



SORUS

L.S.

SPOROPHYLL

LEPTOSPORANGIUM



**ABAXIAL
SURFACE**

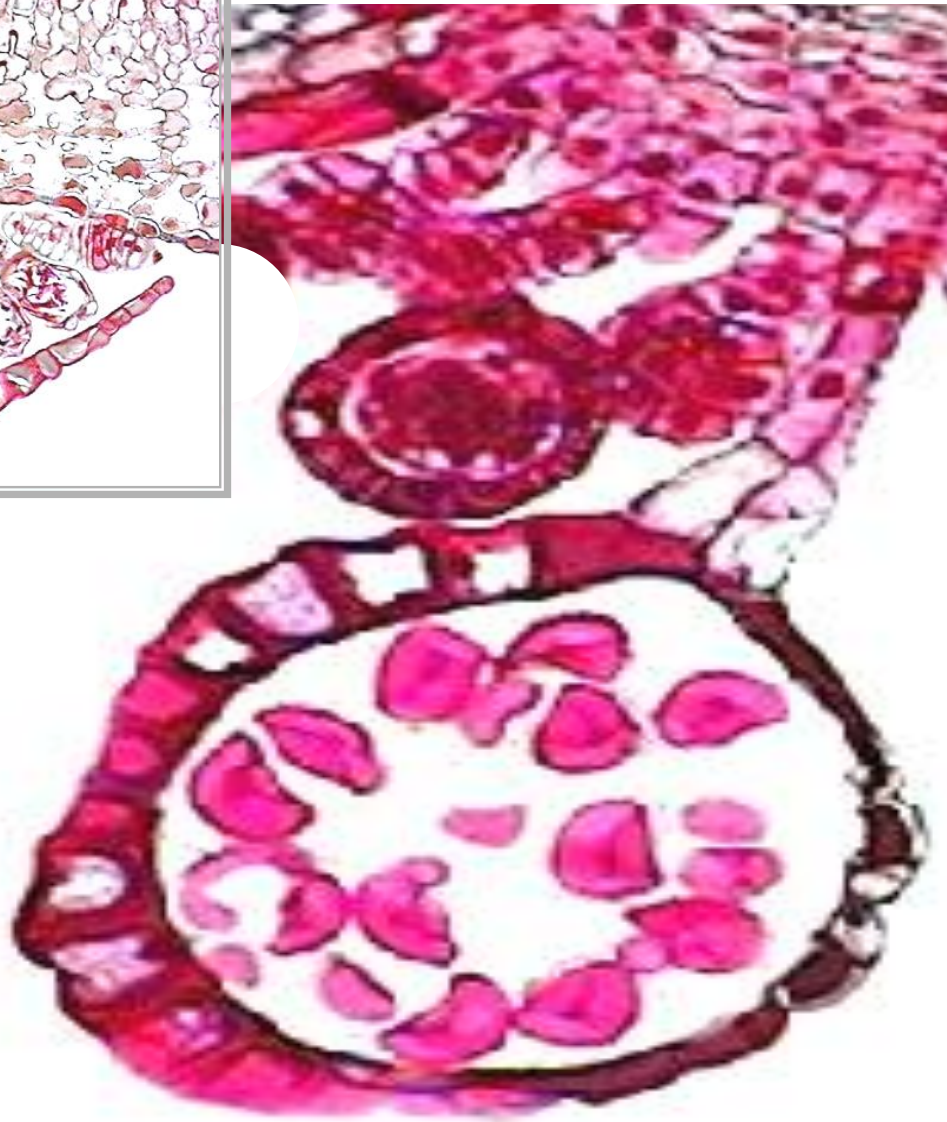
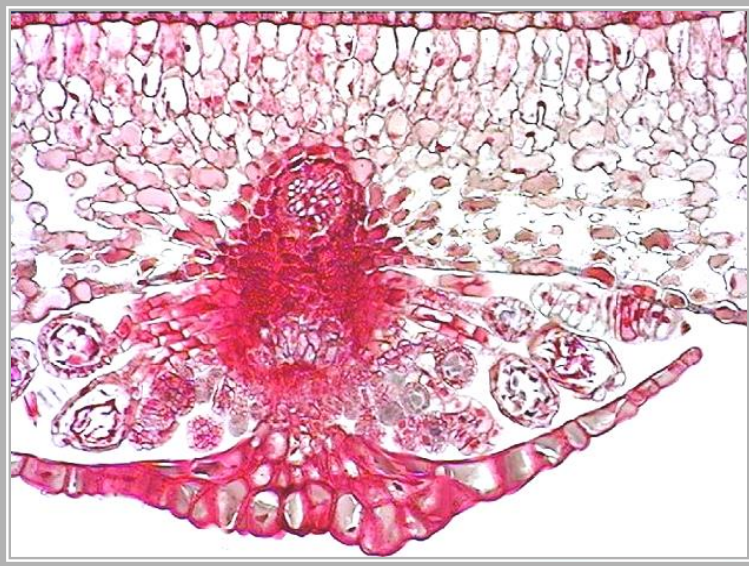




LEPTOSPORANGIUM STRUCTURE

L.S.

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LEPTOSPORANGIUM

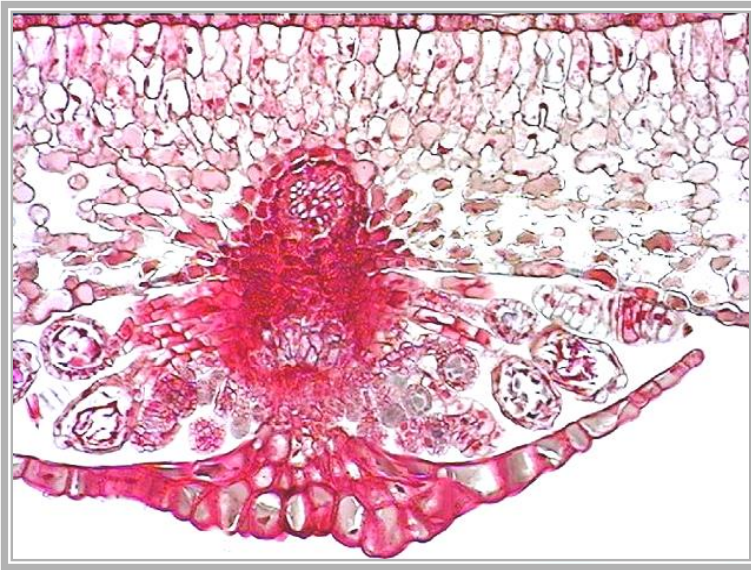


L.S.

S

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LEPTOSPORANGIUM



L.S.

S

STALK

LEPTOSPORANGIUM

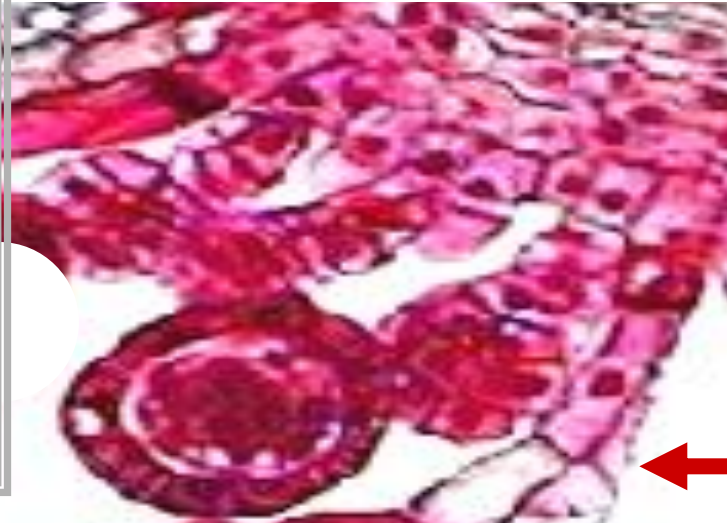
STALK

LEPTOSPORANGIUM STALK



BEARS
SPORANGIUM

LEPTOSPORANGIUM
STALK



L.S.

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← STALK

SPORANGIUM



LEPTOSPORANGIUM



L.S.

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STALK

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LEPTOSPORANGIUM



L.S.

A



STALK

ANNULUS

LEPTOSPORANGIUM

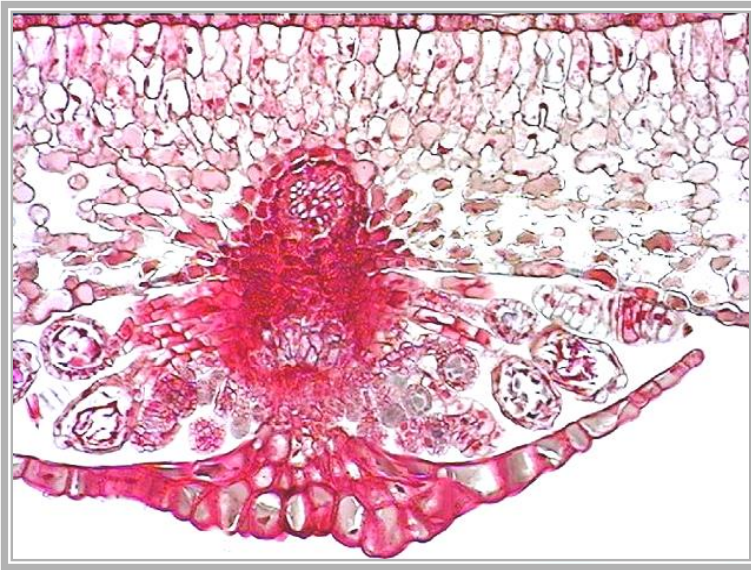
ANNULUS

LEPTOSPORANGIUM ANNULUS



SPORANGIUM
WALL

LEPTOSPORANGIUM
ANNULUS



L.S.

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STALK

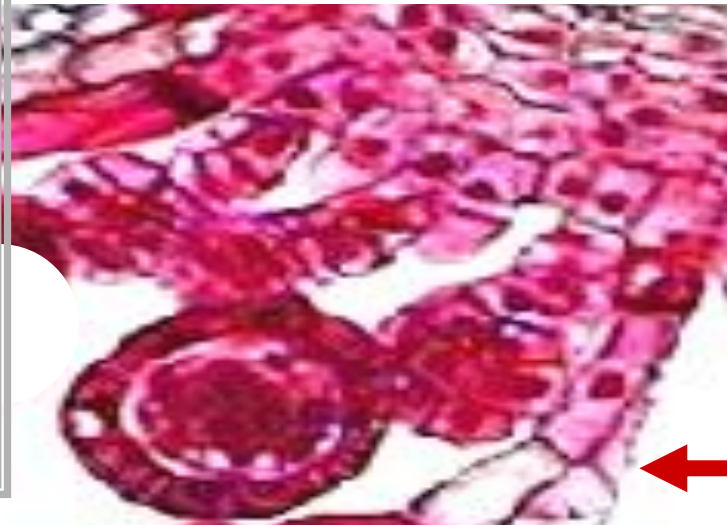
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LEPTOSPORANGIUM



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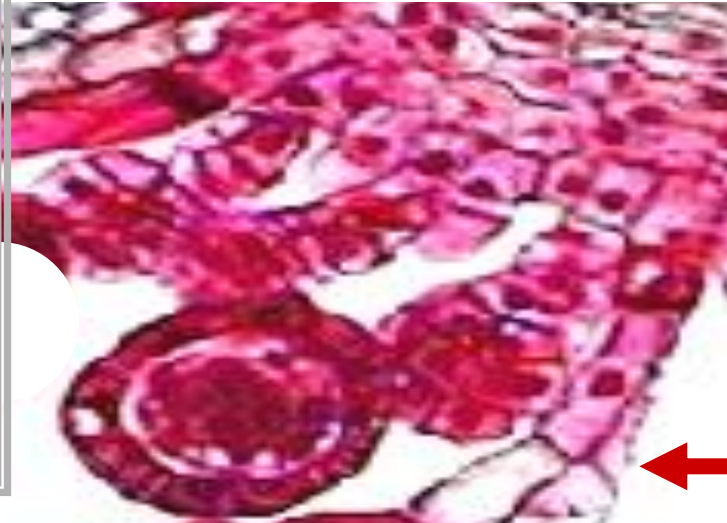
STALK

