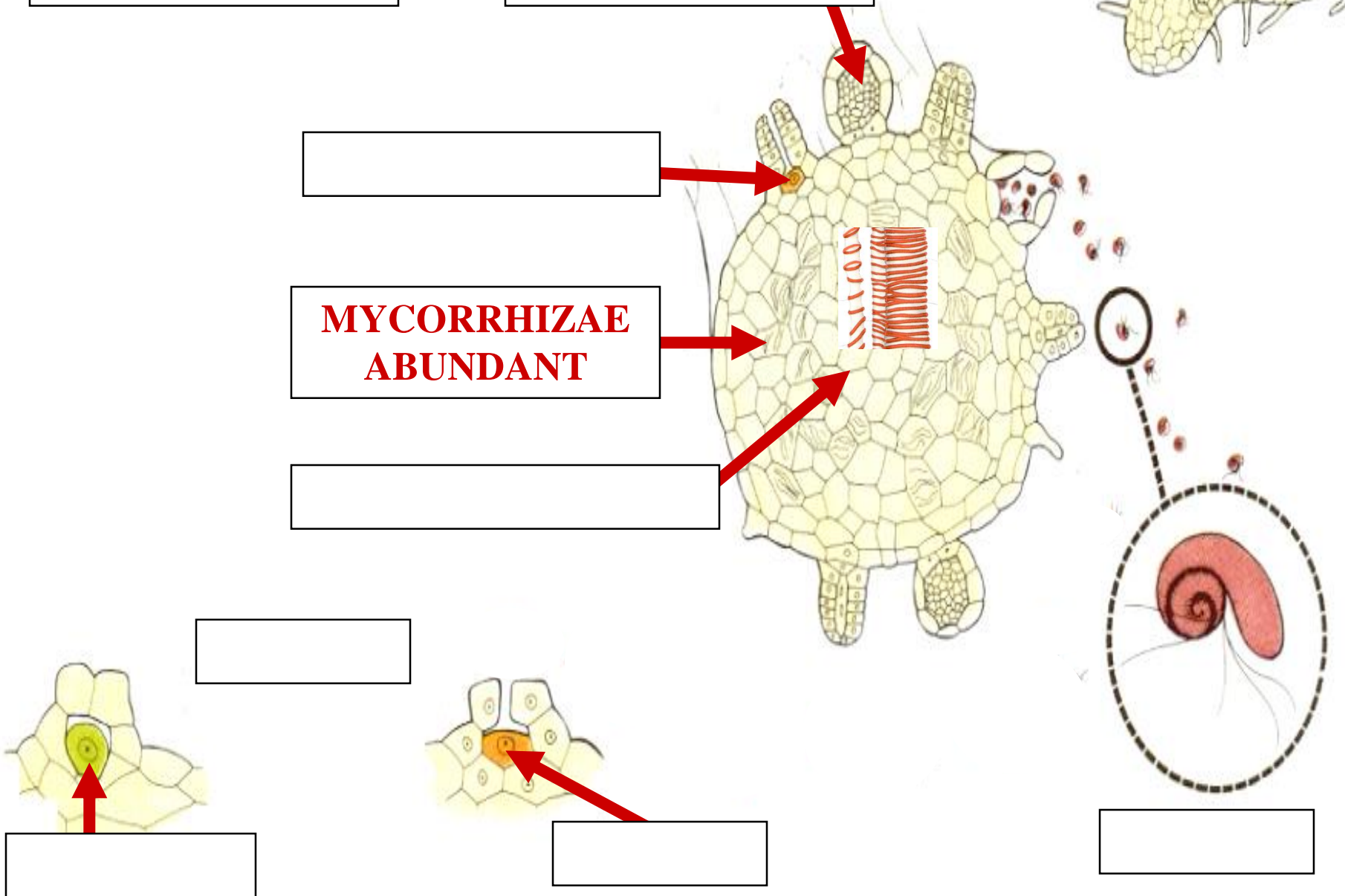
EUSPORANGIUM

**FORKED
SCALE**

NON-PSYN

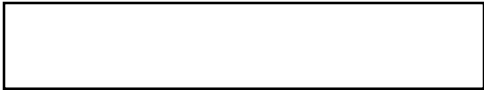
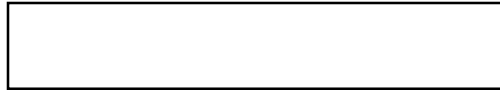


GAMETOPHYTE



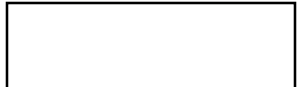
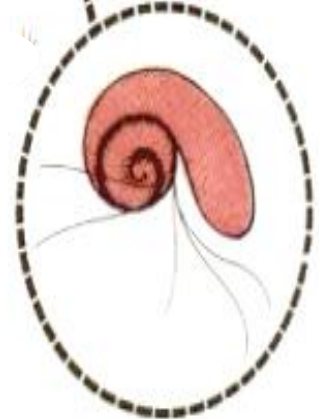
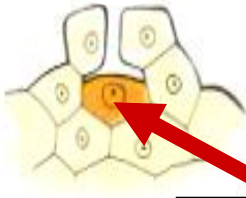
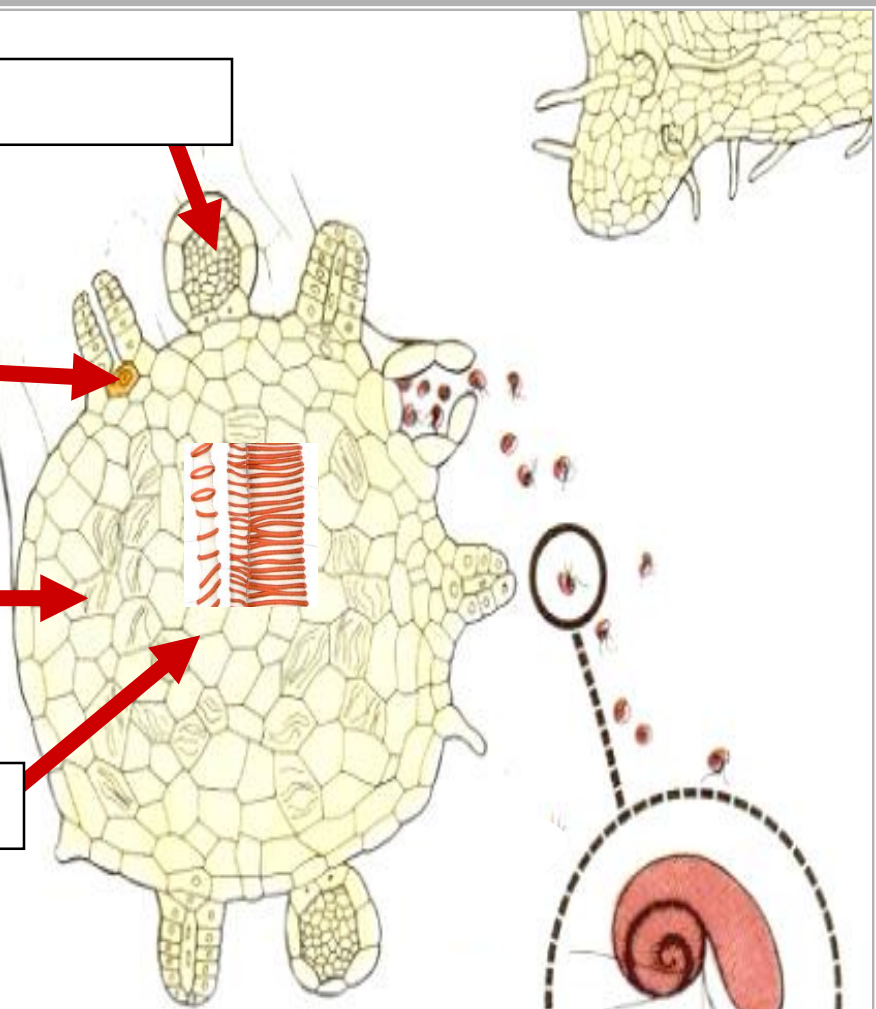
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ABUNDANT**

GAMETOPHYTE

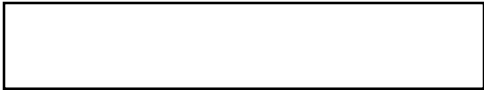


**MYCORRHIZAE
ABUNDANT**

VASCULAR TISSUE

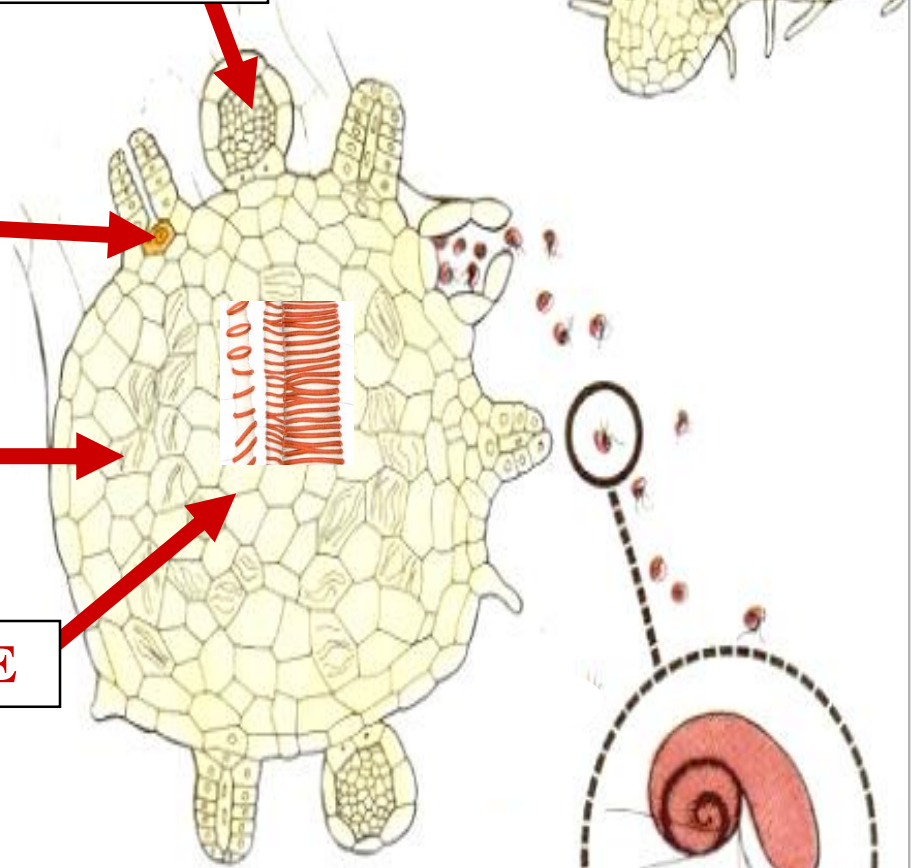
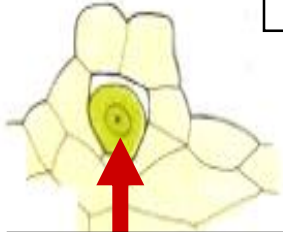


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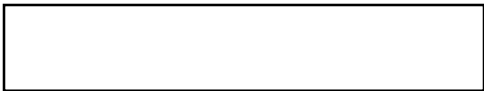
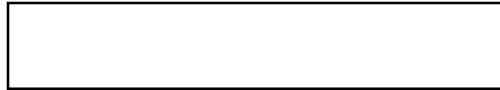


BISEXUAL

VASCULAR TISSUE



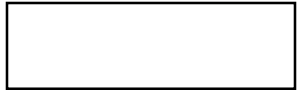
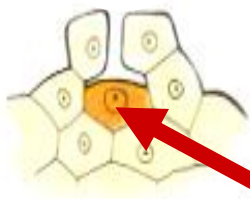
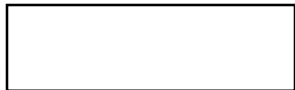
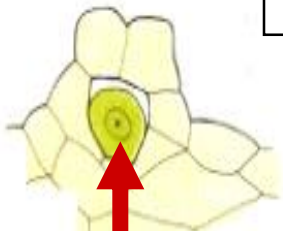
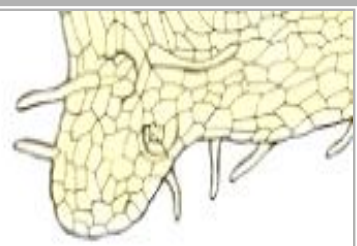
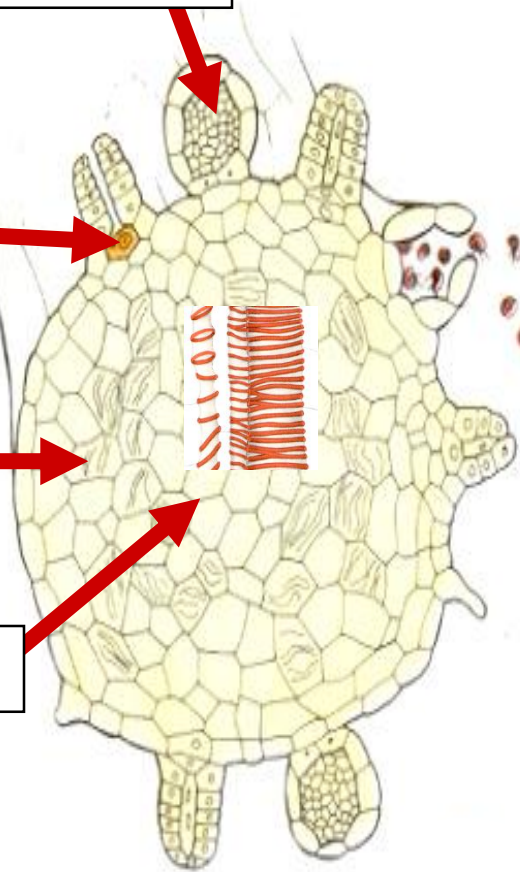
GAMETOPHYTE



GAMETANGIA



VASCULAR TISSUE



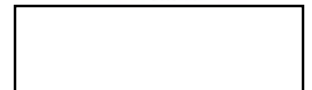
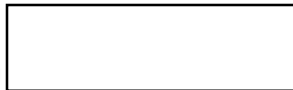
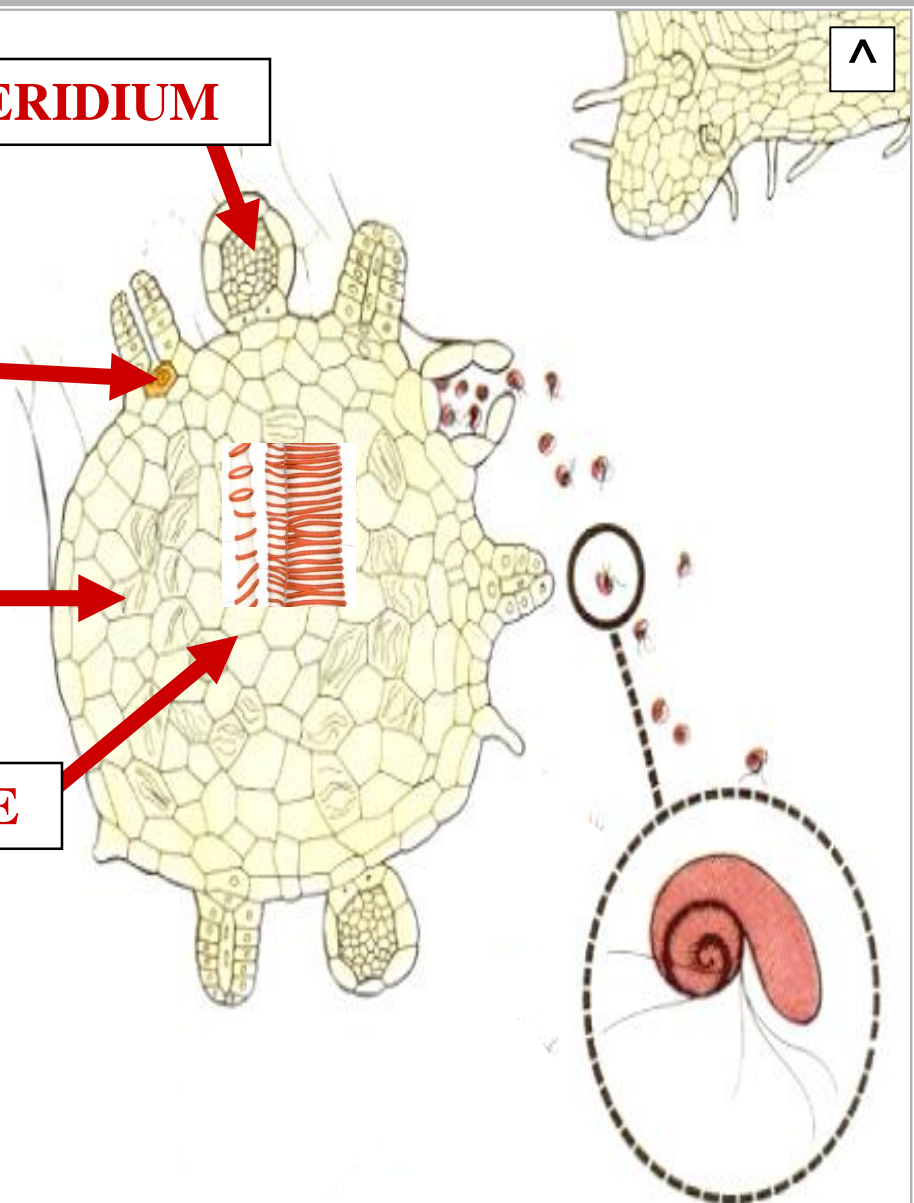
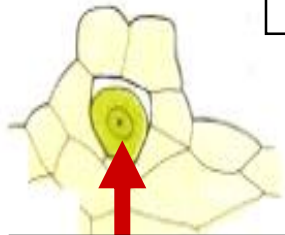
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ANTHERIDIUM