ANNULUS



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LEPTOSPORANGIUM



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STALK

ANNULUS



STOMIUM

LEPTOSPORANGIUM

STOMIUM

LEPTOSPORANGIUM STOMIUM



MODIFIED
ANNULUS CELLS

LEPTOSPORANGIUM
STOMIUM

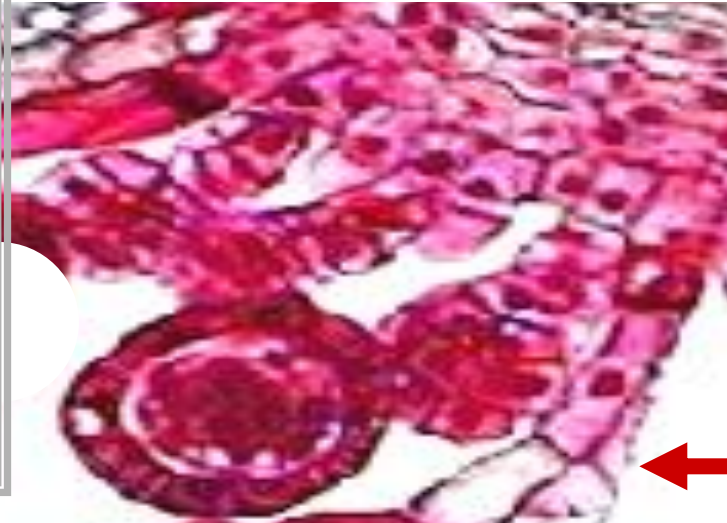
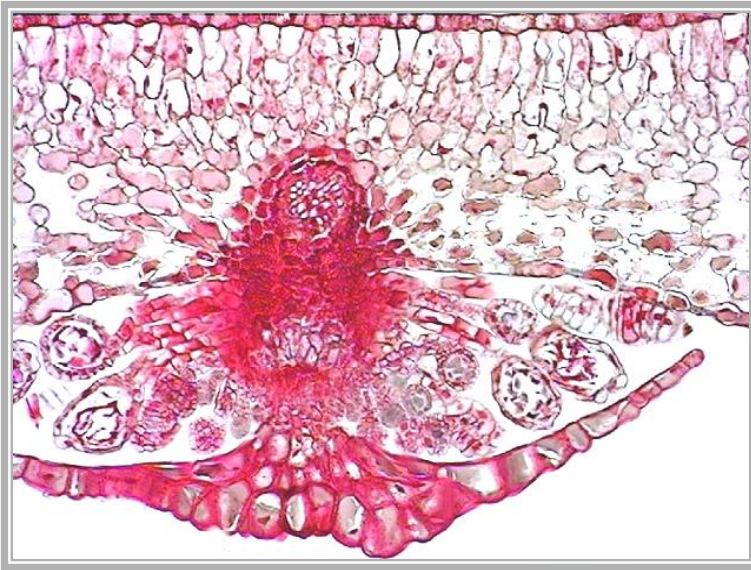
LEPTOSPORANGIUM STOMIUM



MODIFIED
ANNULUS CELLS

DEHISCENCE POINT

LEPTOSPORANGIUM STOMIUM



L.S.



STALK

ANNULUS



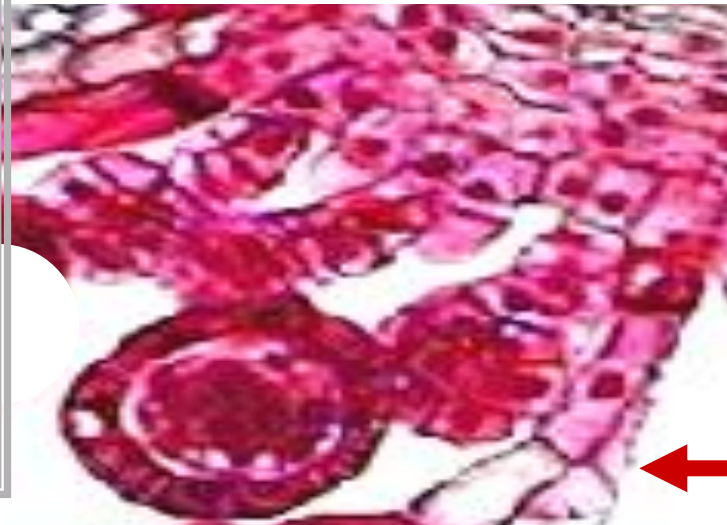
STOMIUM

LEPTOSPORANGIUM



L.S.

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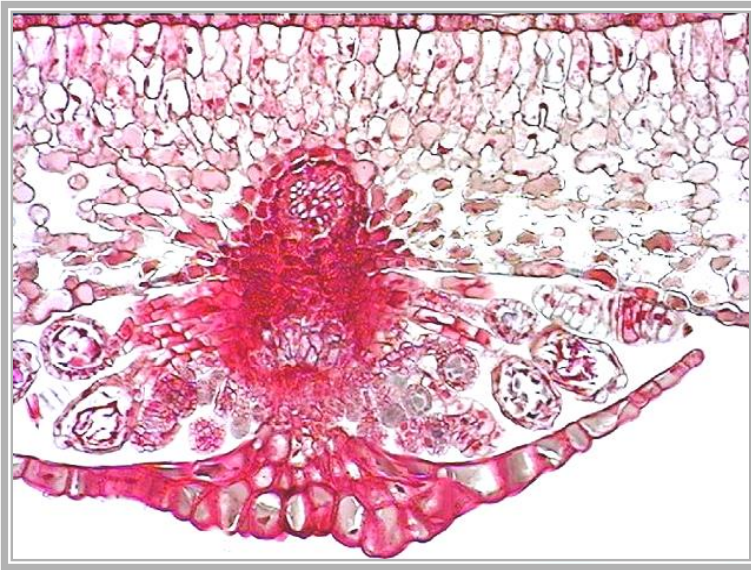
STALK

ANNULUS

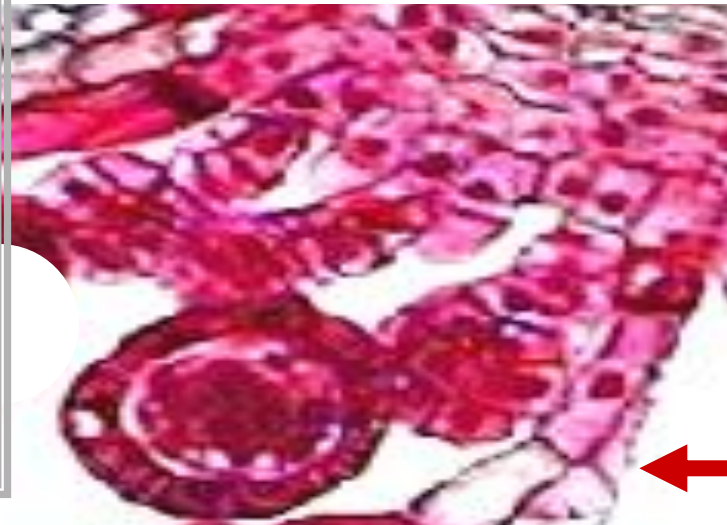


STOMIUM
MODIFIED
ANNULUS CELLS

LEPTOSPORANGIUM



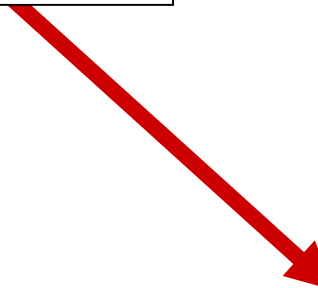
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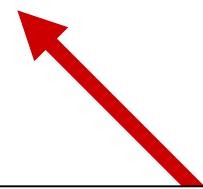
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ANNULUS



**STOMIUM
DEHISCENCE
POINT**



LEPTOSPORANGIUM



SPORE DISPERSAL



SPORE DISPERSAL CATAPULT-LIKE

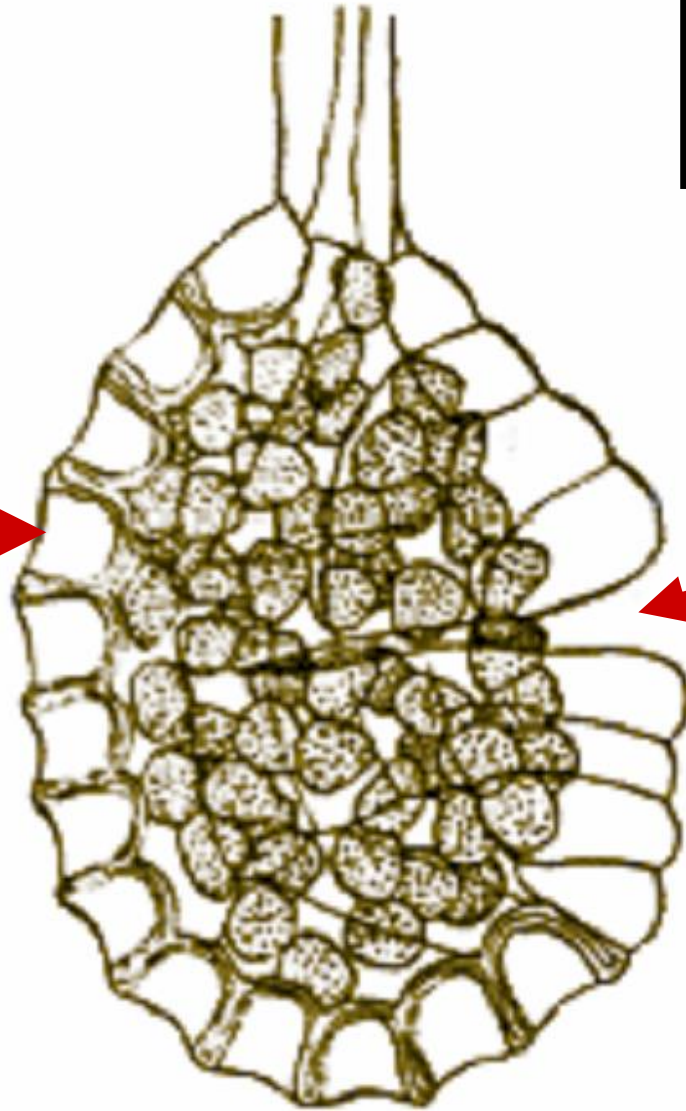
LEPTOSPORANGIUM

D

START
POSITION

ANNULUS

STOMIUM

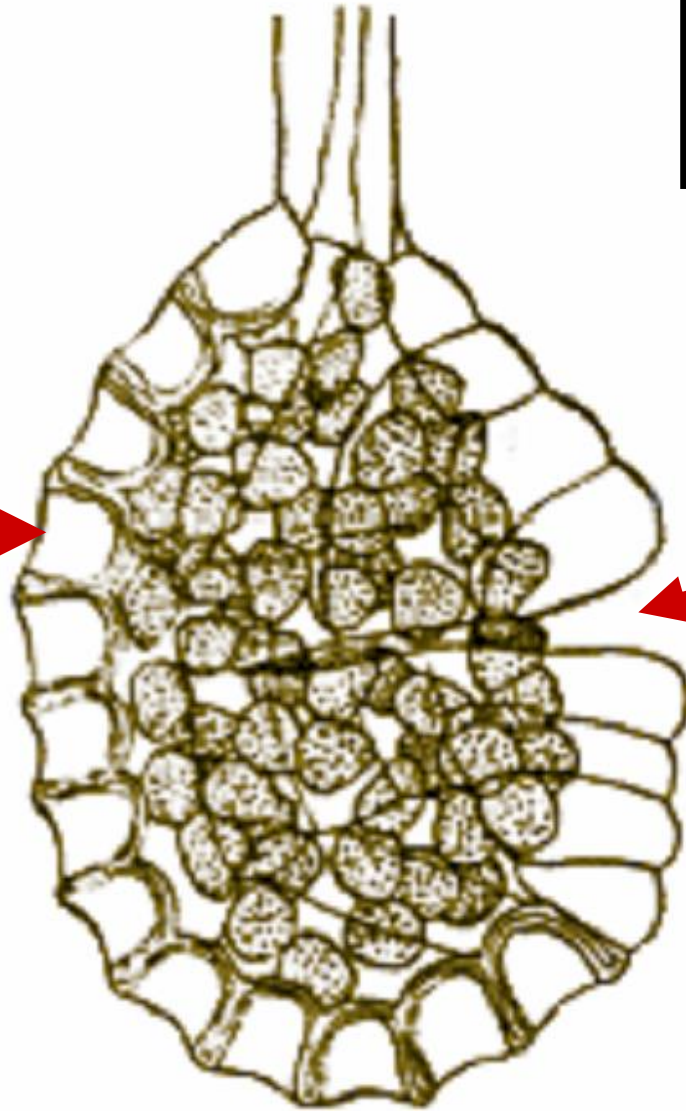


LEPTOSPORANGIUM

**DRY
CONDITIONS**

ANNULUS

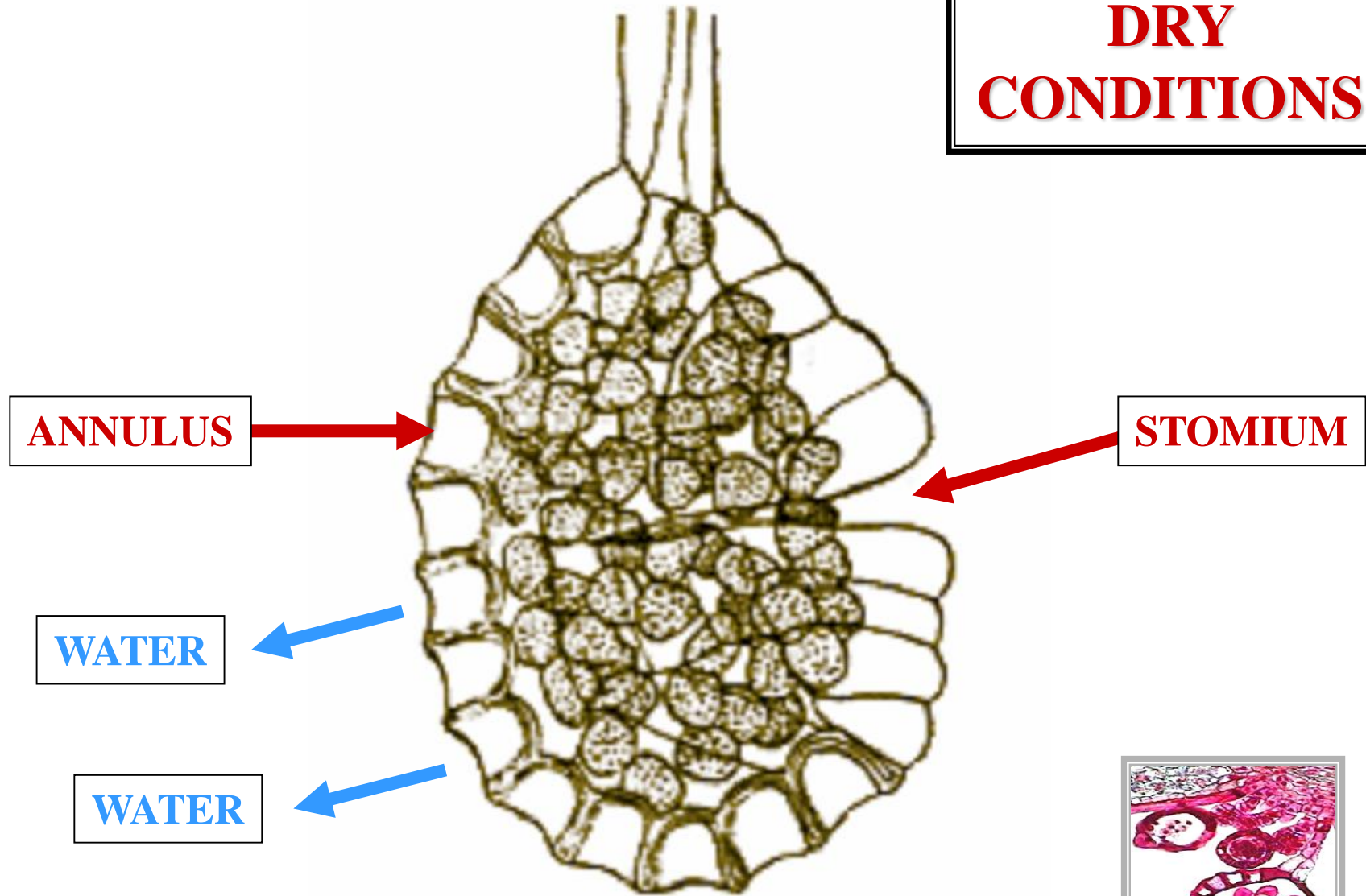
STOMIUM



LEPTOSPORANGIUM

C

**DRY
CONDITIONS**

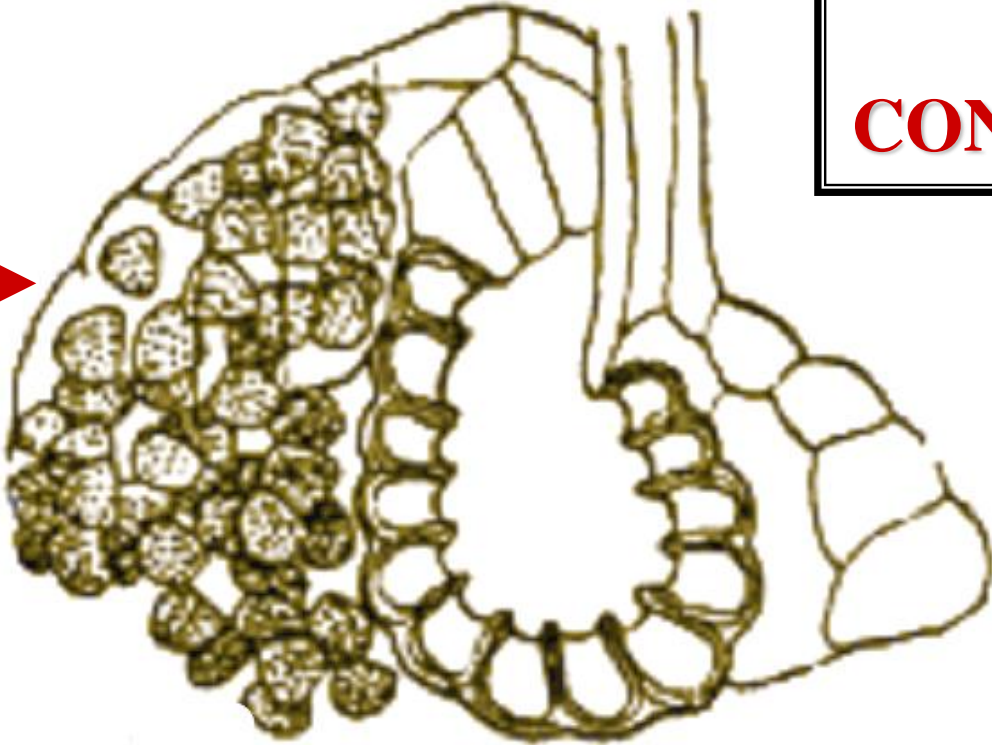




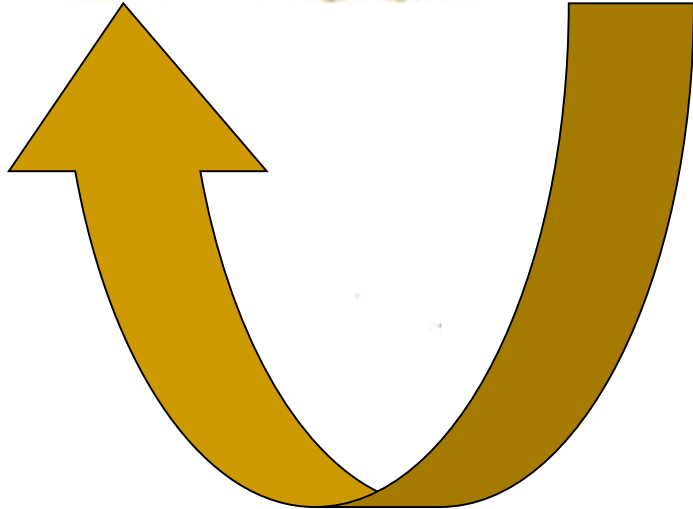
LEPTOSPORANGIUM

**DRY
CONDITIONS**

ANNULUS →



**CATAPULT
POSITION**



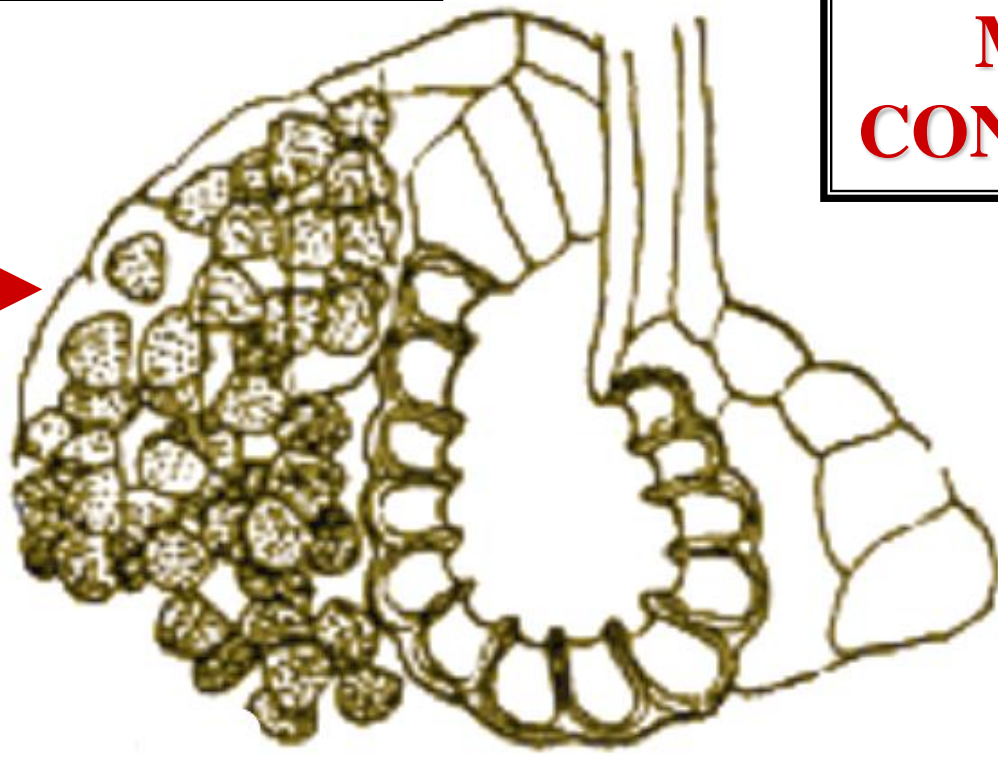
**ANNULUS
CONTRACTS**



LEPTOSPORANGIUM

**MOIST
CONDITIONS**

ANNULUS



LEPTOSPORANGIUM

→ C

**MOIST
CONDITIONS**

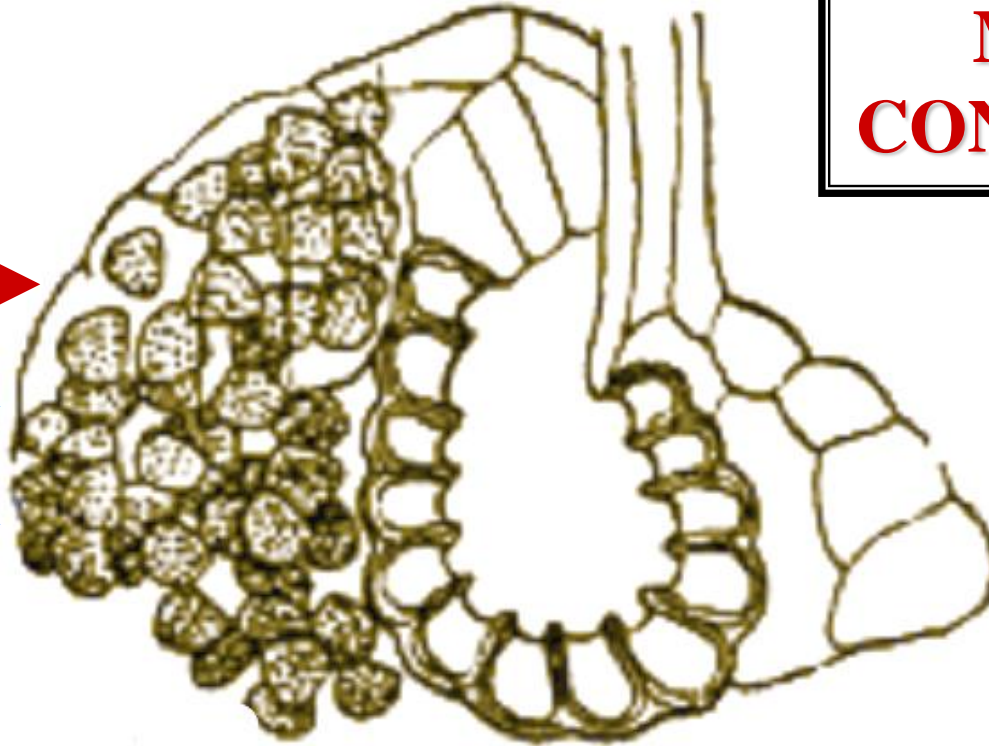
ANNULUS



WATER