ARCHEGONIUM

GAMETANGIA

VASCULAR TISSUE



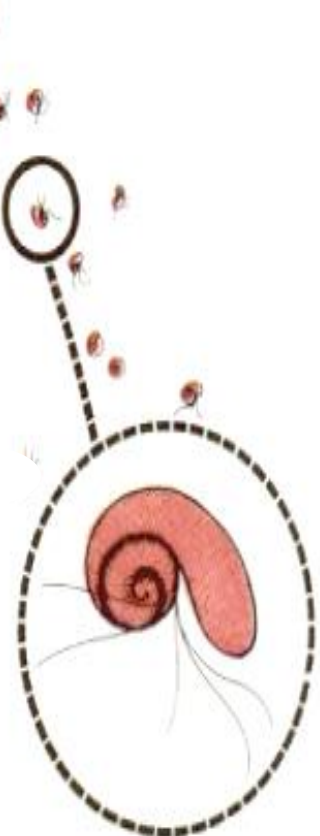
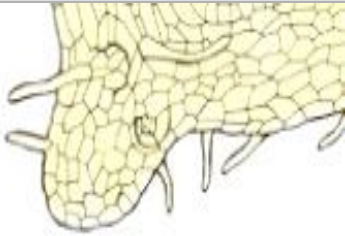
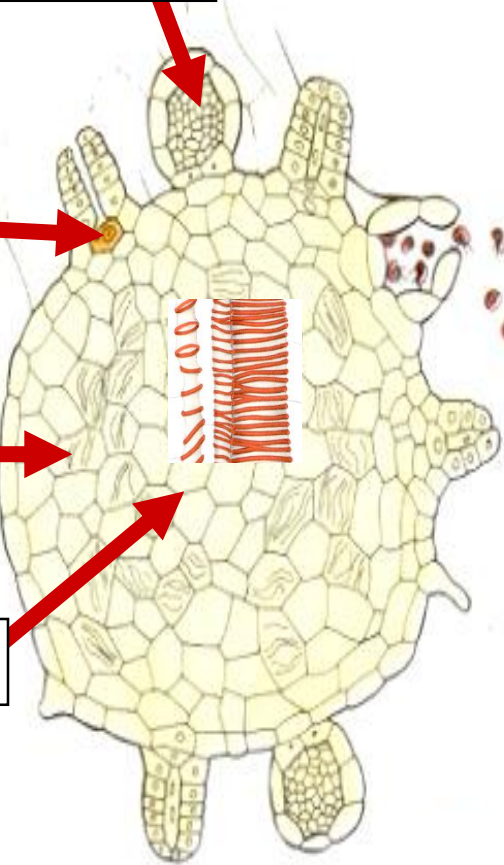
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ANTHERIDIUM

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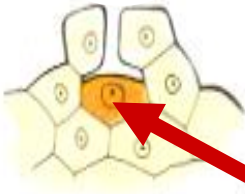
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VASCULAR TISSUE



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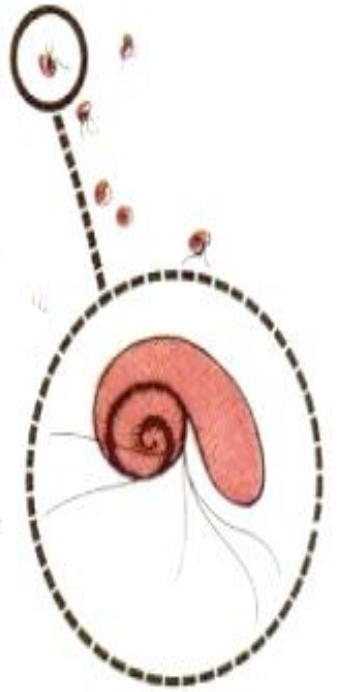
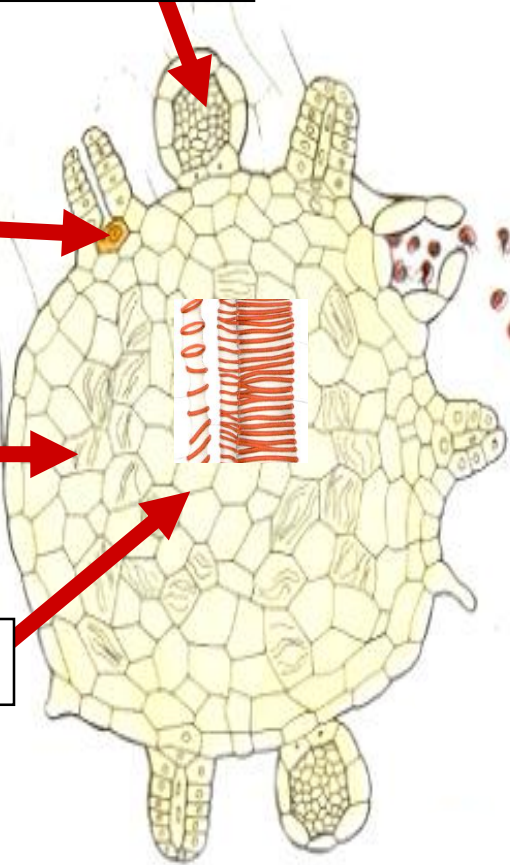
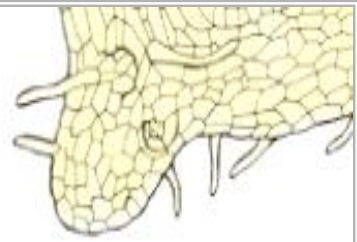
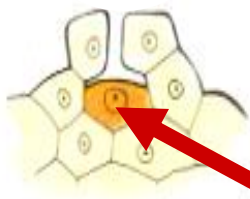
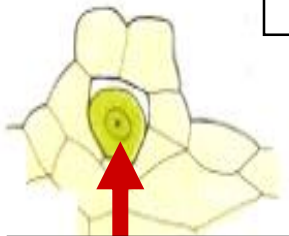
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GAMETOPHYTE

SPERMATOCYTES

GAMETANGIA

VASCULAR TISSUE



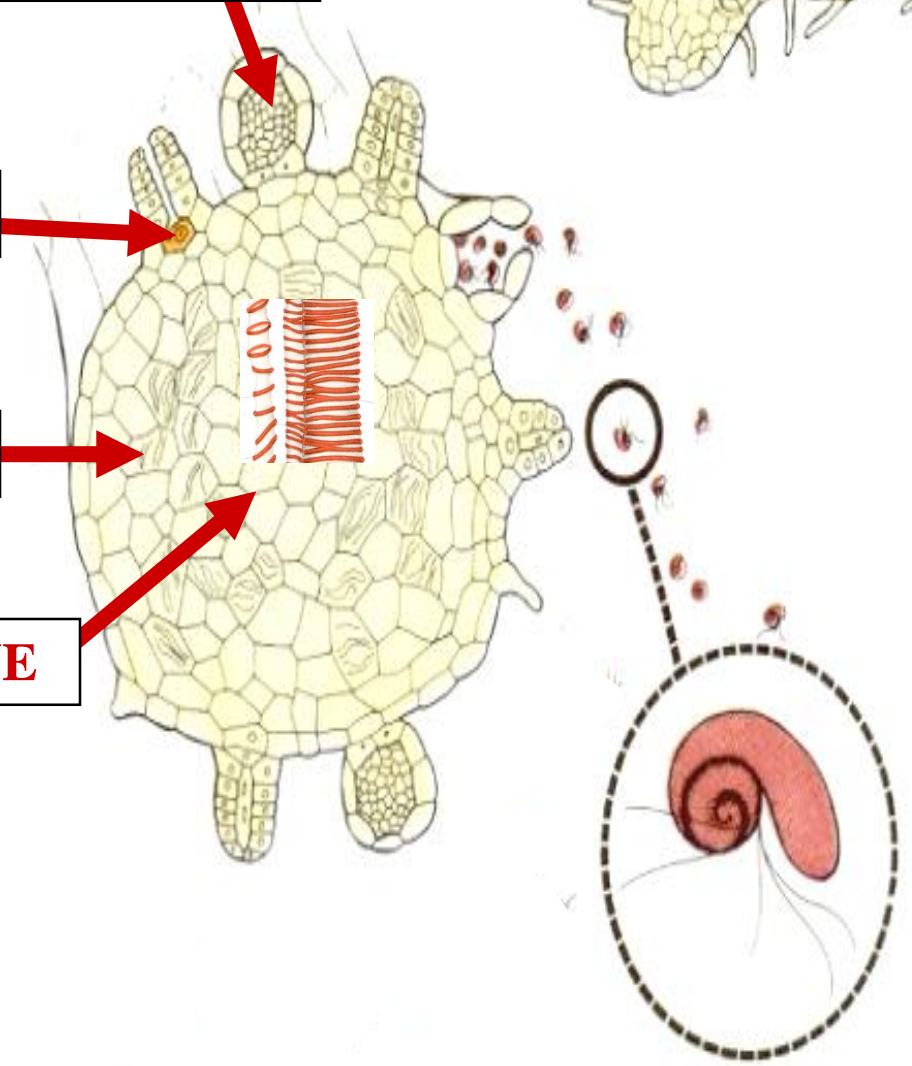
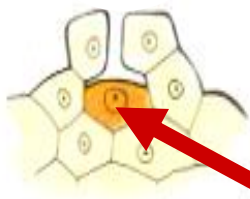
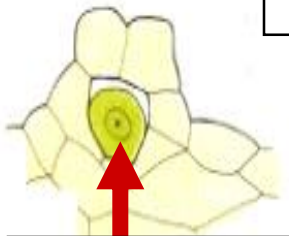
GAMETOPHYTE

1N

M

GAMETANGIA

VASCULAR TISSUE

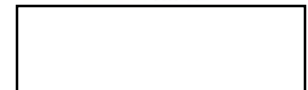
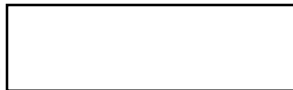
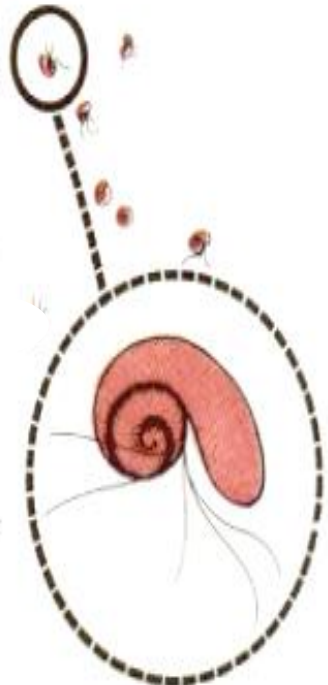
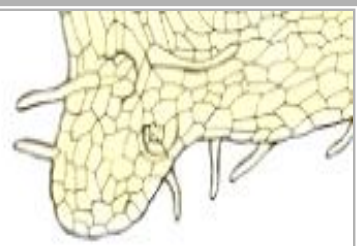
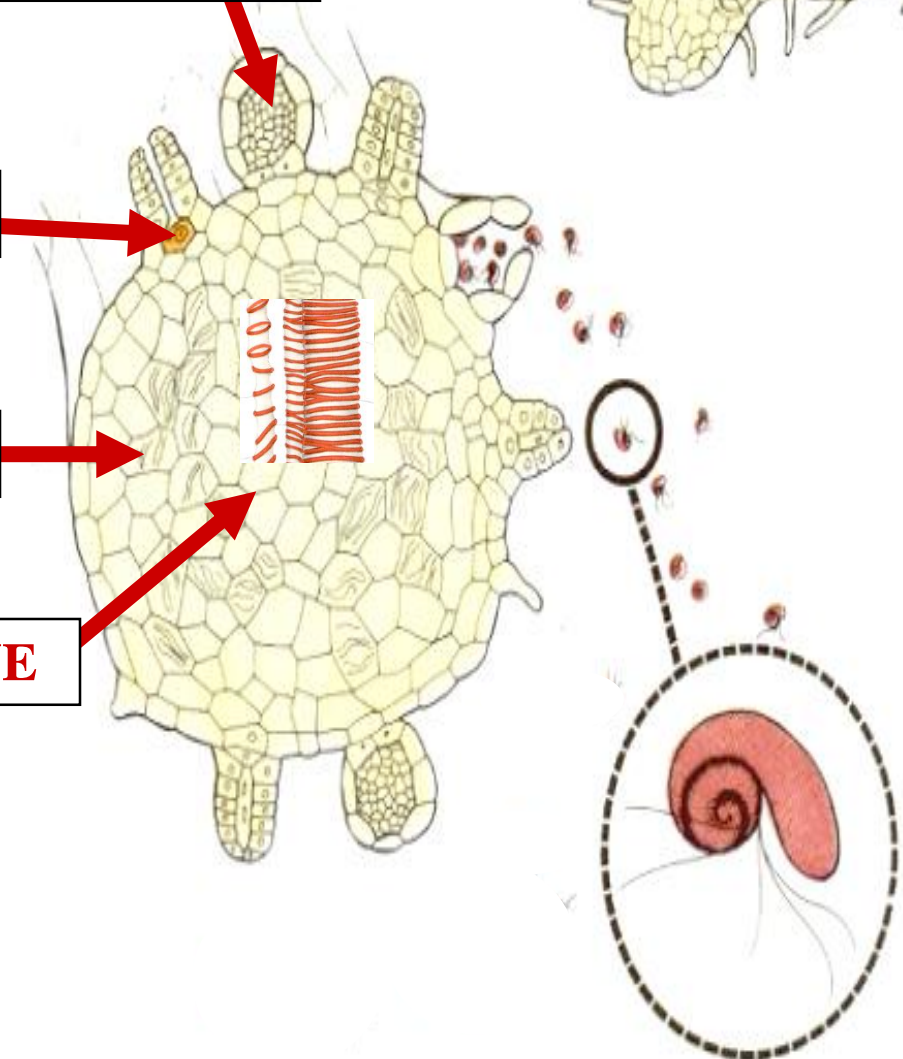
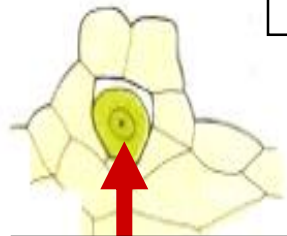


GAMETOPHYTE

MITOSIS

GAMETANGIA

VASCULAR TISSUE



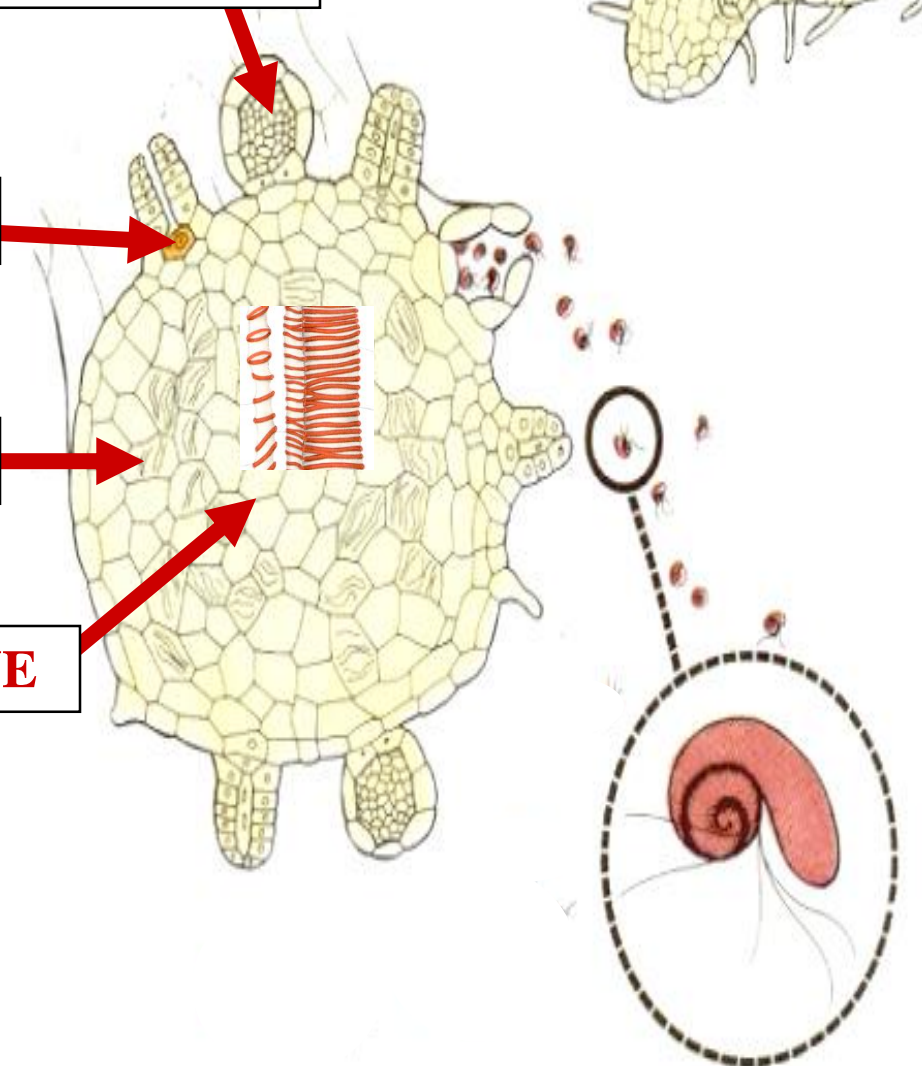
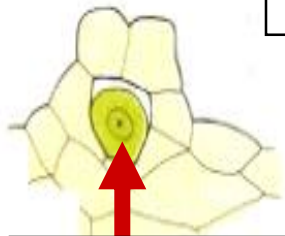
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MITOSIS