WATER



**ANNULUS
EXPANDS**



LEPTOSPORANGIUM



**MOIST
CONDITIONS**

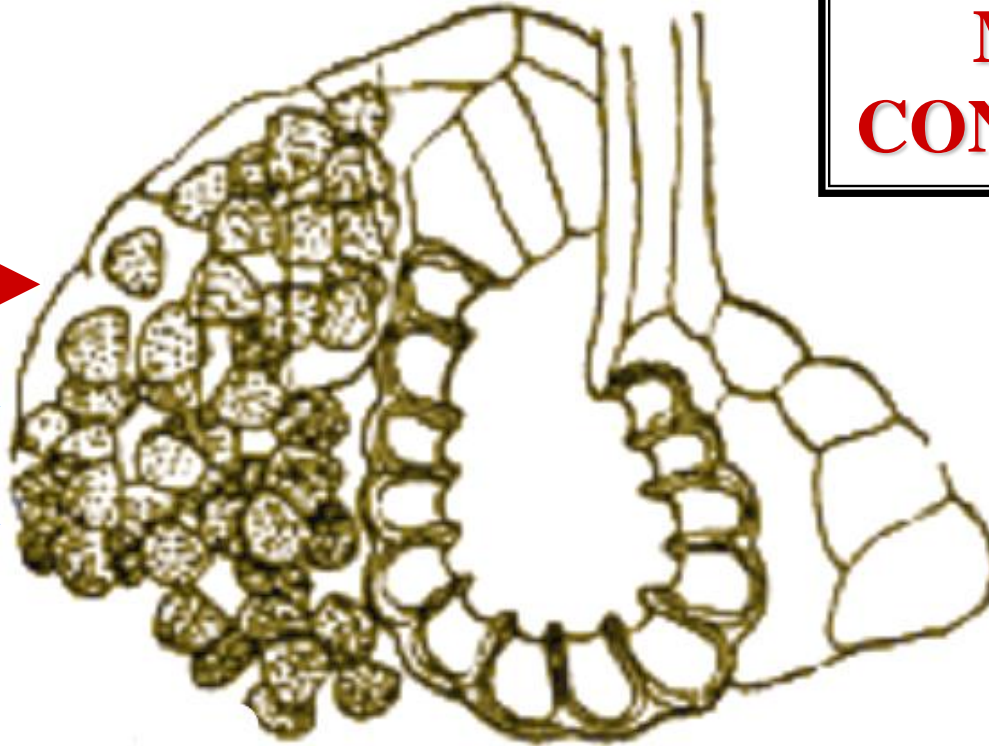
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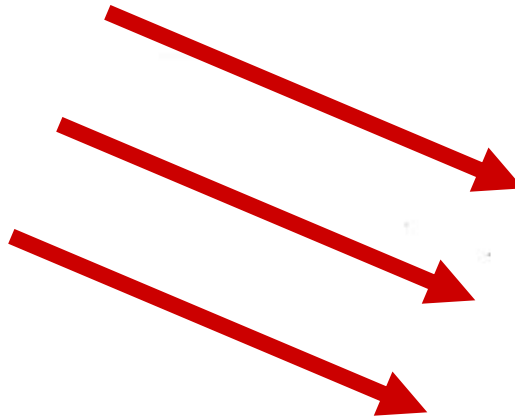
WATER



WATER



**CATAPULTS
FORWARD**

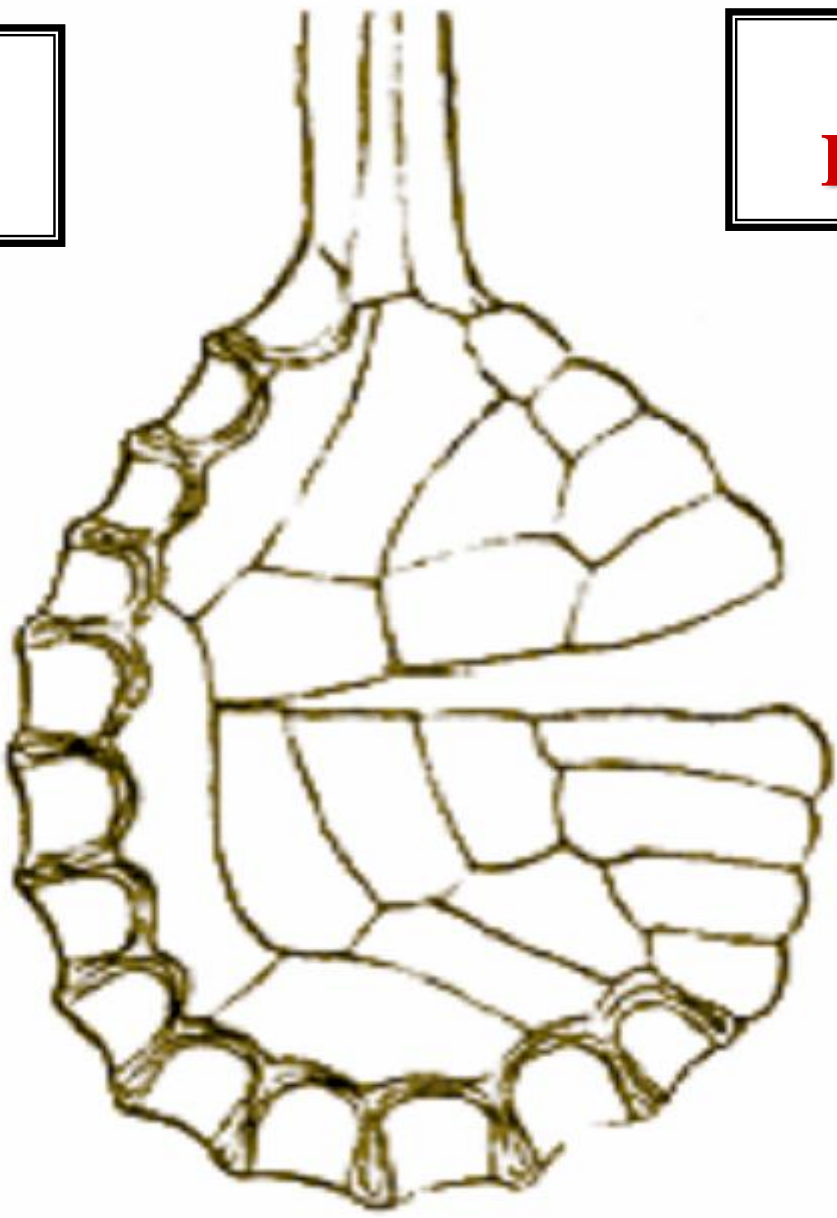


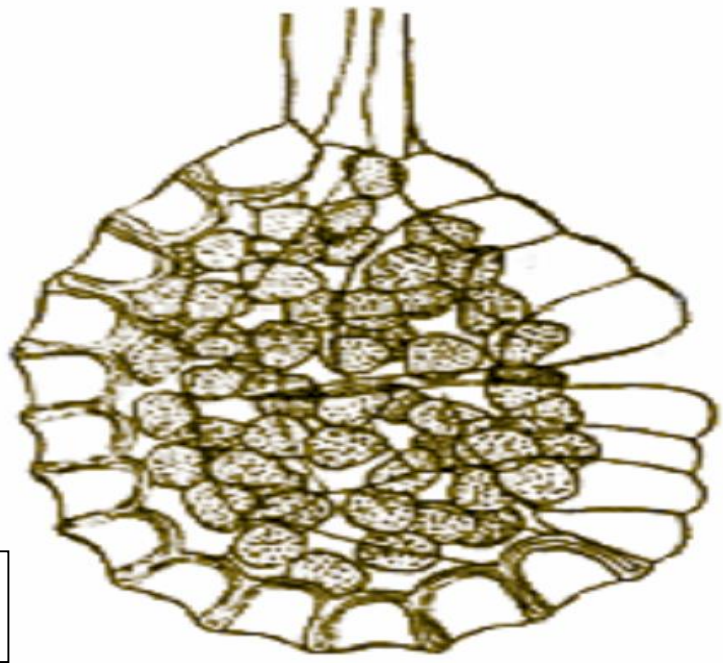
**ANNULUS
EXPANDS**



**SPORE
DISPERSAL**

**END
POSITION**





1



1



2



**DRY
CONDITIONS**





1



2



**DRY
CONDITIONS**

3



**MOIST
CONDITIONS**



1

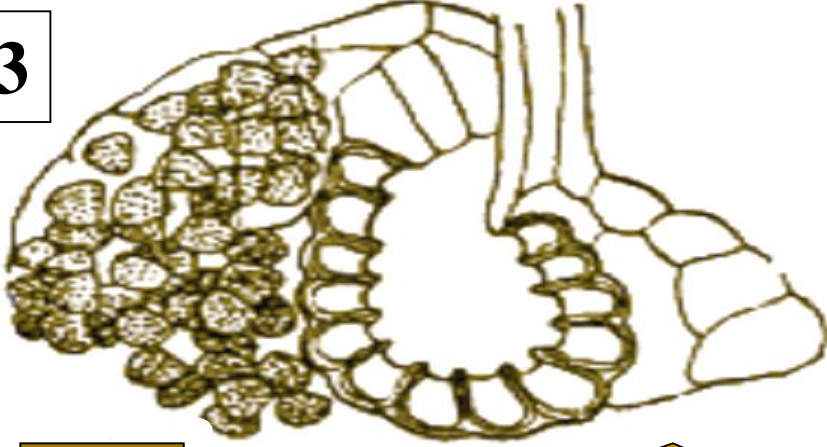


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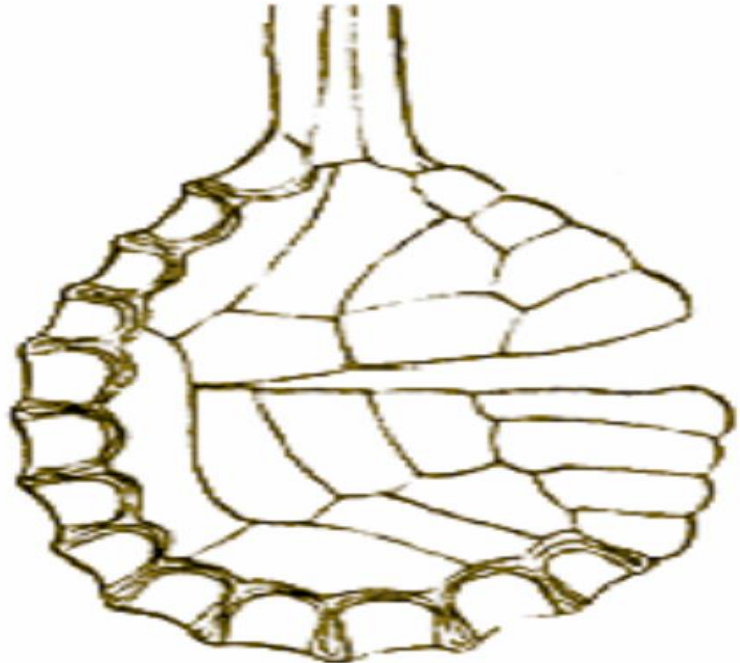


**DRY
CONDITIONS**

3



4



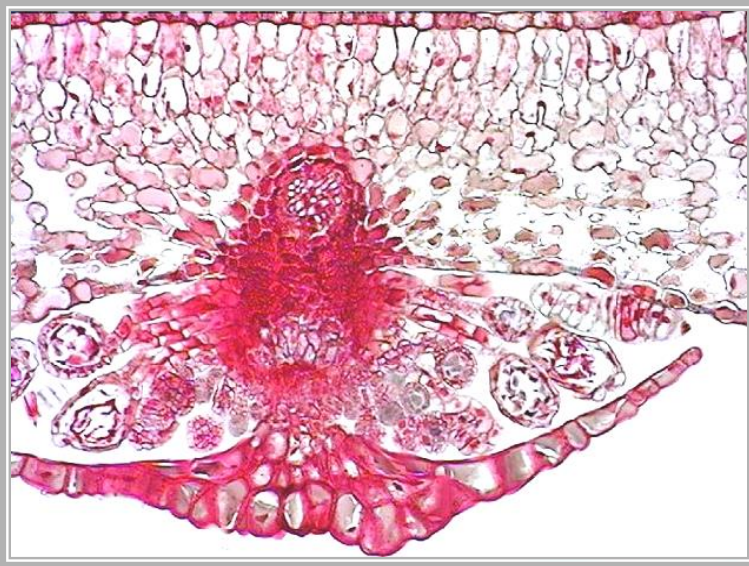
**MOIST
CONDITIONS**



SPORE HABIT

L.S.