GAMETANGIA

VASCULAR TISSUE

SPERM

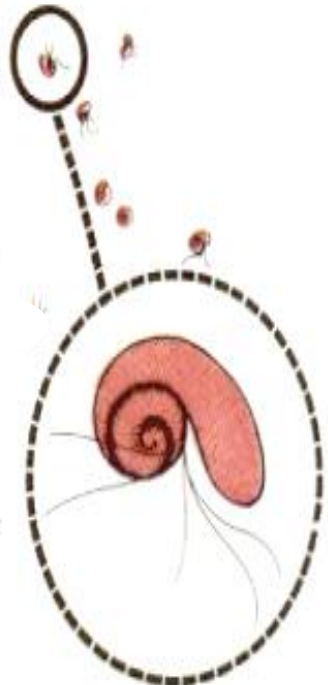


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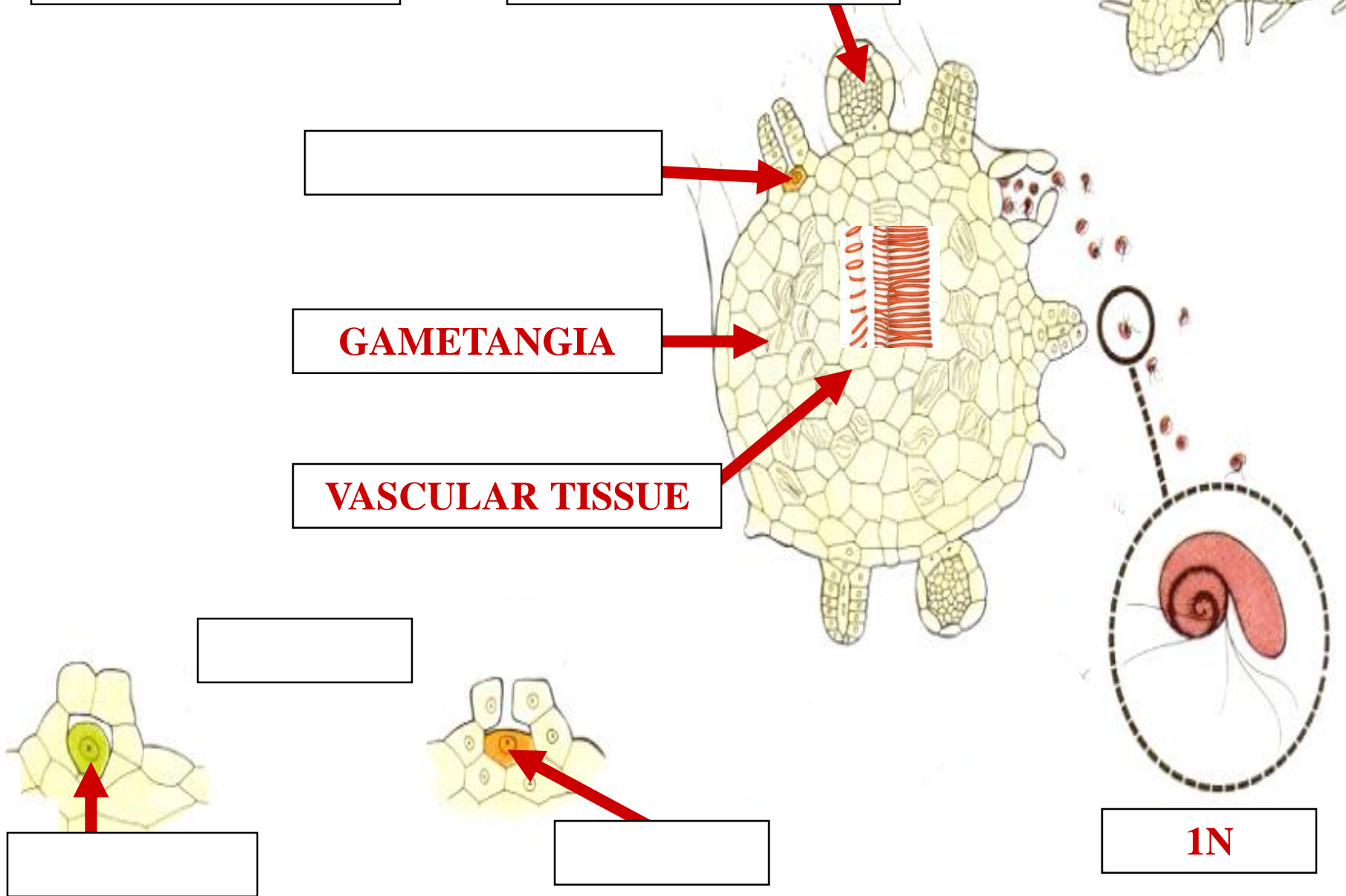
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MITOSIS

GAMETANGIA

VASCULAR TISSUE

1N



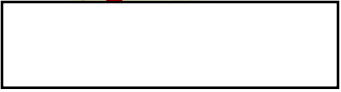
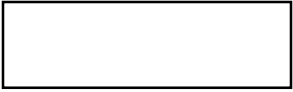
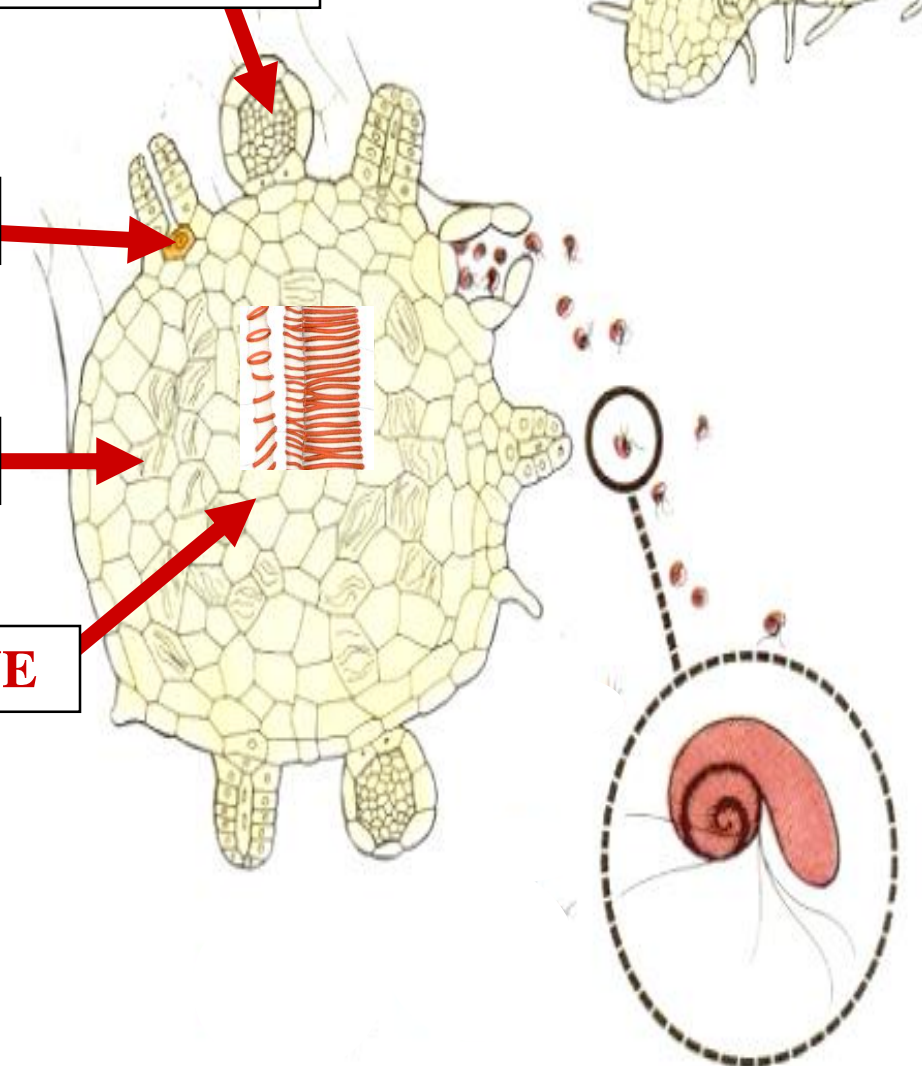
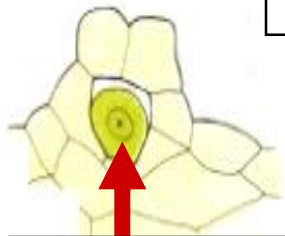
GAMETOPHYTE

MITOSIS

GAMETANGIA

VASCULAR TISSUE

MULTIFLAGELLATED



GAMETOPHYTE

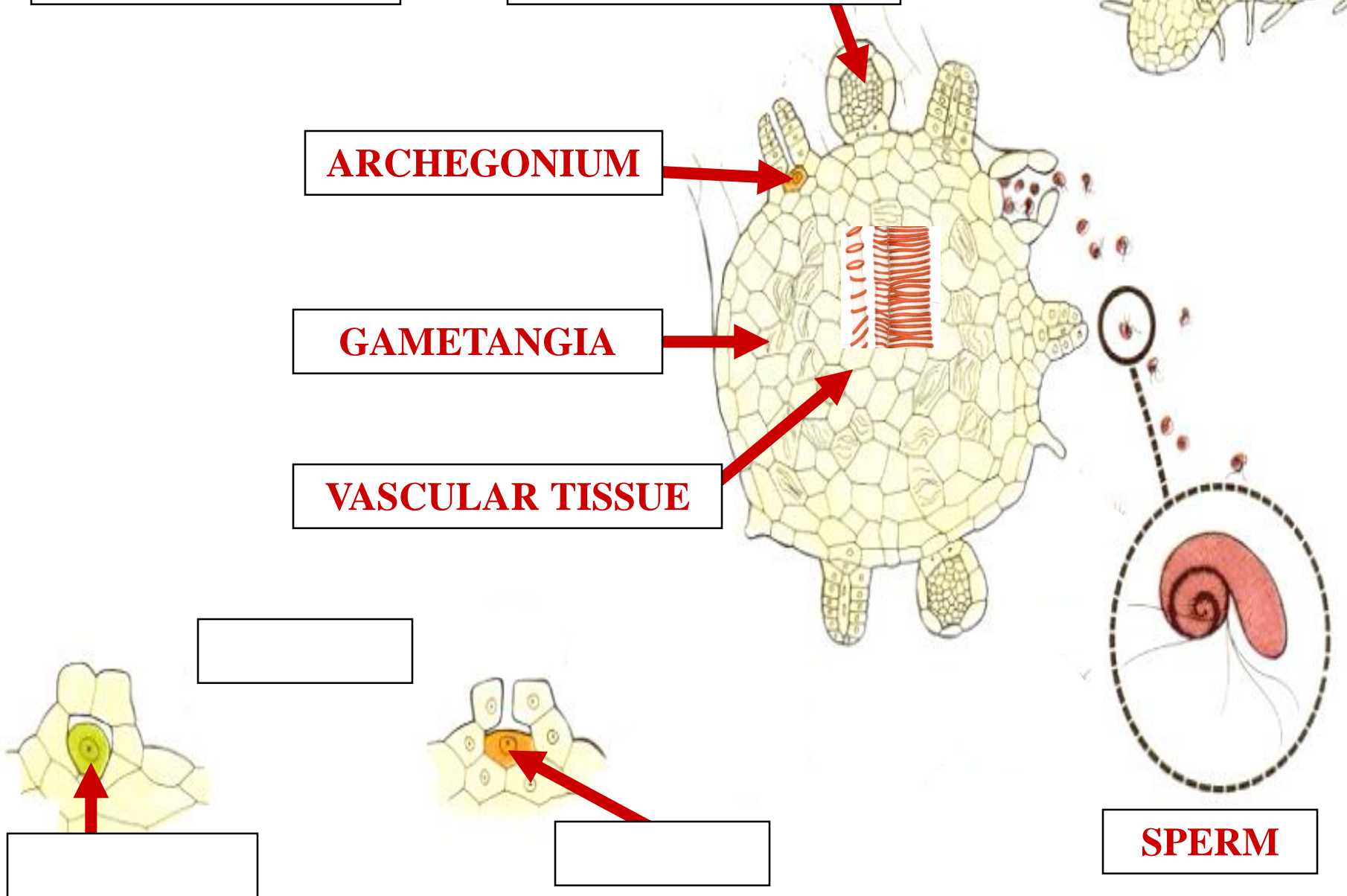
ANTHERIDIUM

ARCHEGONIUM

GAMETANGIA

VASCULAR TISSUE

SPERM



GAMETOPHYTE

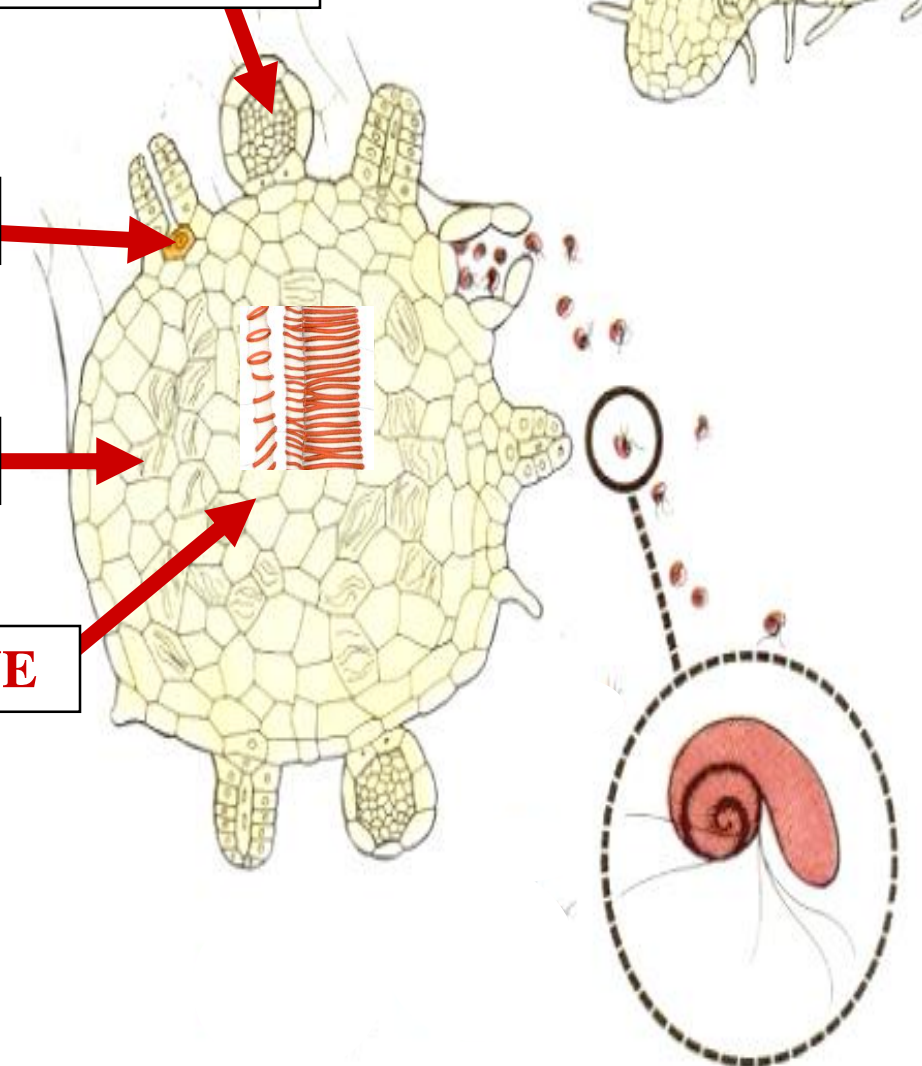
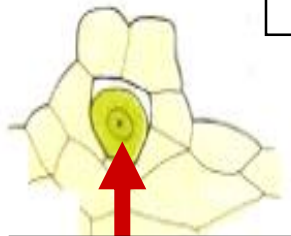
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OOCYTE