I



SPORES

L.S.

H



ISOSPORES

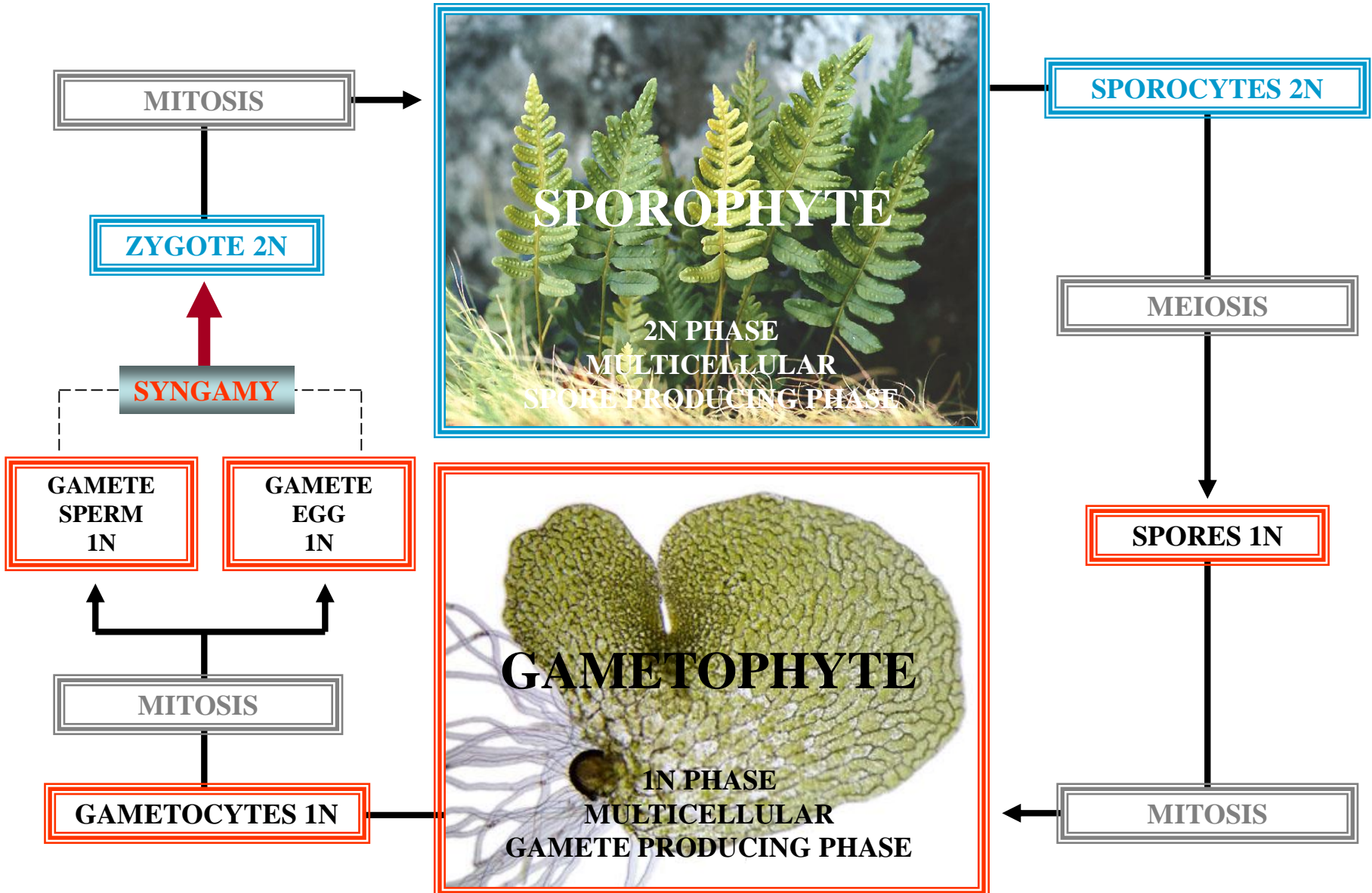
L.S.



ISOSPORES

HOMOSPOROUS

PTERIDALES LIFE CYCLE





GAMETOPHYTE CHARACTERS

L.S.



ISOSPORES

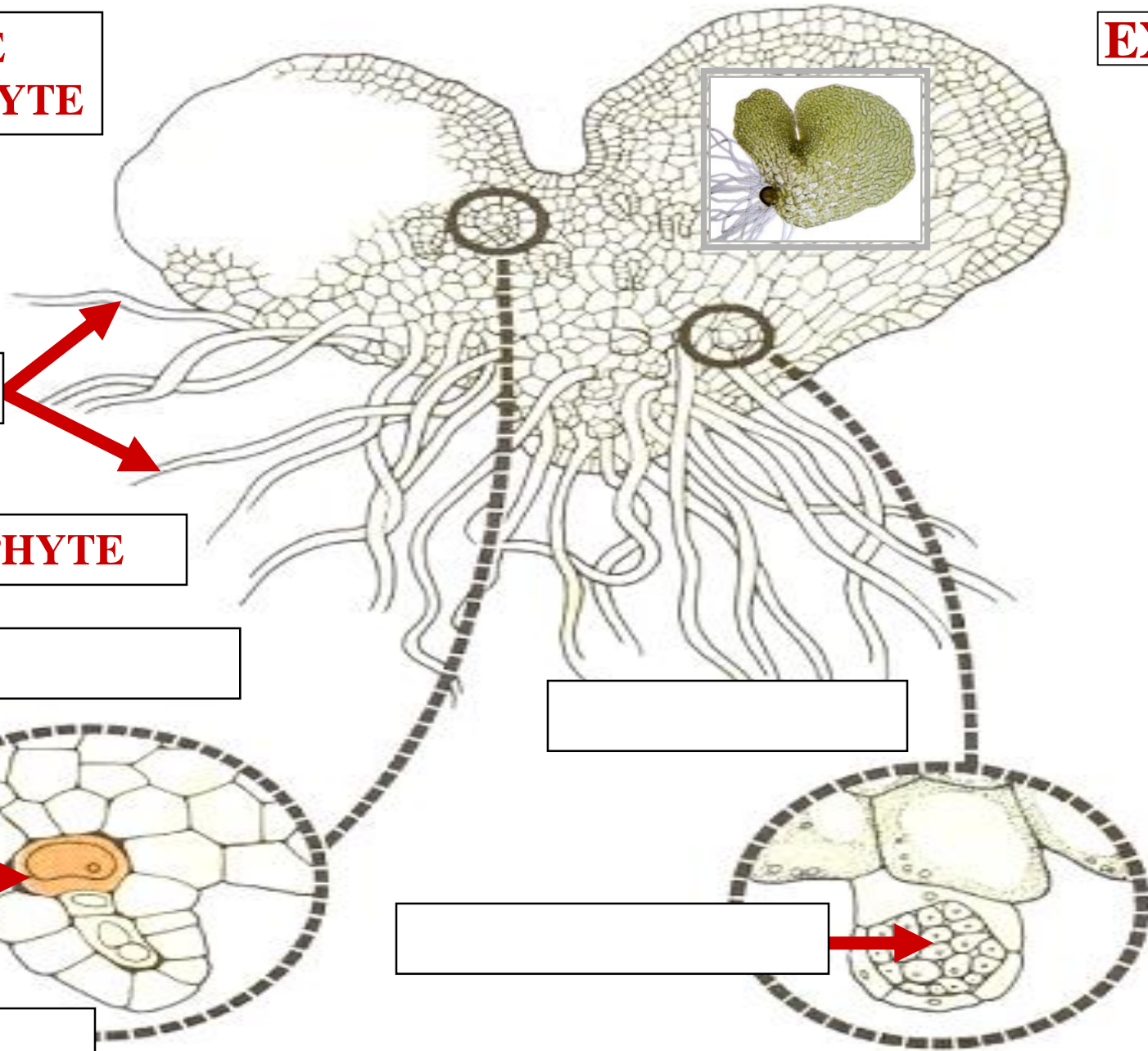
HOMOSPOROUS



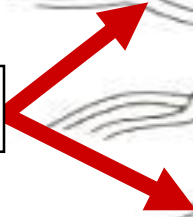
EXOSPORIC GAMETOPHYTE

EX

**MATURE
GAMETOPHYTE**



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GAMETOPHYTE

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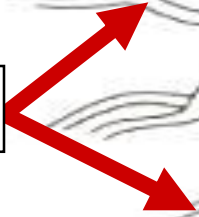
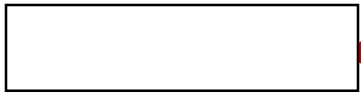
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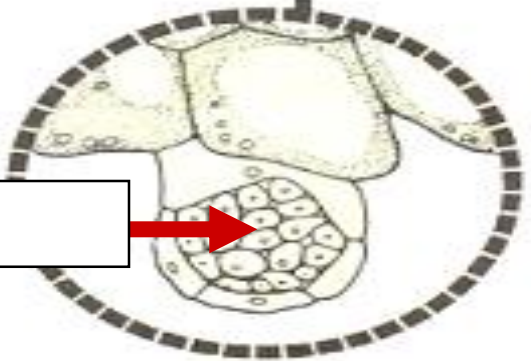
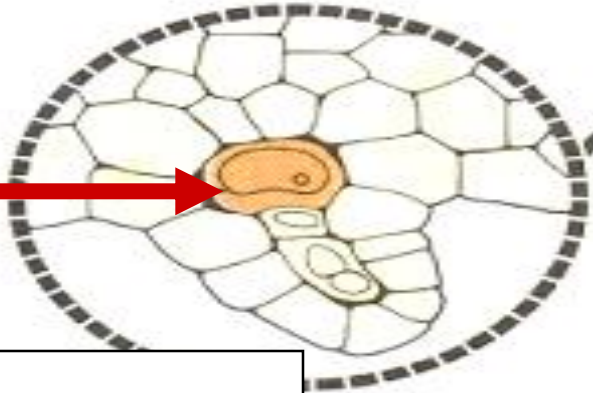
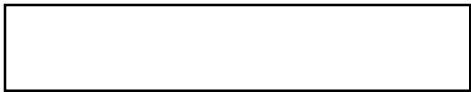


**MATURE
GAMETOPHYTE**

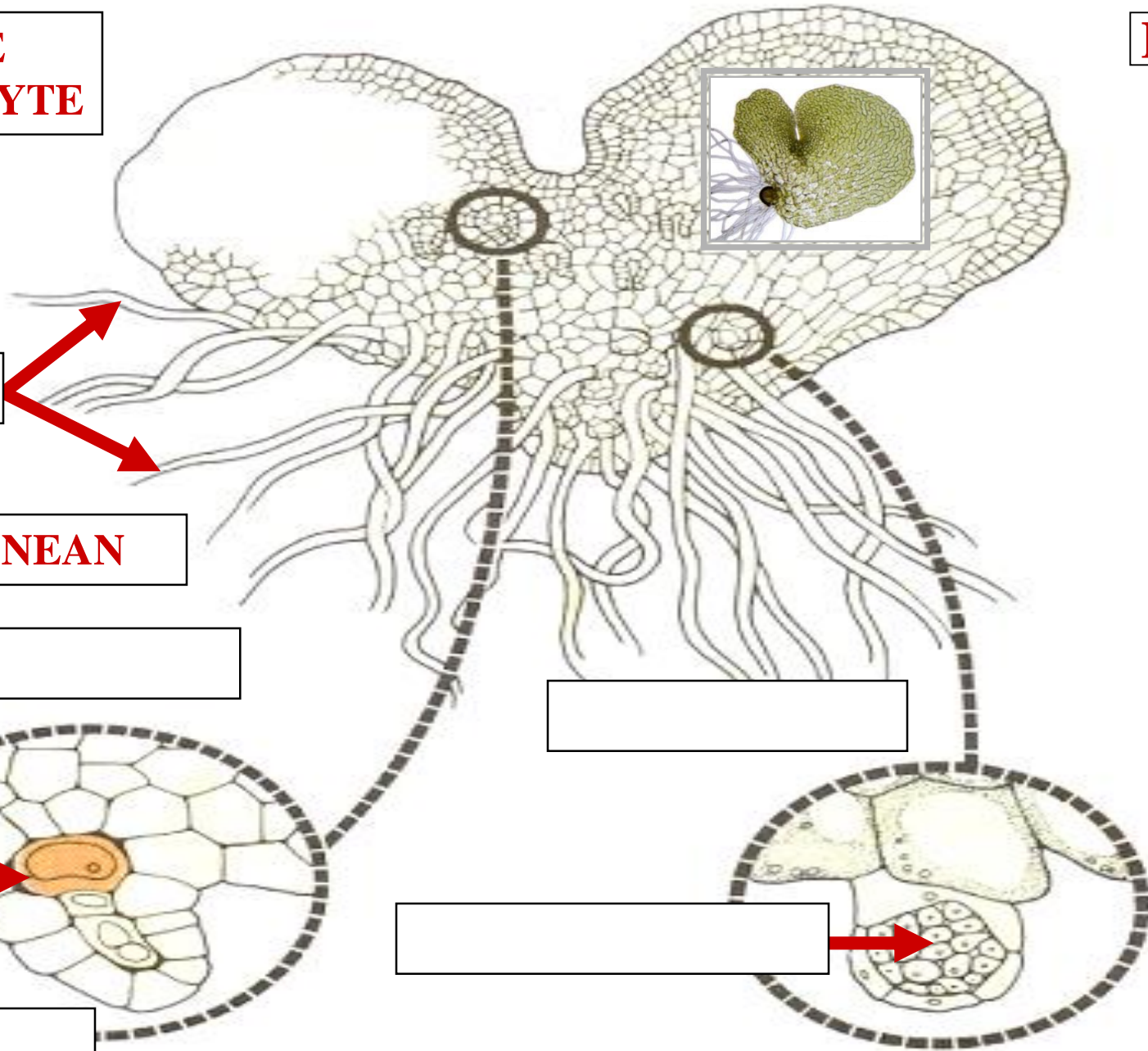
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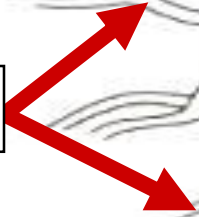
EXOSPORIC



**MATURE
GAMETOPHYTE**



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EPITERRANEAN

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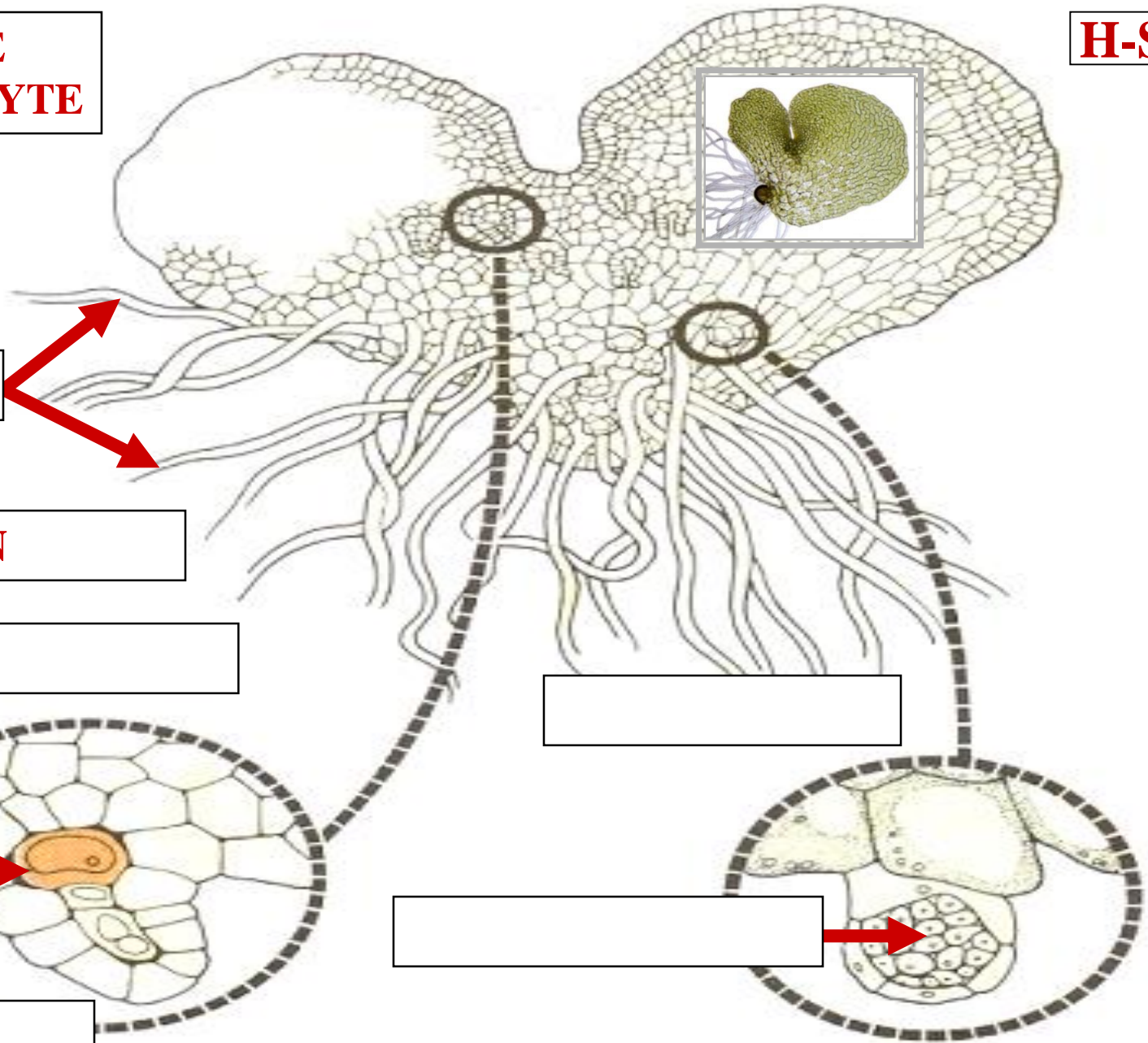
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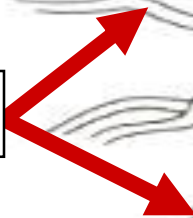


**MATURE
GAMETOPHYTE**

H-S



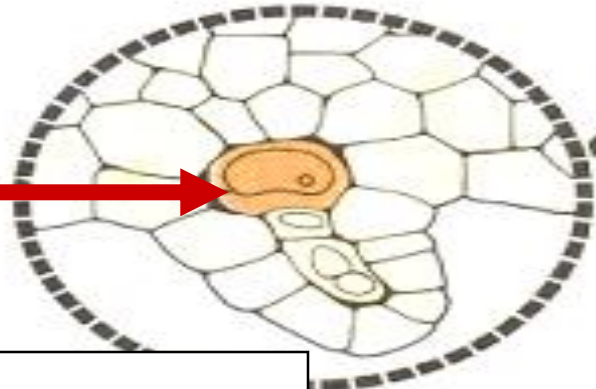
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PSYN

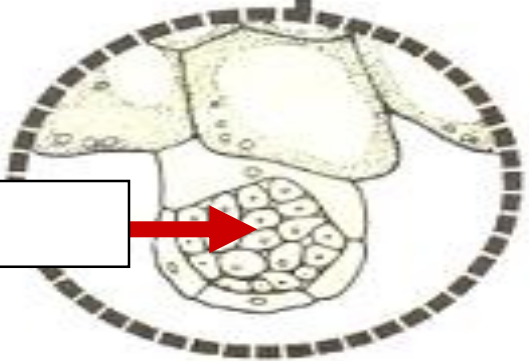
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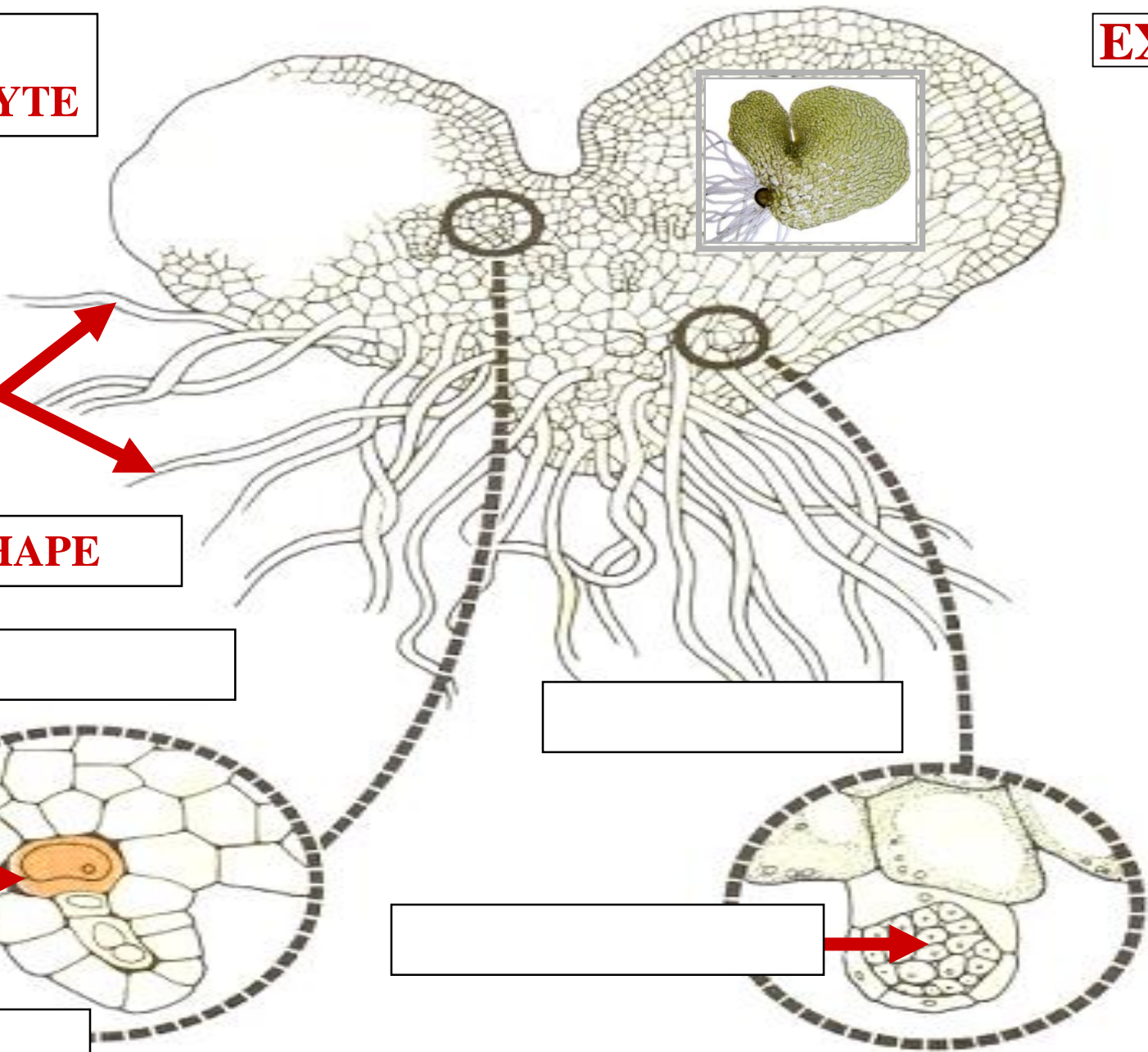
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EX