GAMETANGIA

VASCULAR TISSUE

SPERM



GAMETOPHYTE

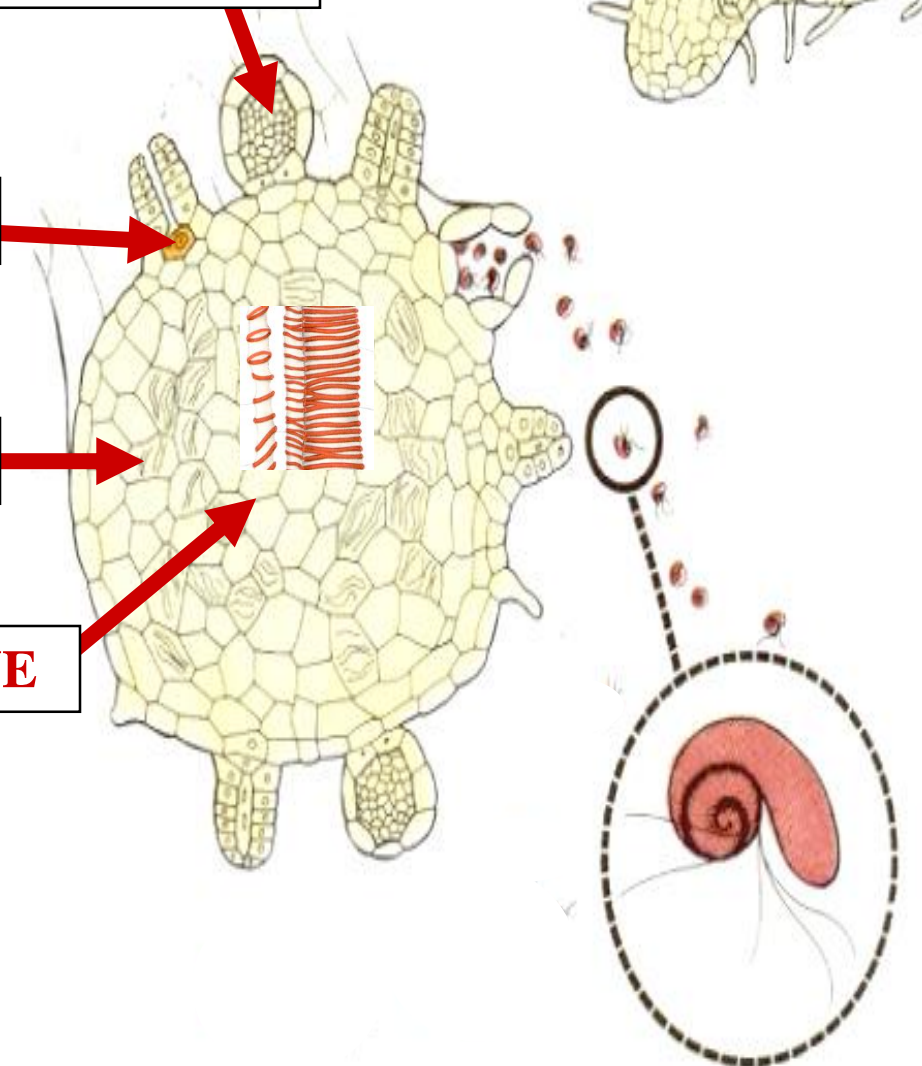
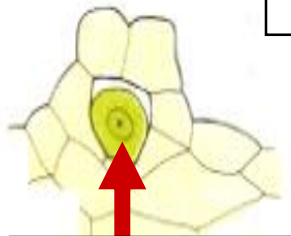
ANTHERIDIUM

1N

GAMETANGIA

VASCULAR TISSUE

SPERM



GAMETOPHYTE

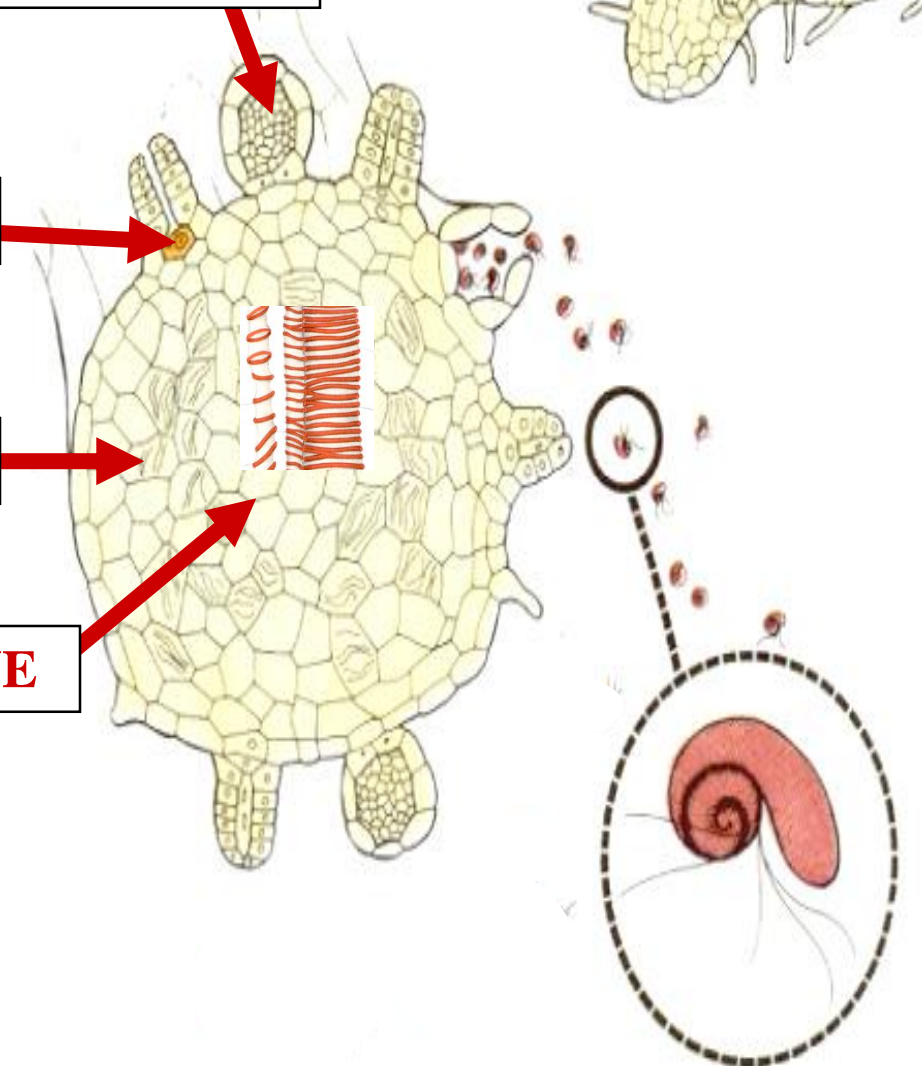
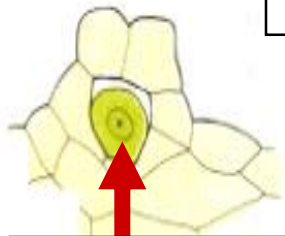
ANTHERIDIUM

MITOSIS

GAMETANGIA

VASCULAR TISSUE

SPERM



GAMETOPHYTE

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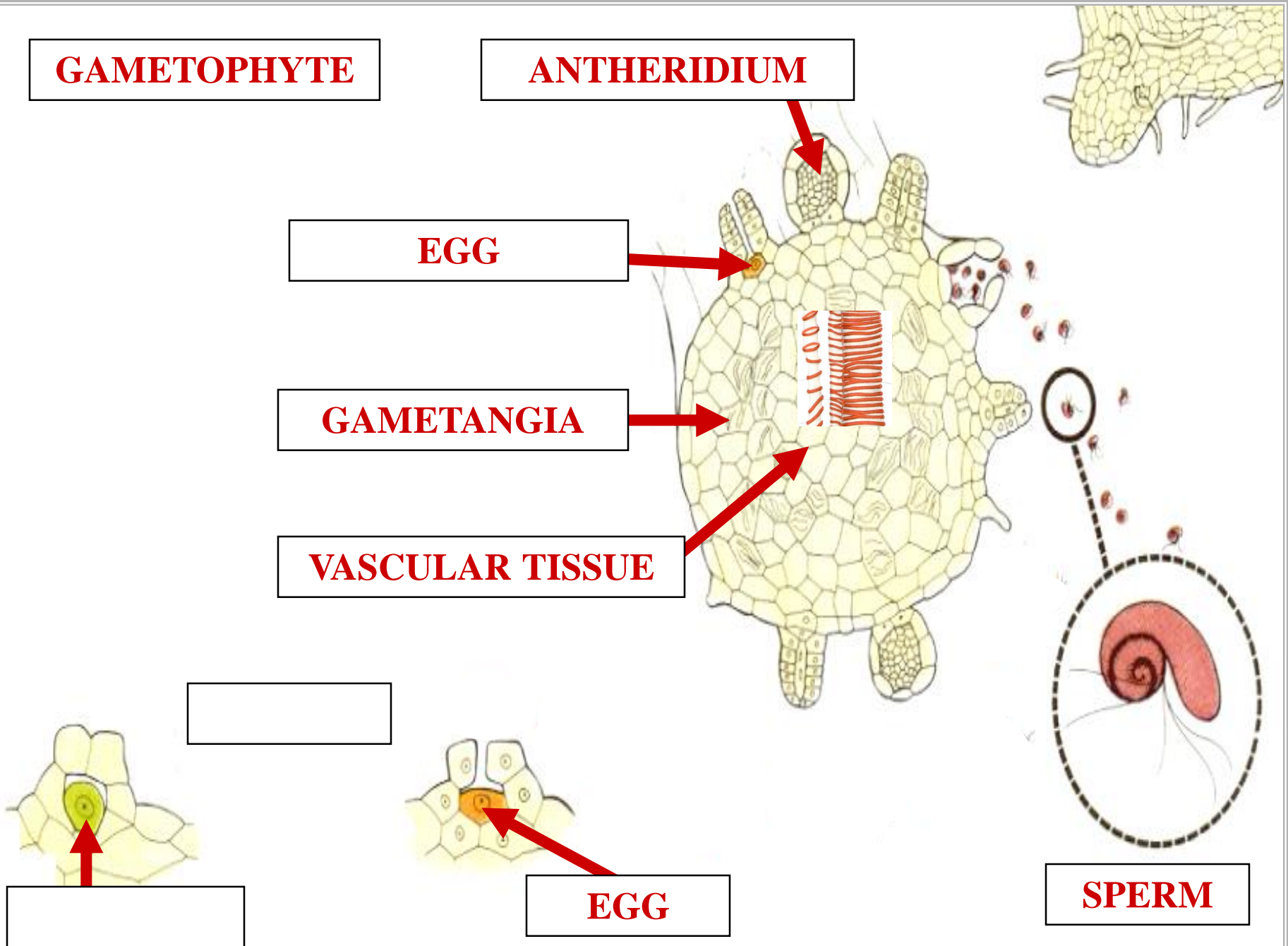
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GAMETANGIA

VASCULAR TISSUE

EGG

SPERM



GAMETOPHYTE

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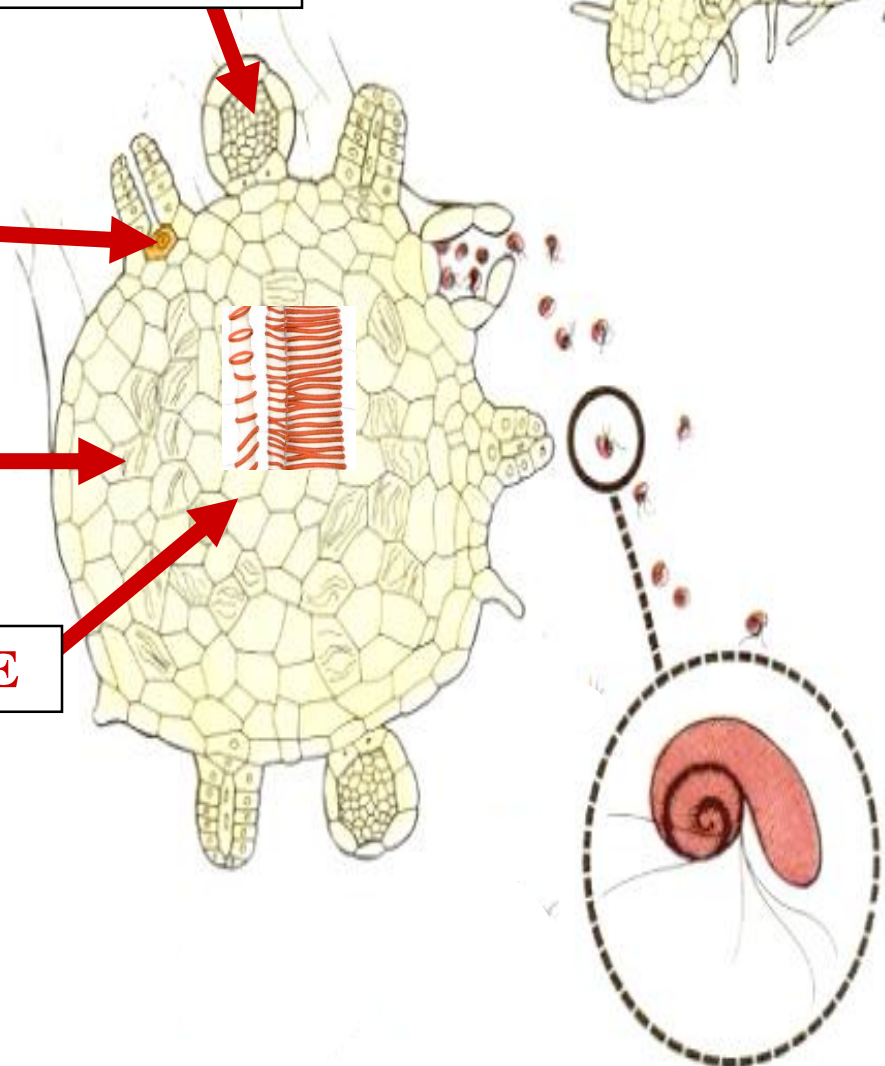
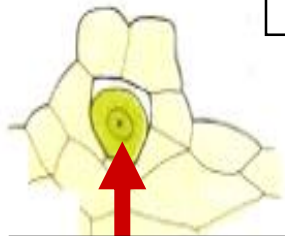
ARCHEGONIA

GAMETANGIA

VASCULAR TISSUE

1N

SPERM



GAMETOPHYTE

ANTHERIDIUM

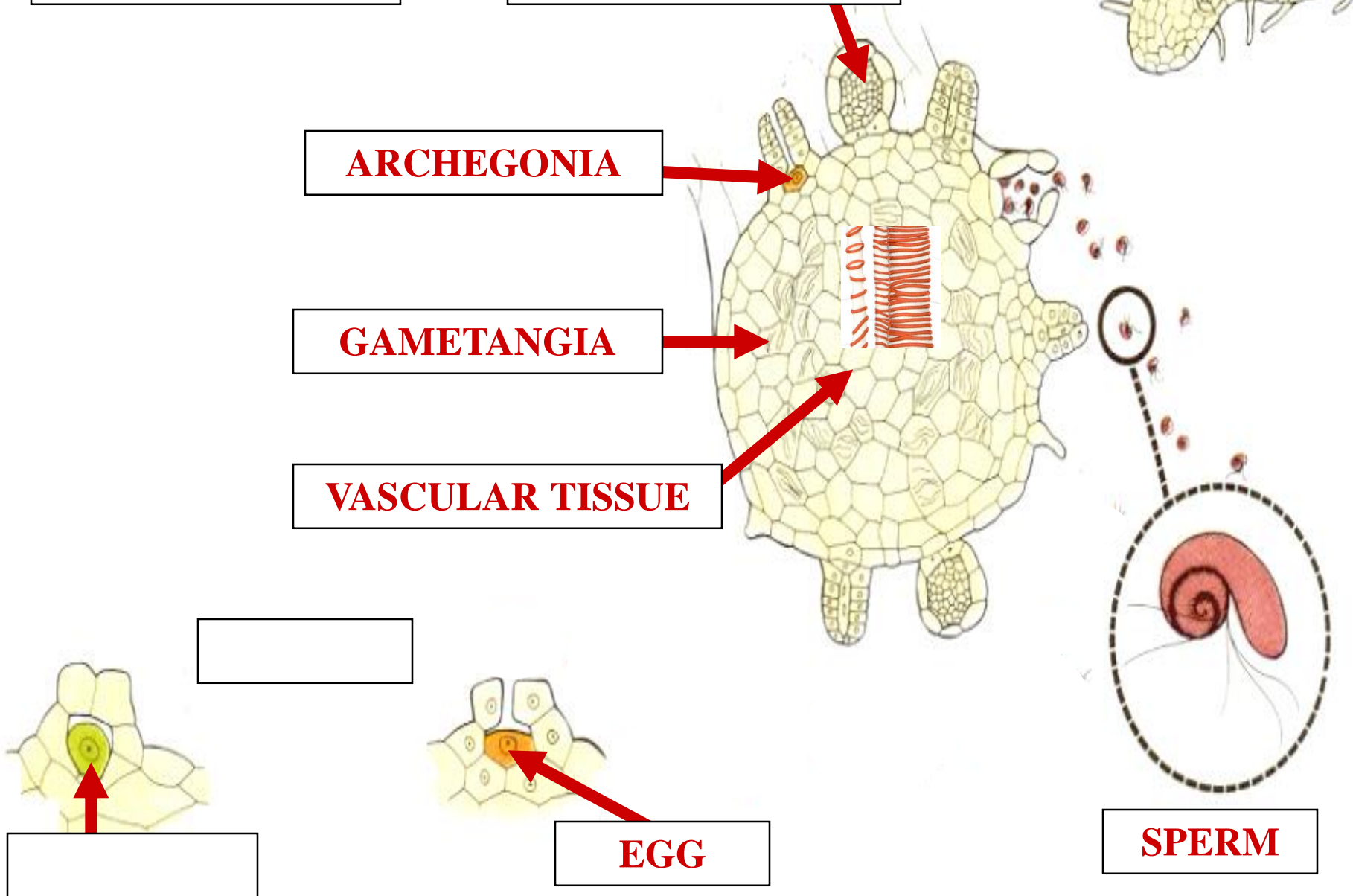
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GAMETANGIA