**MATURE
GAMETOPHYTE**



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HEART-SHAPE

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**MATURE
GAMETOPHYTE**



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EXOSPORIC

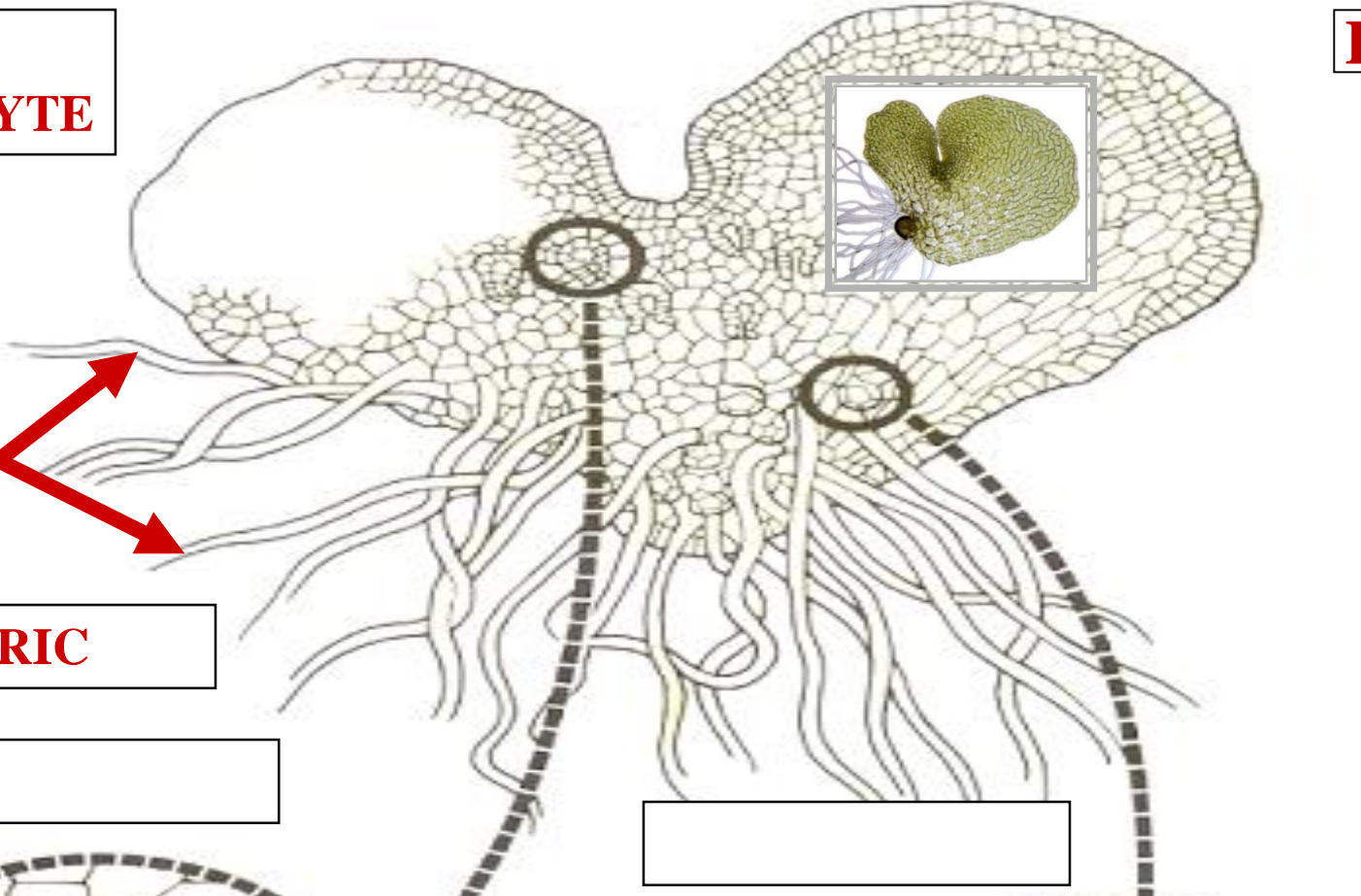
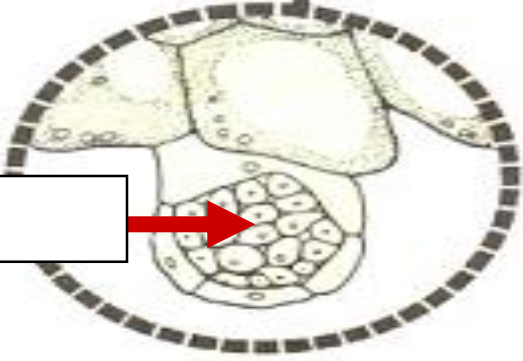
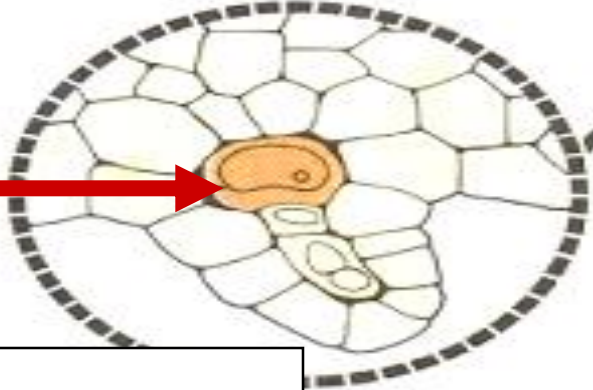
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**MATURE
GAMETOPHYTE**

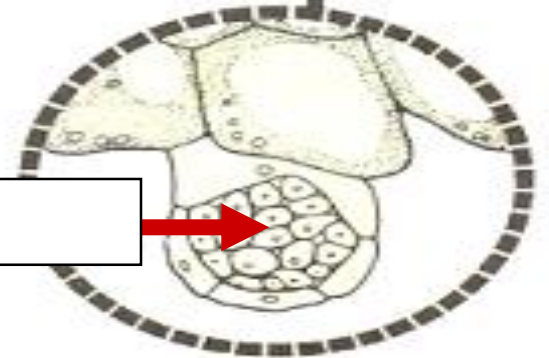
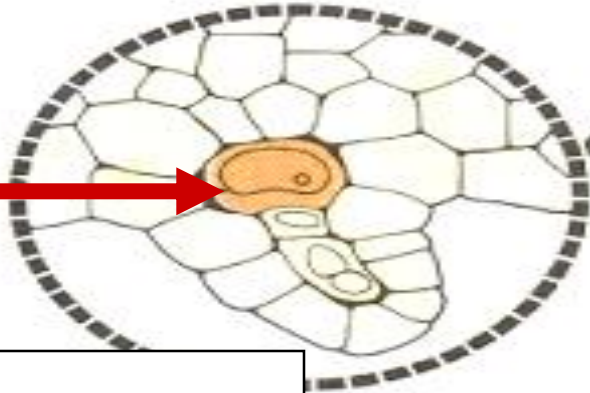
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BISEXUAL

ARCHEGONIUM

ANTHERIDIUM



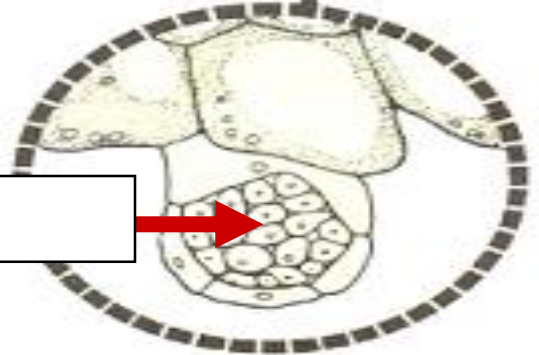
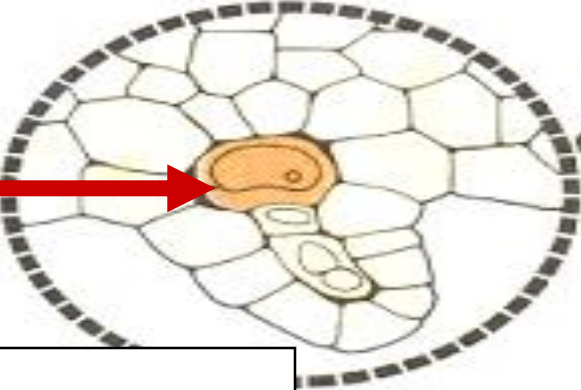
**MATURE
GAMETOPHYTE**