VASCULAR TISSUE

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

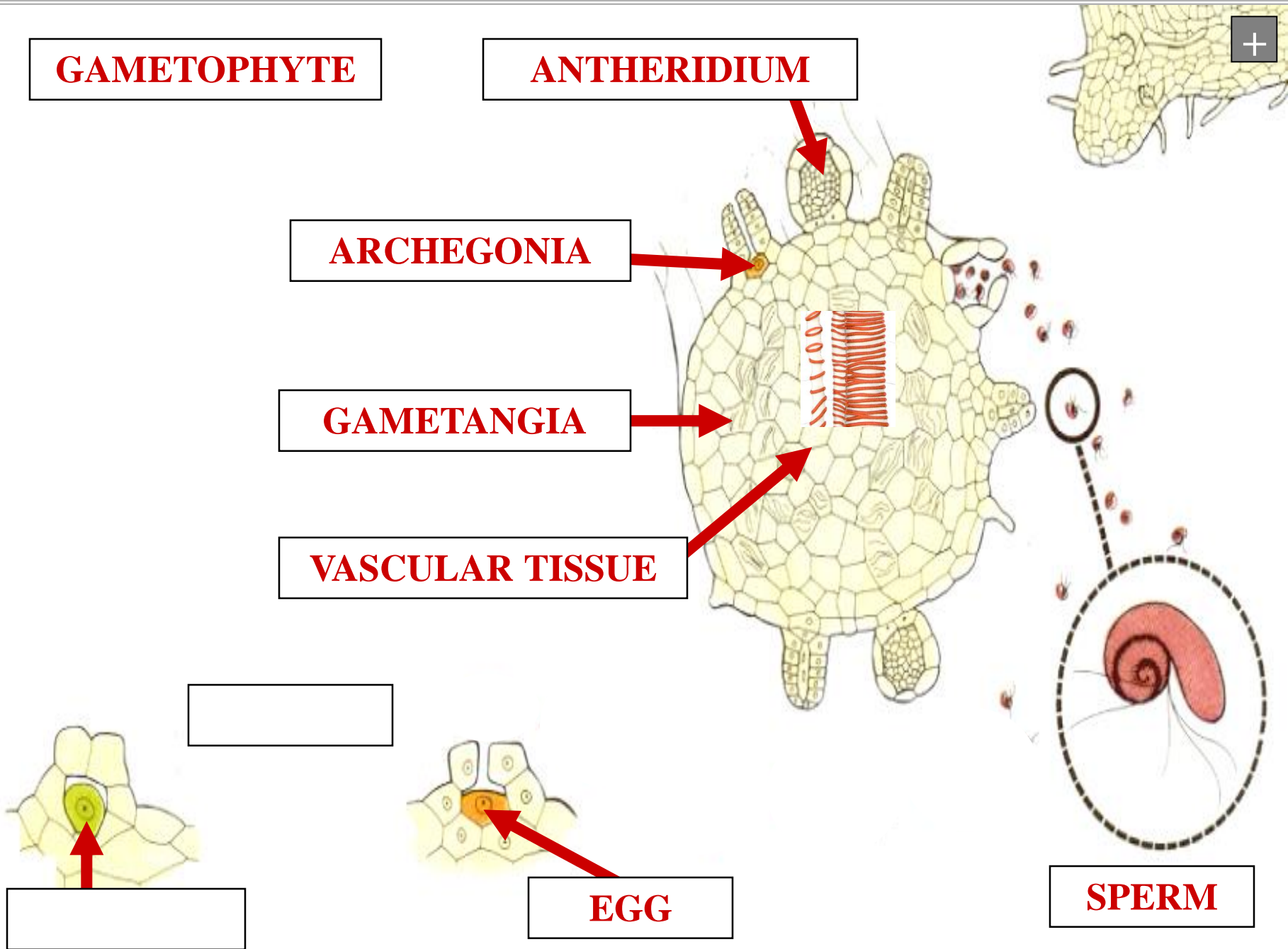
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GAMETANGIA

VASCULAR TISSUE

EGG

SPERM



GAMETOPHYTE

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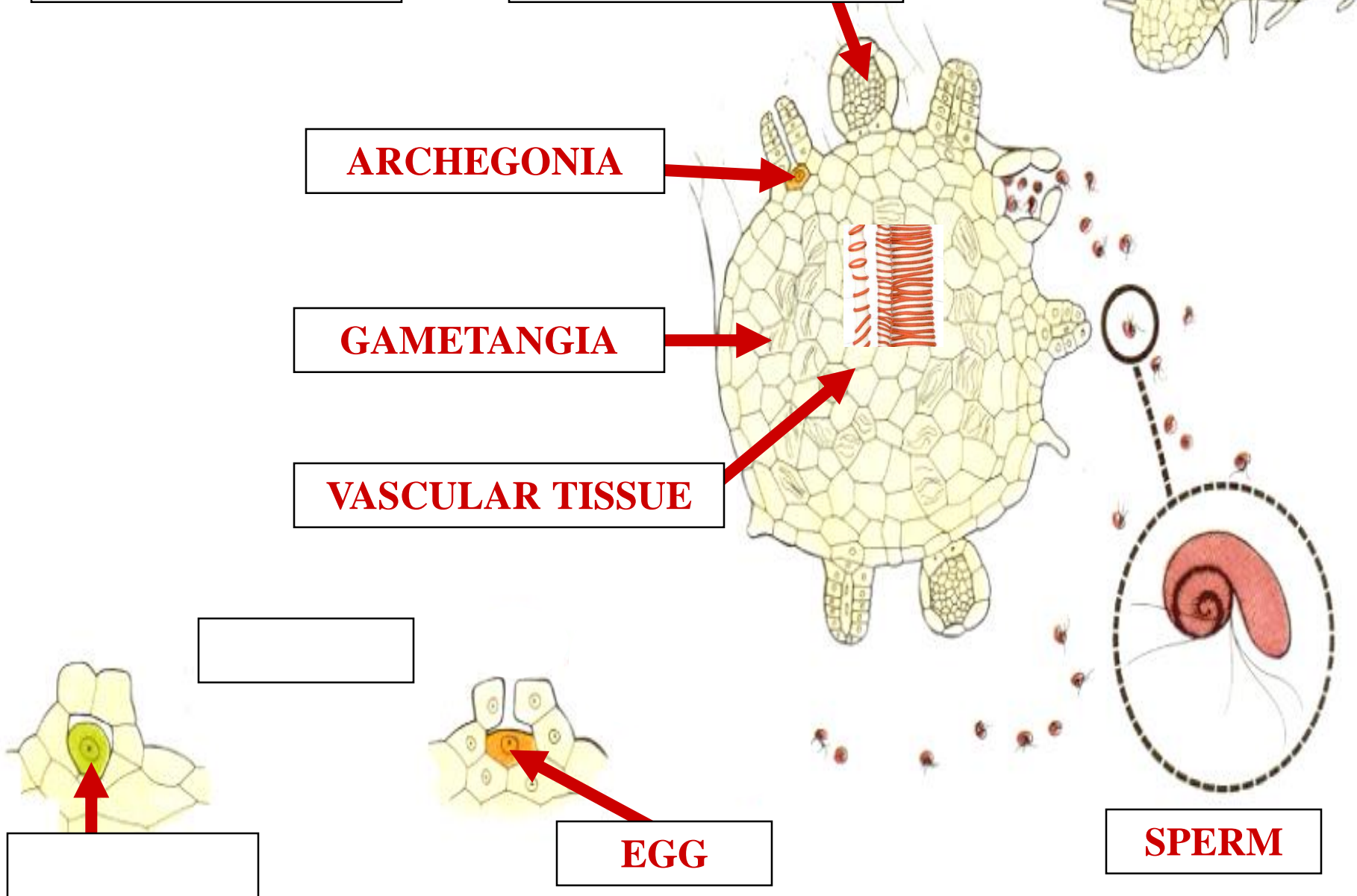
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GAMETANGIA

VASCULAR TISSUE

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

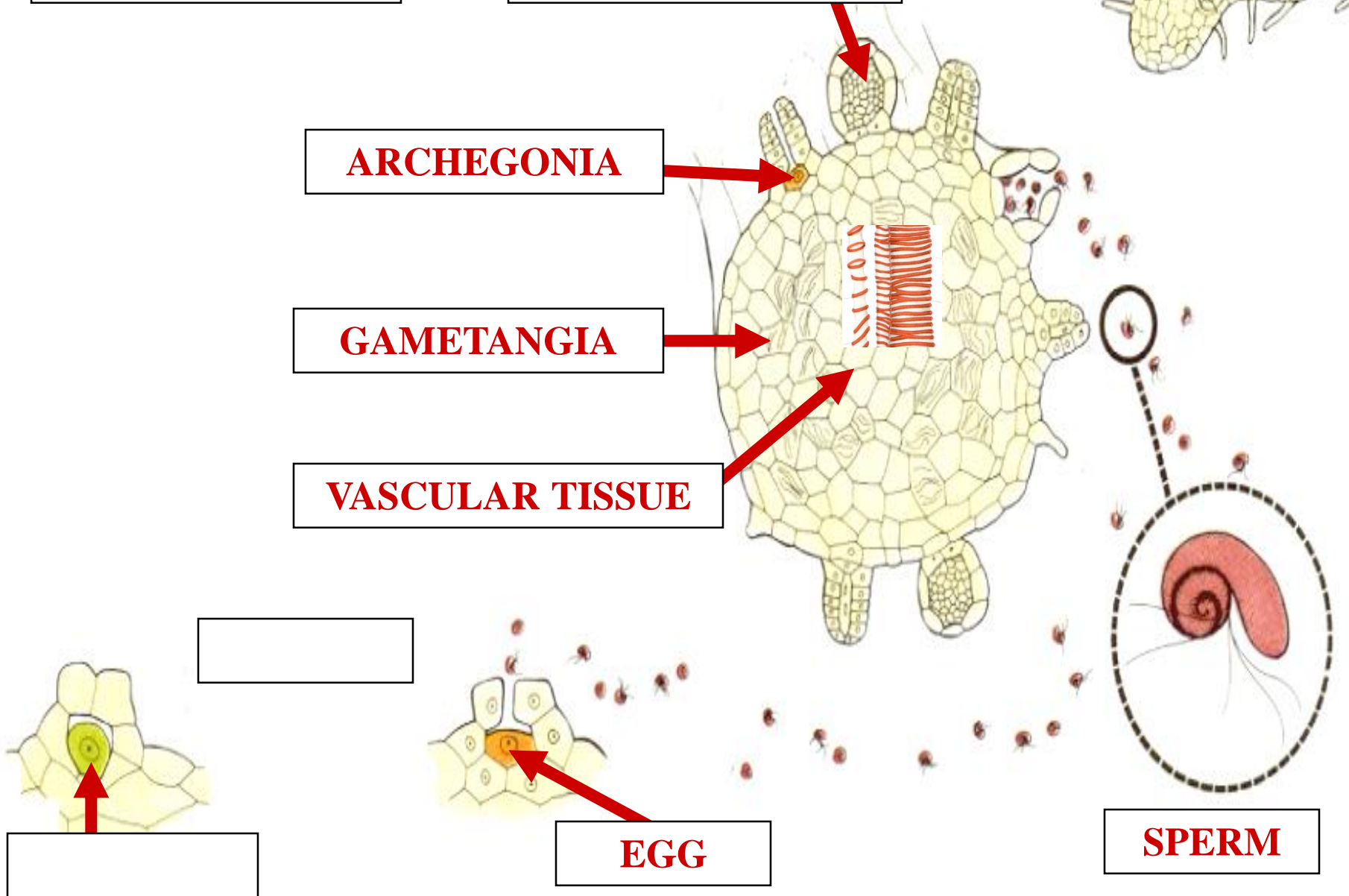
GAMETANGIA

VASCULAR TISSUE

EGG

SPERM

S



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

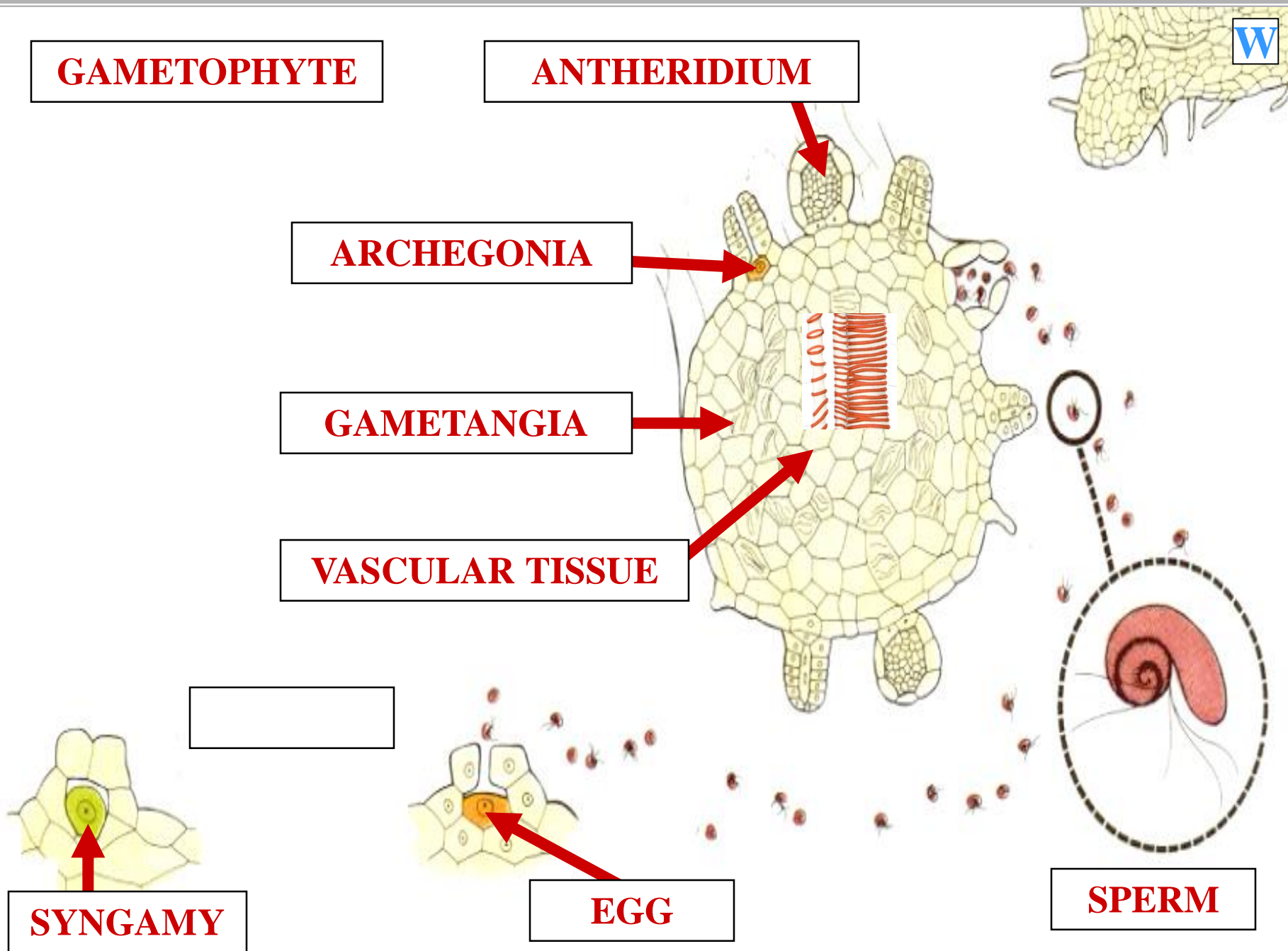
GAMETANGIA

VASCULAR TISSUE

SYNGAMY

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

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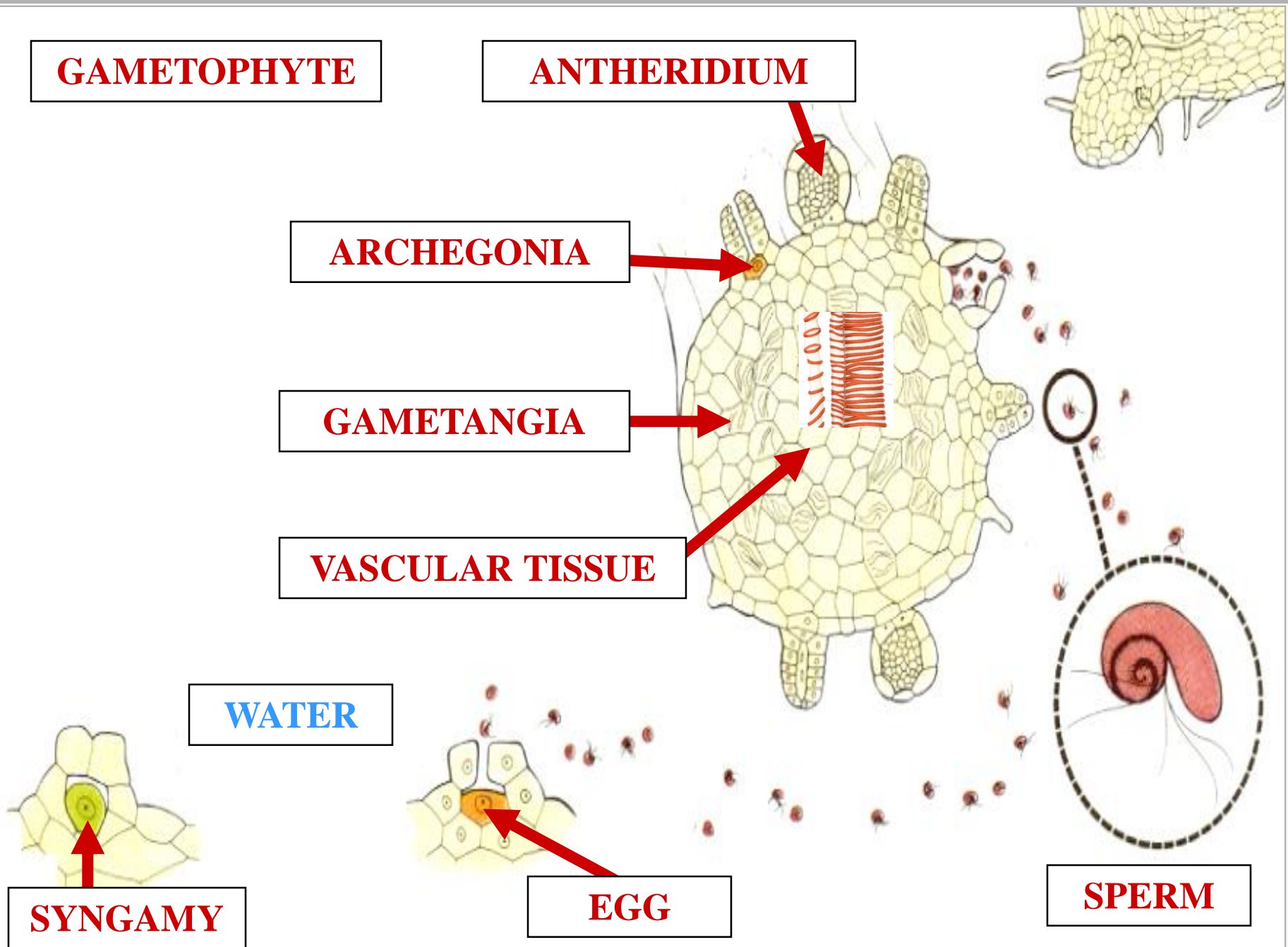
VASCULAR TISSUE

WATER

SYNGAMY

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

GAMETANGIA

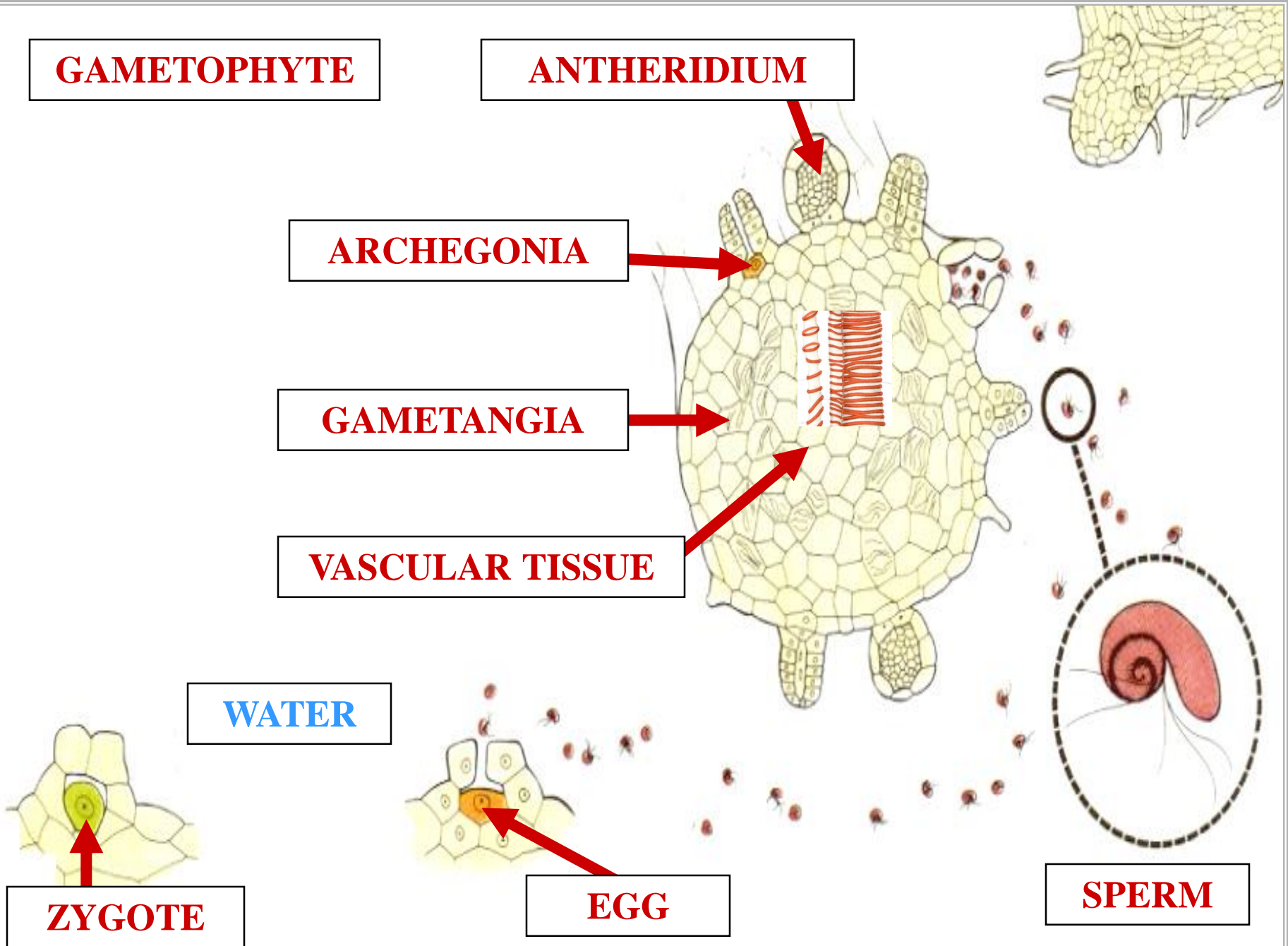
VASCULAR TISSUE

WATER

ZYGOTE

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

GAMETANGIA

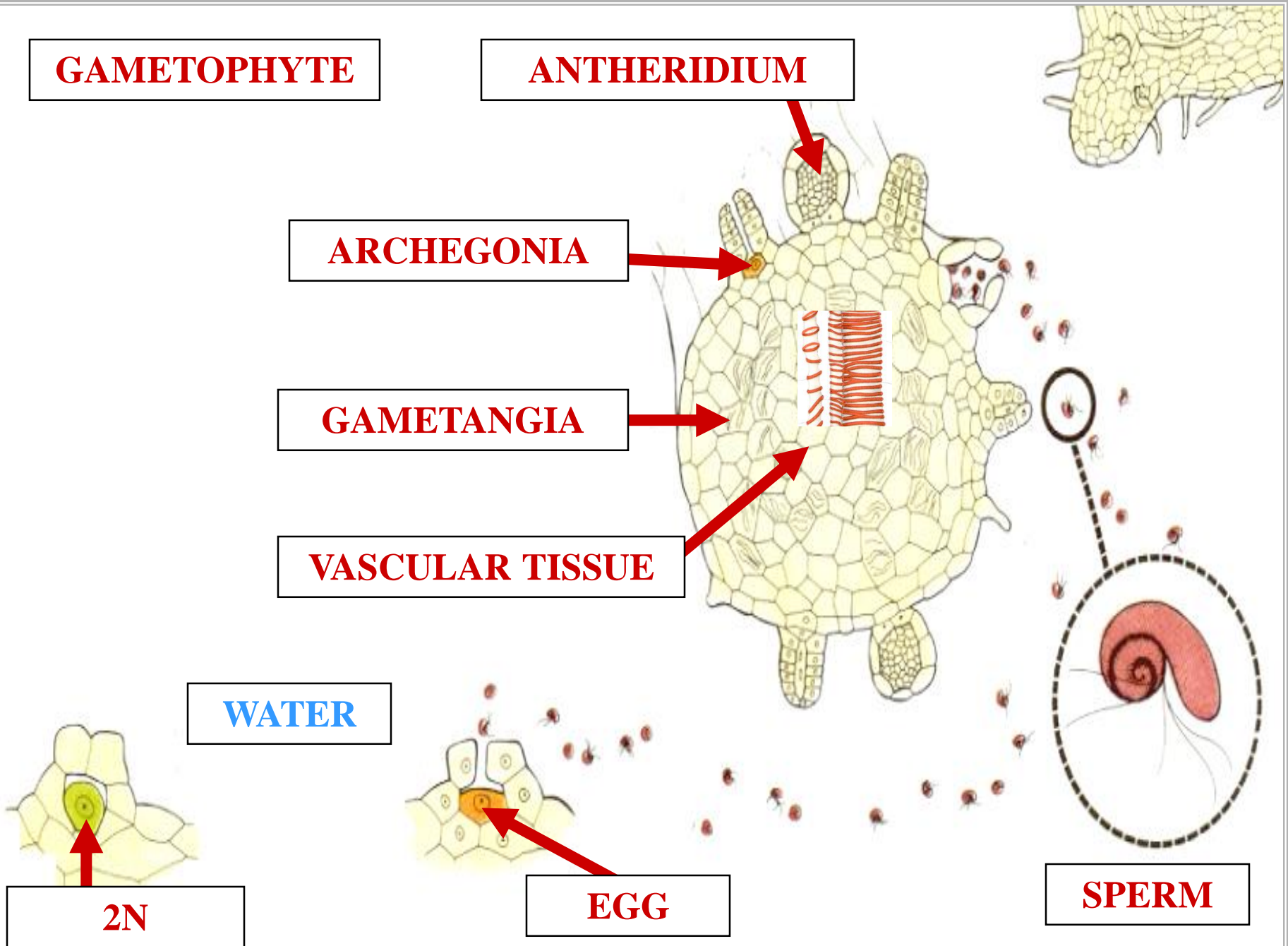
VASCULAR TISSUE

WATER

2N

EGG

SPERM



GAMETOPHYTE

ANTHERIDIUM

ARCHEGONIA

GAMETANGIA

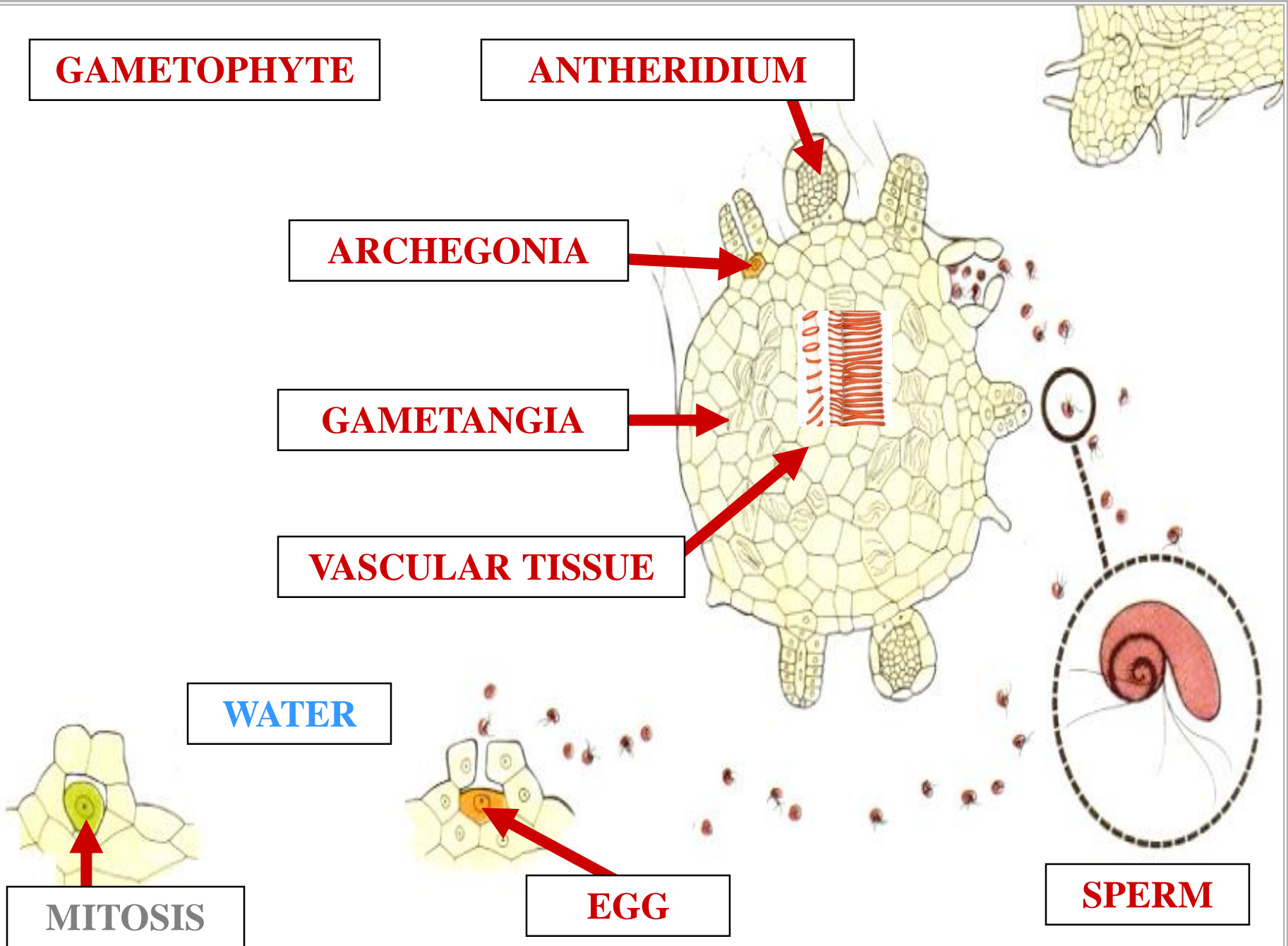
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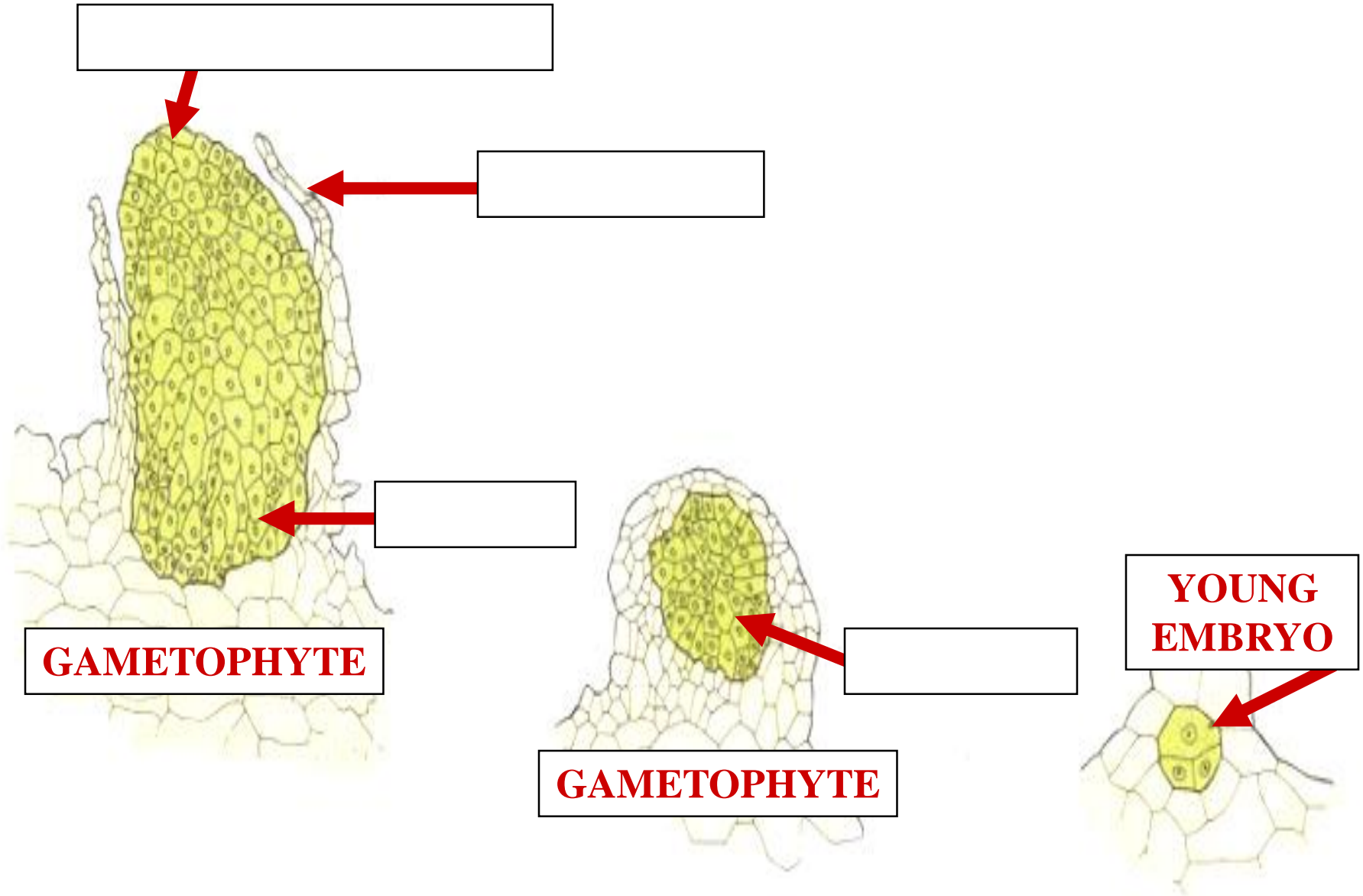
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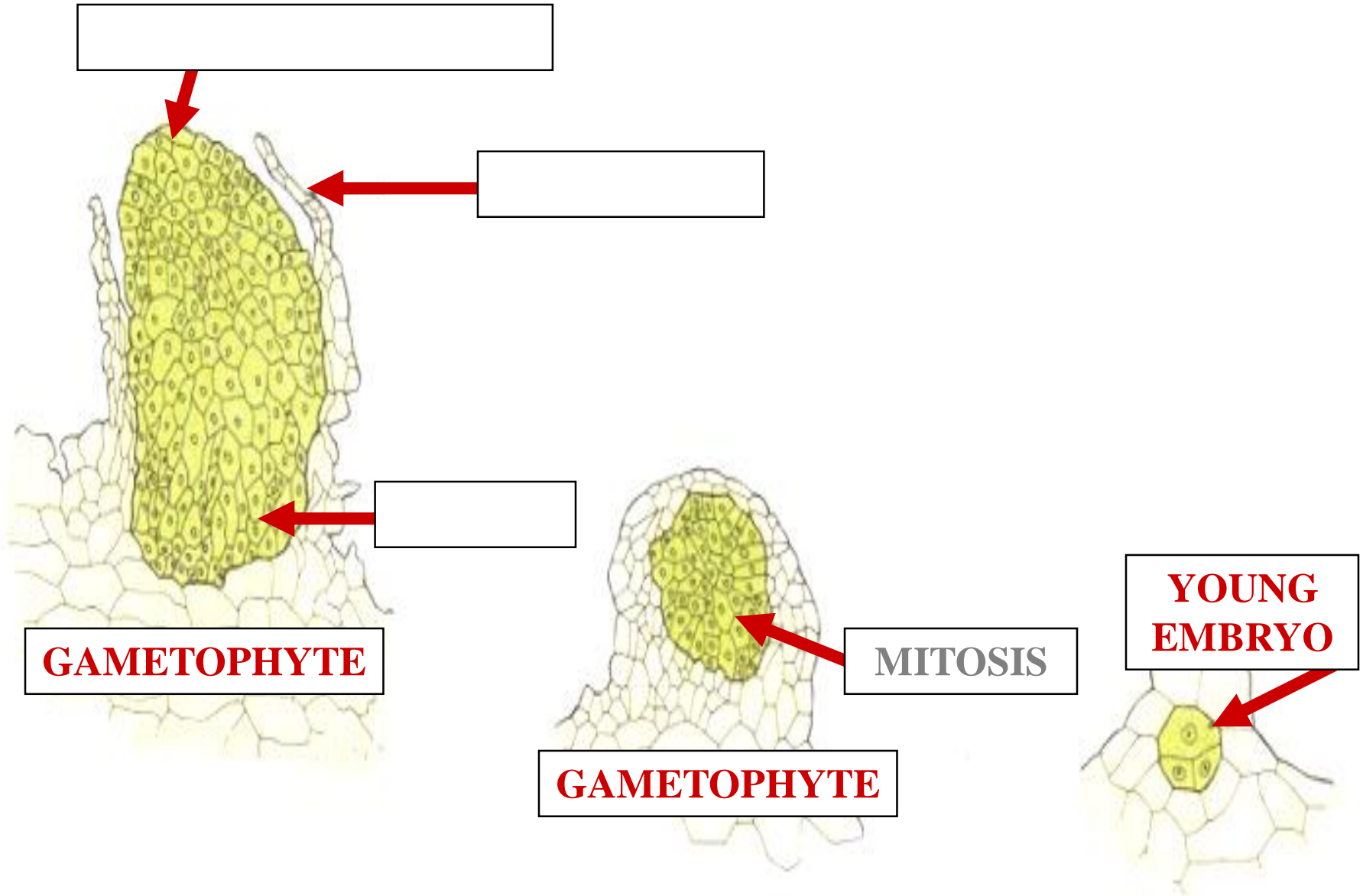
MITOSIS

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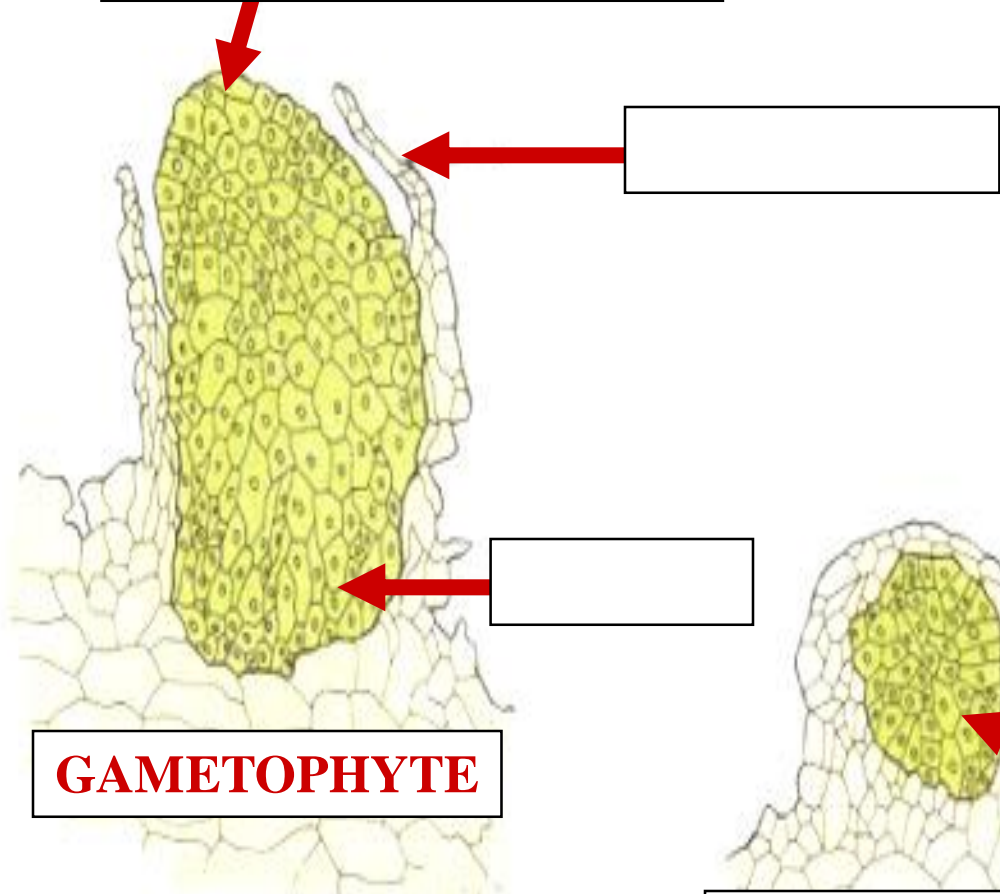
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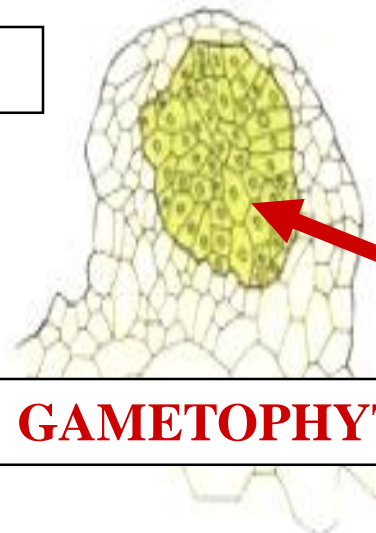




YOUNG SPOROPHYTE



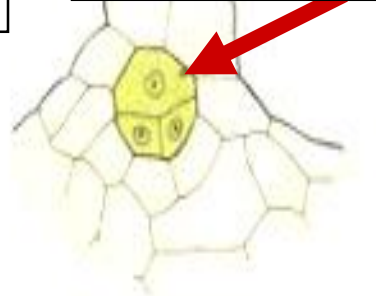
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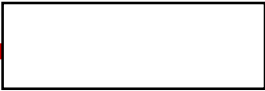
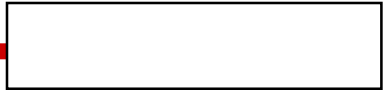
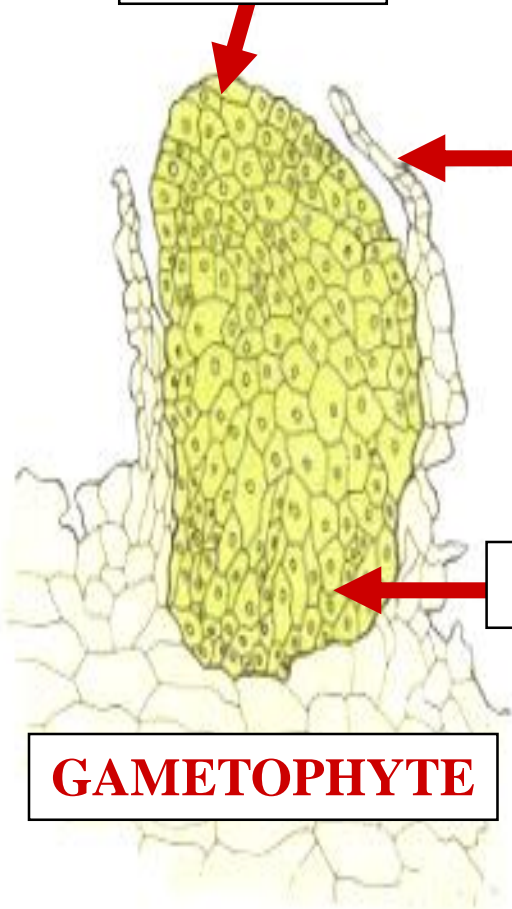
MITOSIS

GAMETOPHYTE

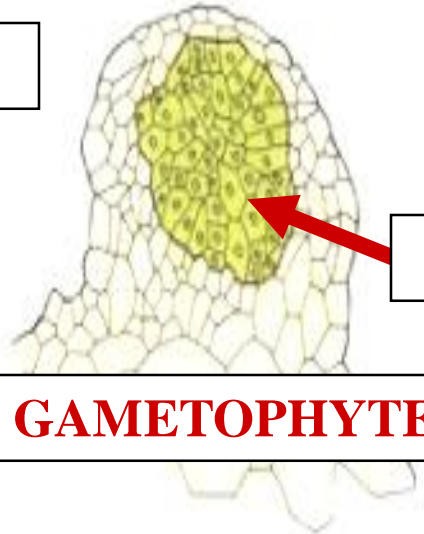
YOUNG EMBRYO



MITOSIS



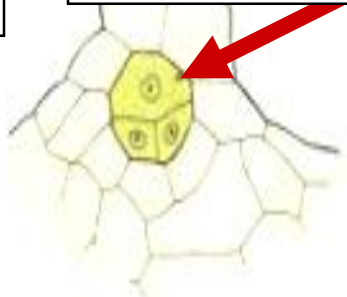
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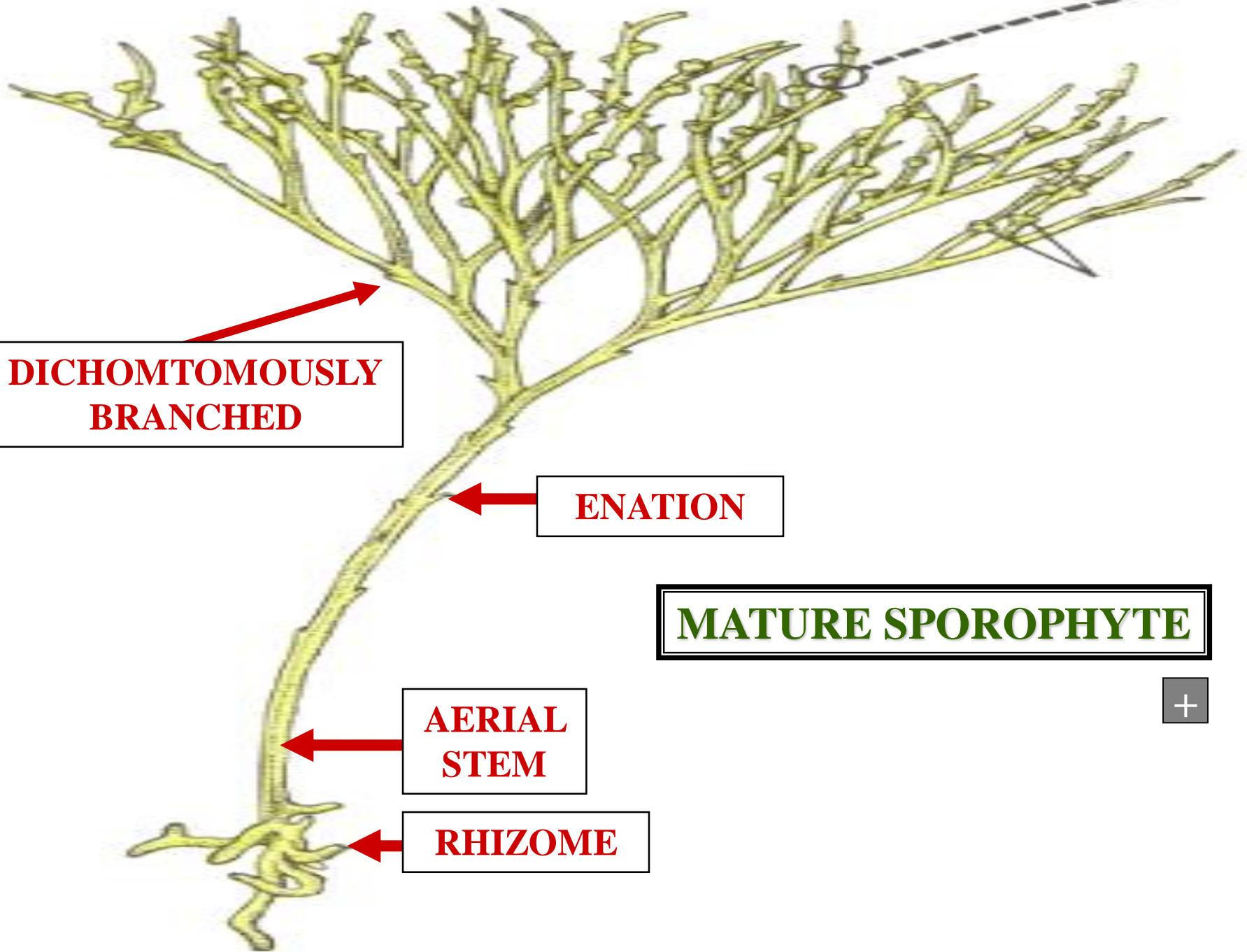


MITOSIS

GAMETOPHYTE

YOUNG EMBRYO





**DICHOTOMOUSLY
BRANCHED**

ENATION

MATURE SPOROPHYTE

**AERIAL
STEM**

RHIZOME

+



PSILOTUM



PTERIDOPHYTA CLASSIFICATION

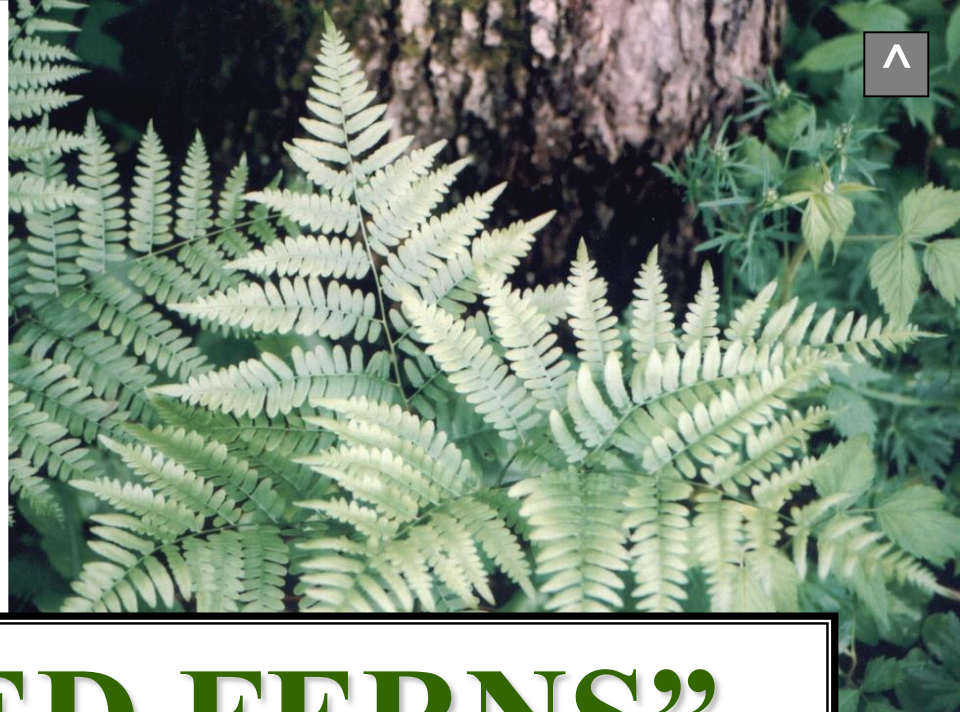


ALABAMA
TRACHEOPHYTE

PTERIDOPSISIDA

ALABAMA
TRACHEOPHYTE

COMMON NAME



“ADVANCED FERNS”



PTERIDOPSISIDA CHARACTERS

PTERIDOPSISIDA CHARACTERS

TERRESTRIAL OR AQUATIC

PTERIDOPSISIDA CHARACTERS

PTERIDOPSISIDA CHARACTERS

**TERRESTRIAL OR AQUATIC
CIRCINATE FROND**

PTERIDOPSISIDA CHARACTERS

PTERIDOPSISIDA CHARACTERS

**TERRESTRIAL OR AQUATIC
CIRCINATE FROND
LEPTOSPORANGIATE**

PTERIDOPSISIDA CHARACTERS

PTERIDOPSISIDA CHARACTERS

**TERRESTRIAL OR AQUATIC
CIRCINATE FROND
LEPTOSPORANGIATE
NON-SYNANGIATE**

PTERIDOPSISIDA CHARACTERS

PTERIDOPSISIDA CHARACTERS



TERRESTRIAL OR AQUATIC
CIRCINATE FROND
LEPTOSPORANGIATE
NON-SYNANGIATE
HOMOSPOROUS OR HETEROSPOROUS

**PTERIDOPSISIDA
CHARACTERS**



PTERIDOPSISIDA FOSSIL RECORD

~370

MILLION YEARS

~370 MILLION YEARS AGO

E

DEVONIAN



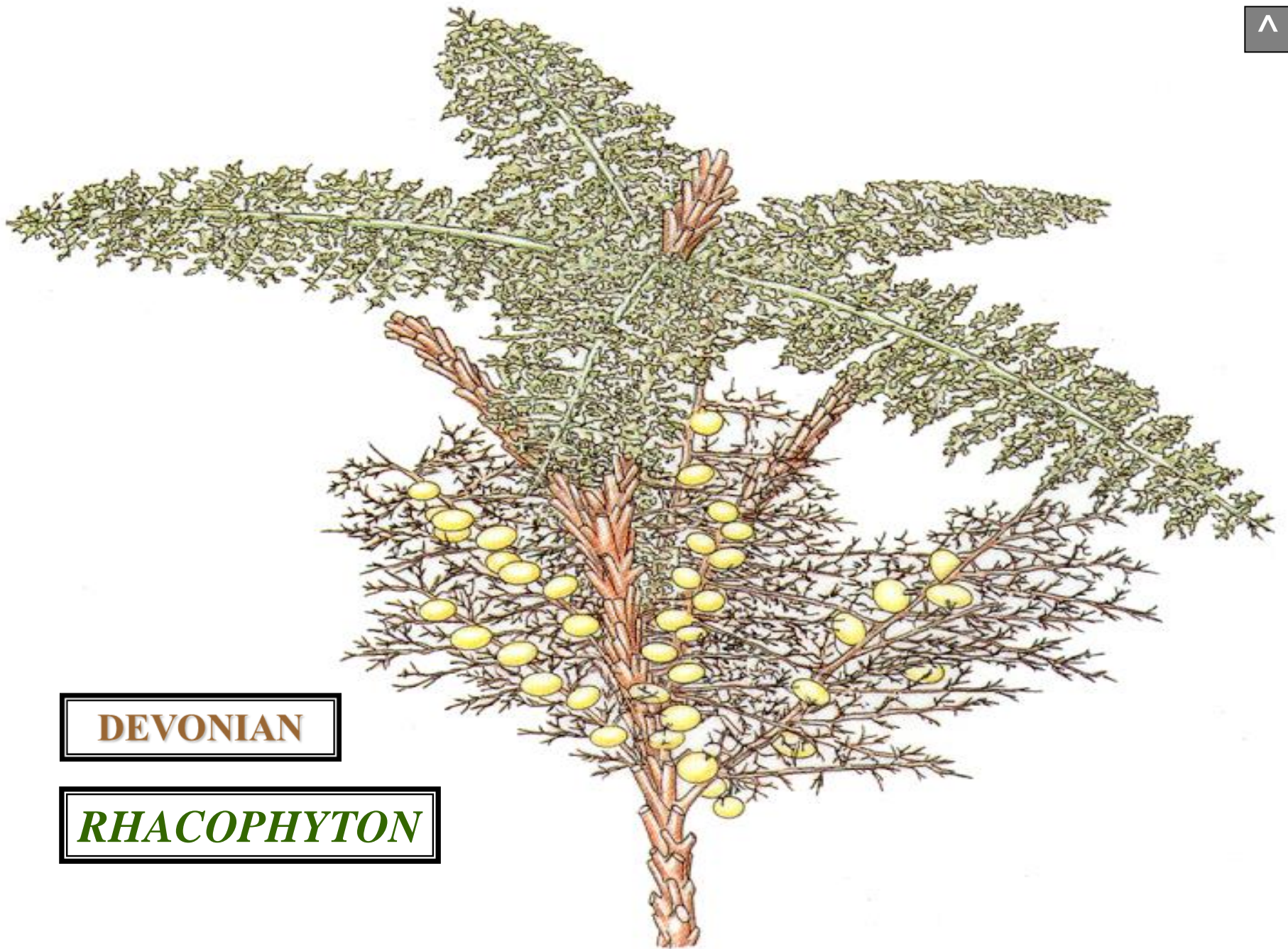
~370 MILLION YEARS AGO



R

“ADVANCED FERNS”
EVOLVE





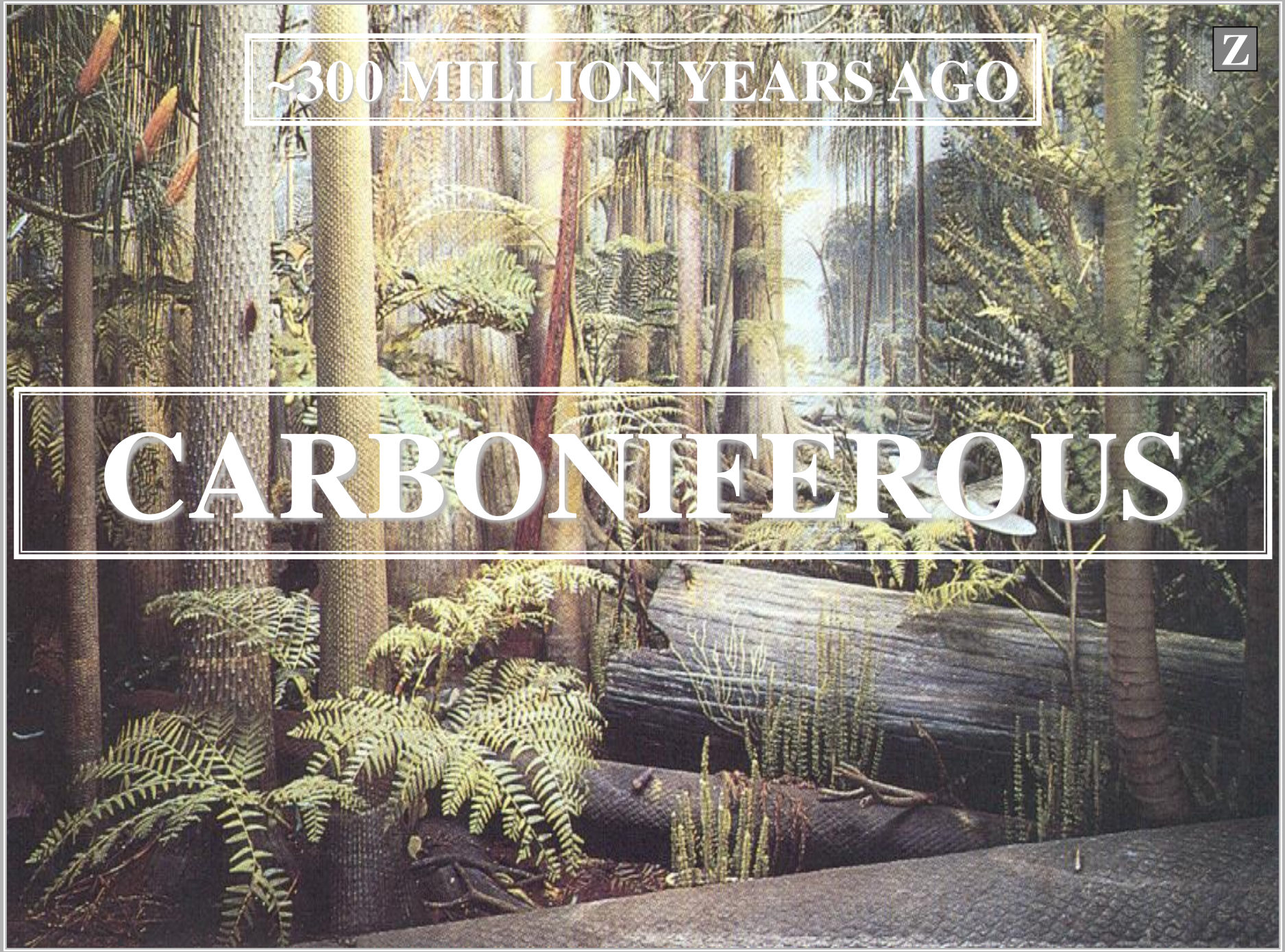
DEVONIAN

RHACOPHYTON

**~300
MILLION YEARS**

~300 MILLION YEARS AGO

CARBONIFEROUS



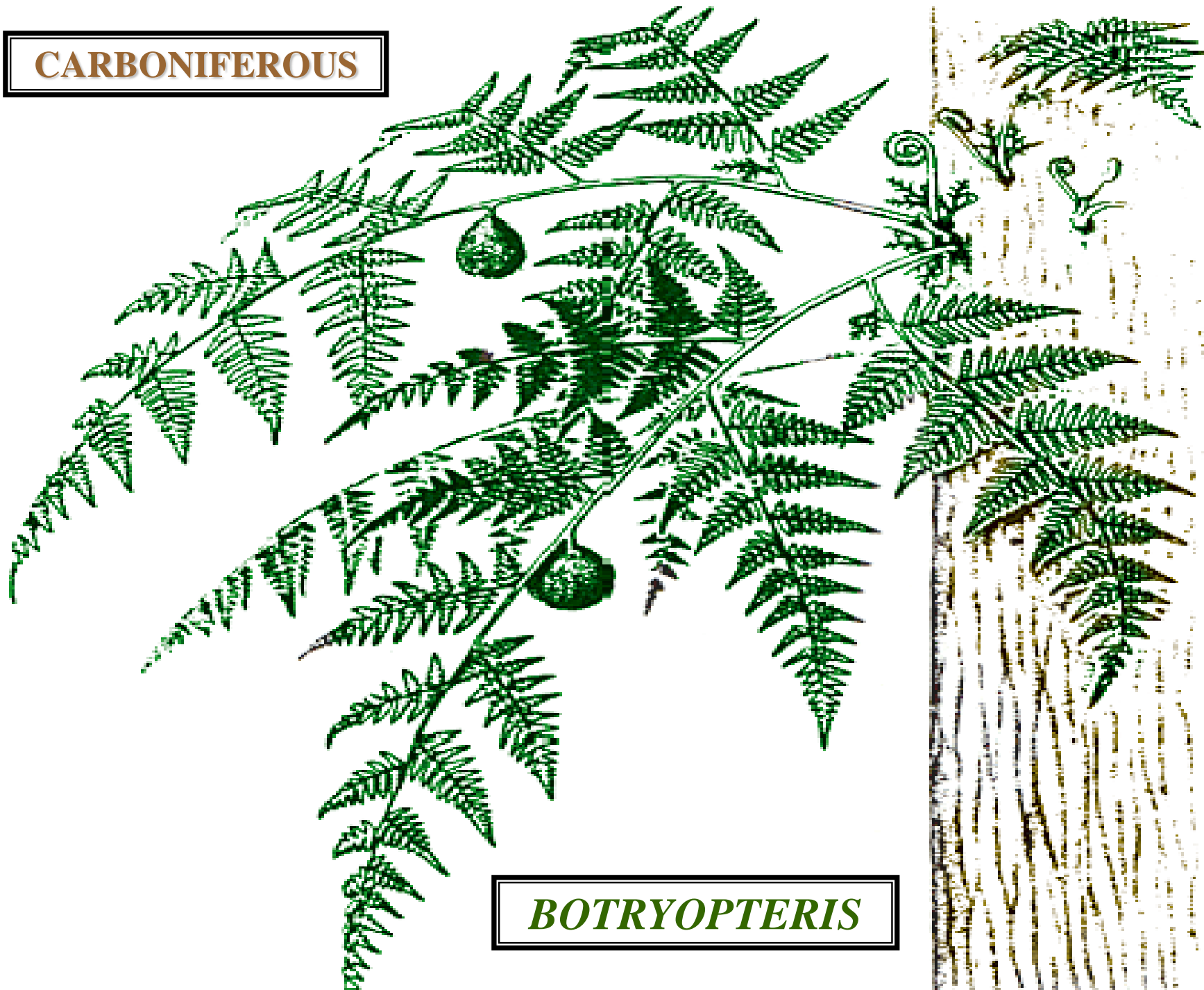


~300 MILLION YEARS AGO



“ADVANCED FERNS”
ZENITH

CARBONIFEROUS



BOTRYOPTERIS



**EUSPORANGIATE
TREE-FERN**

BOTRYOPTERIS

PSARONIUS

?

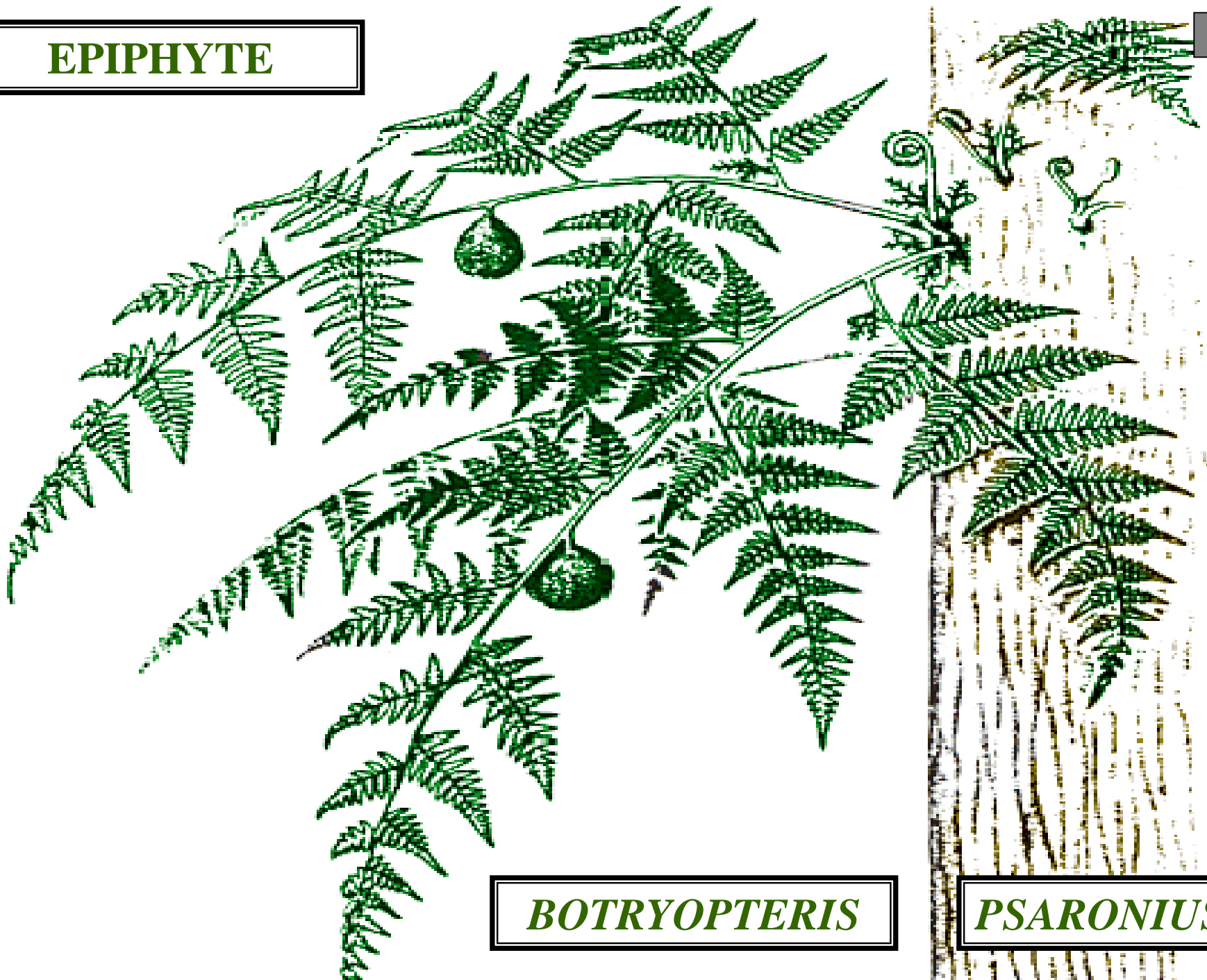
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BOTRYOPTERIS

PSARONIUS

EPIPHYTE



BOTRYOPTERIS

PSARONIUS

PTERIDOPSISIDA ORDERS

**PTERIDOPSISIDA
ORDERS**

PTERIDALES

**PTERIDOPSISIDA
ORDERS**

PTERIDOPSISIDA
ORDERS

PTERIDALES
MARSILEALES

PTERIDOPSISIDA
ORDERS

PTERIDOPSISIDA

ORDERS



PTERIDALES

MARSILEALES

SALVINIALES

PTERIDOPSISIDA

ORDERS