RHIZOIDS

BISEXUAL

RHIZOID REGION



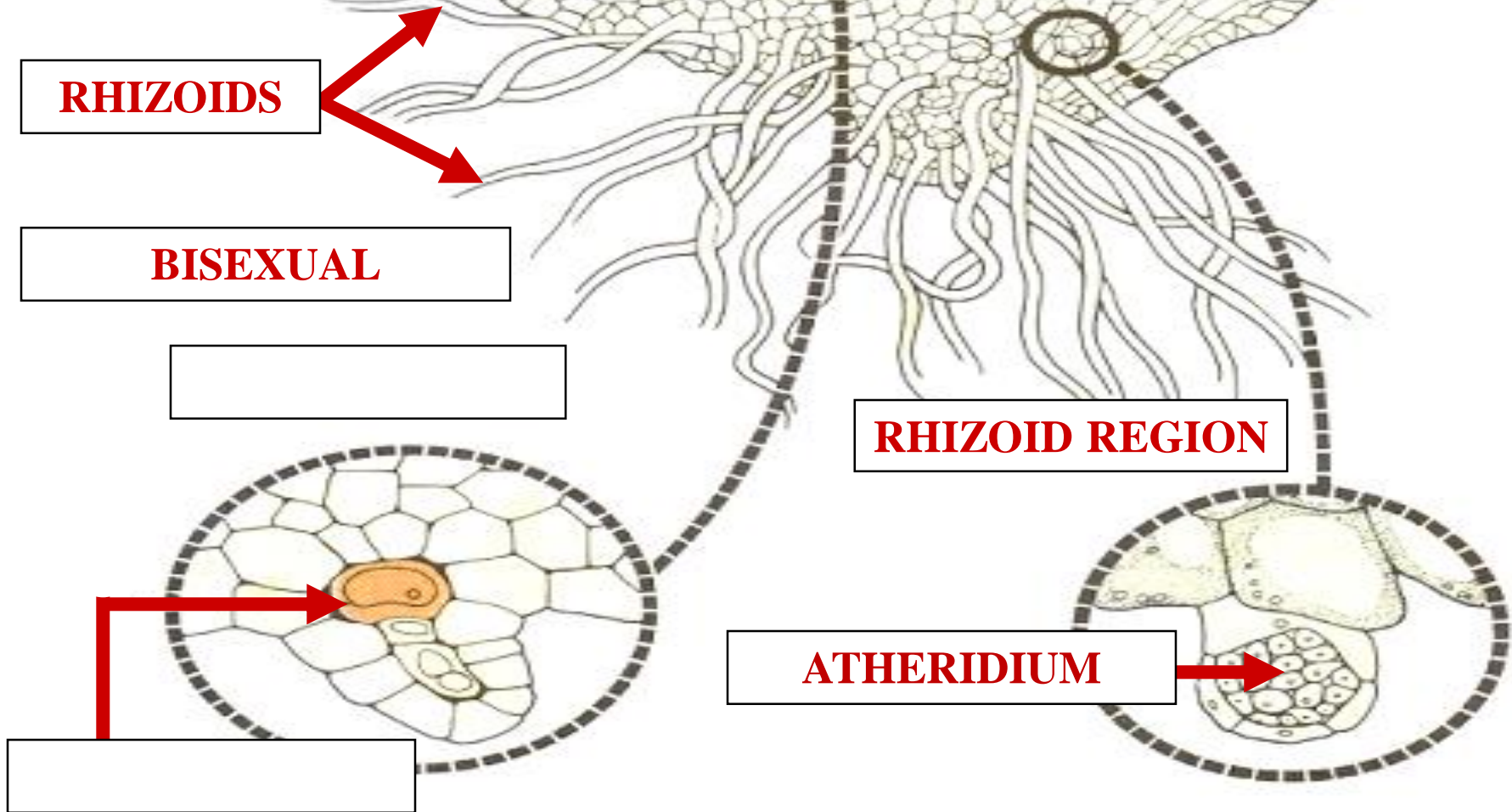
**MATURE
GAMETOPHYTE**

RHIZOIDS

BISEXUAL

RHIZOID REGION

ATHERIDIUM



**MATURE
GAMETOPHYTE**

**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

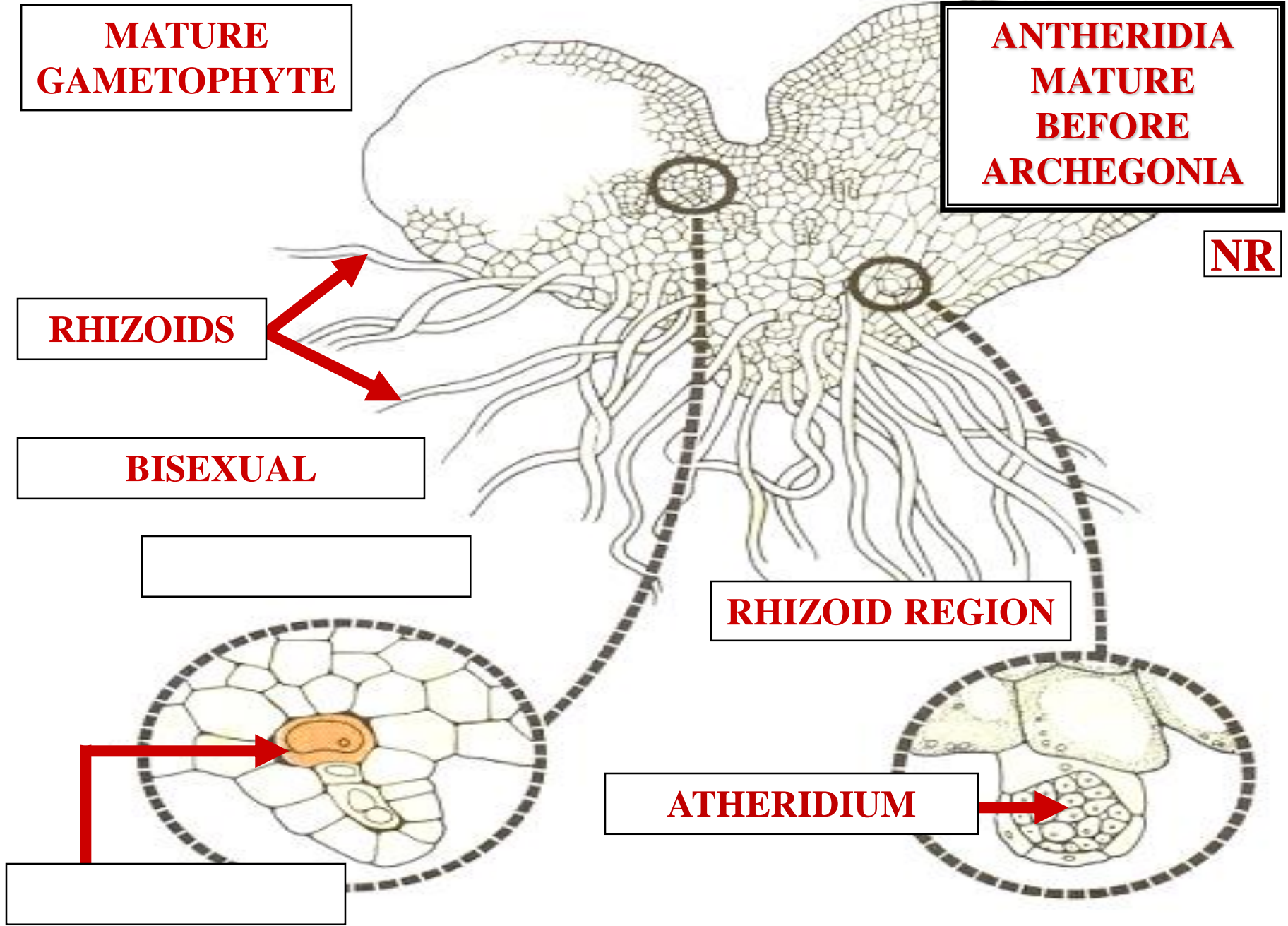
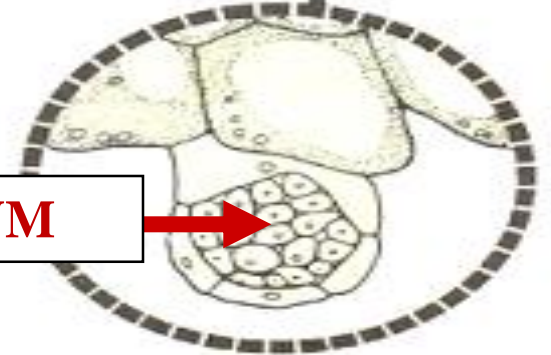
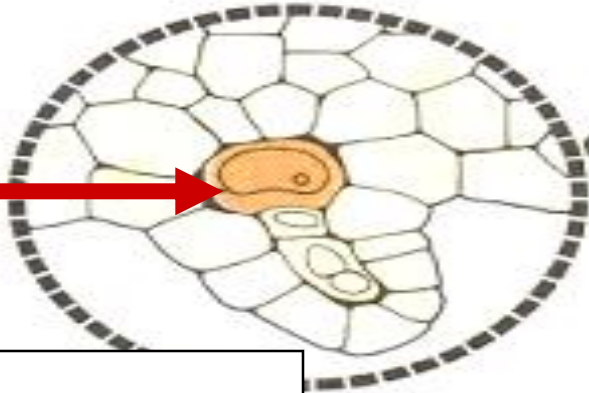
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RHIZOIDS

BISEXUAL

RHIZOID REGION

ANTHERIDIUM



NOTCH REGION

BISEXUAL

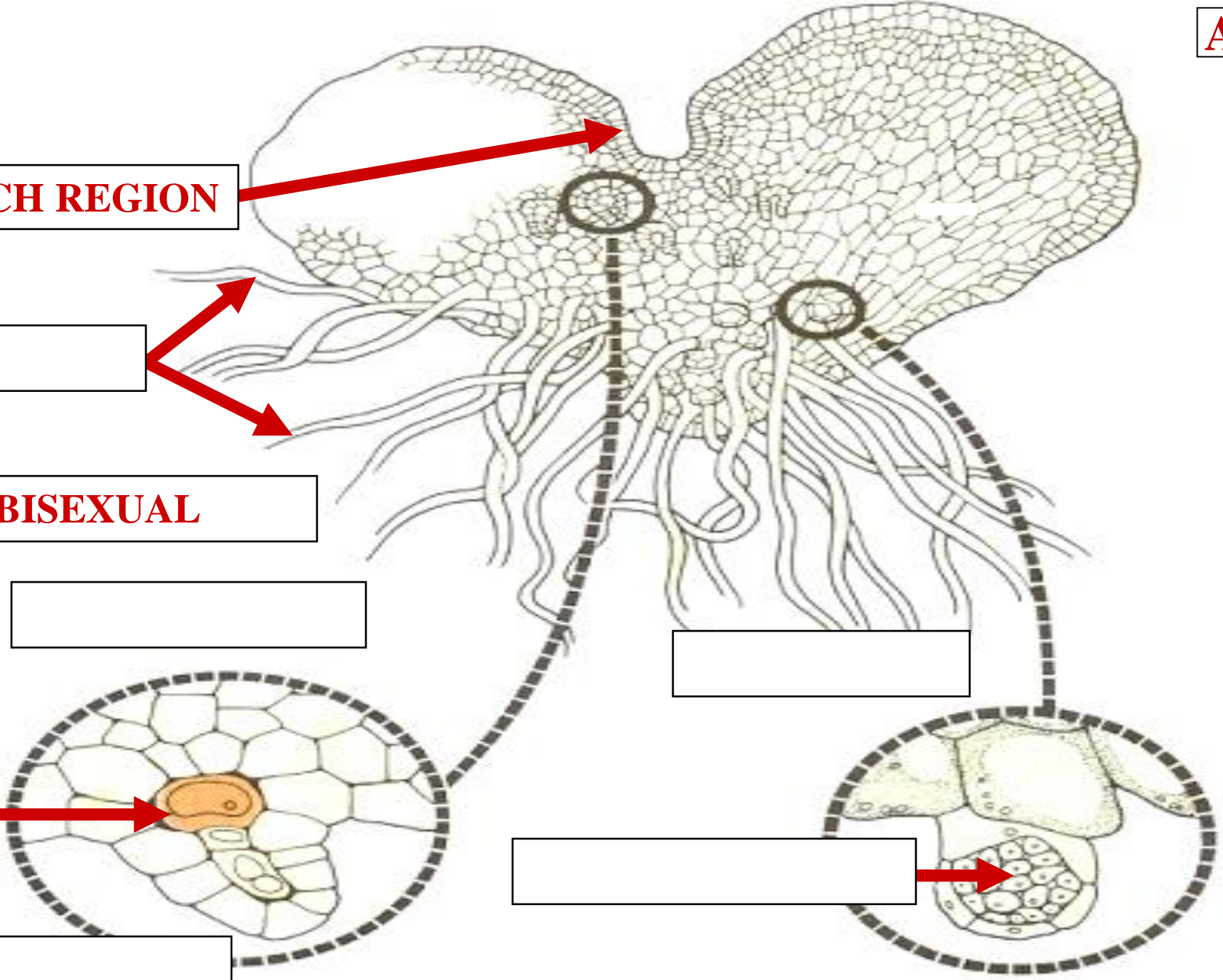
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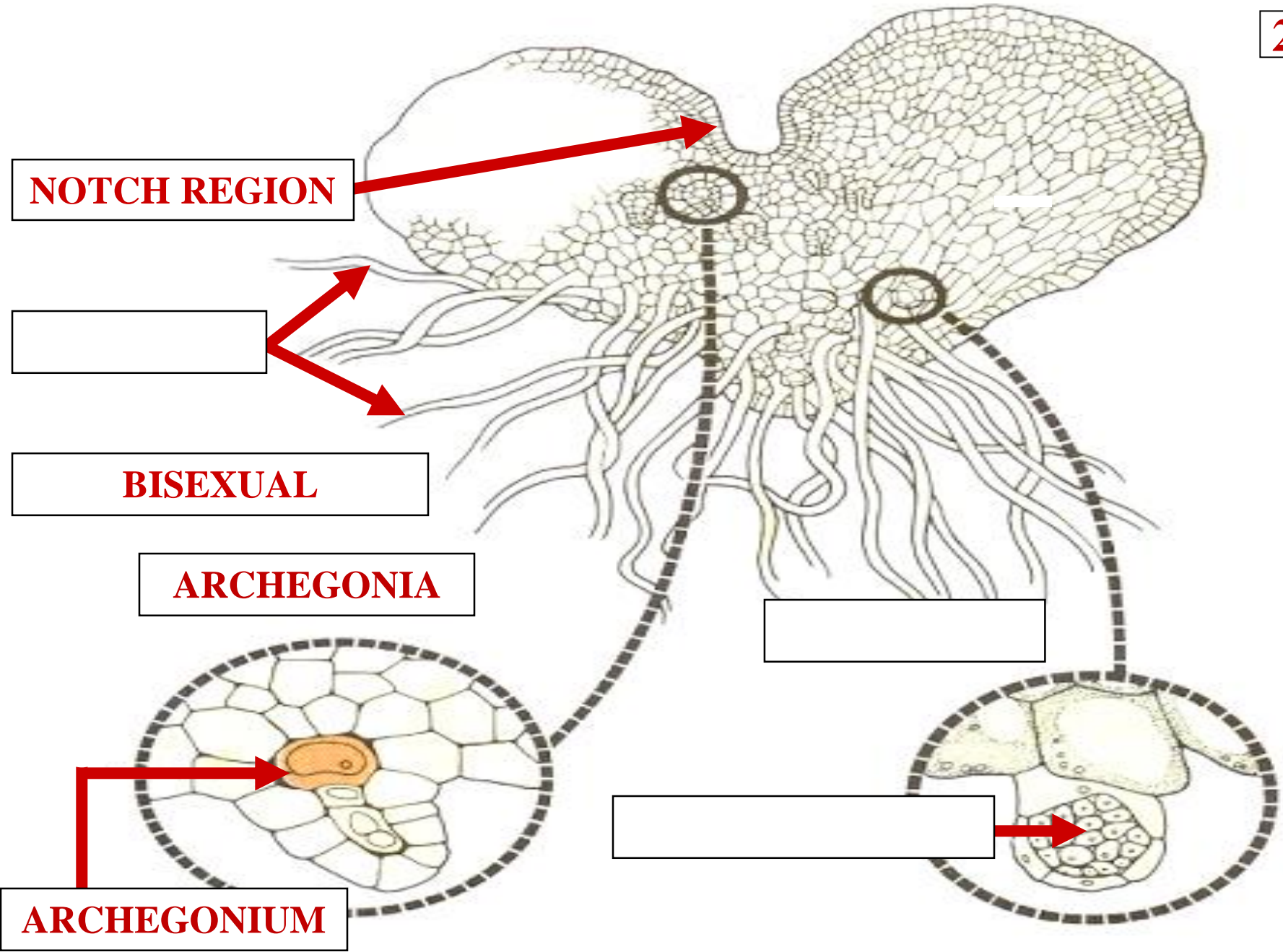
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NOTCH REGION

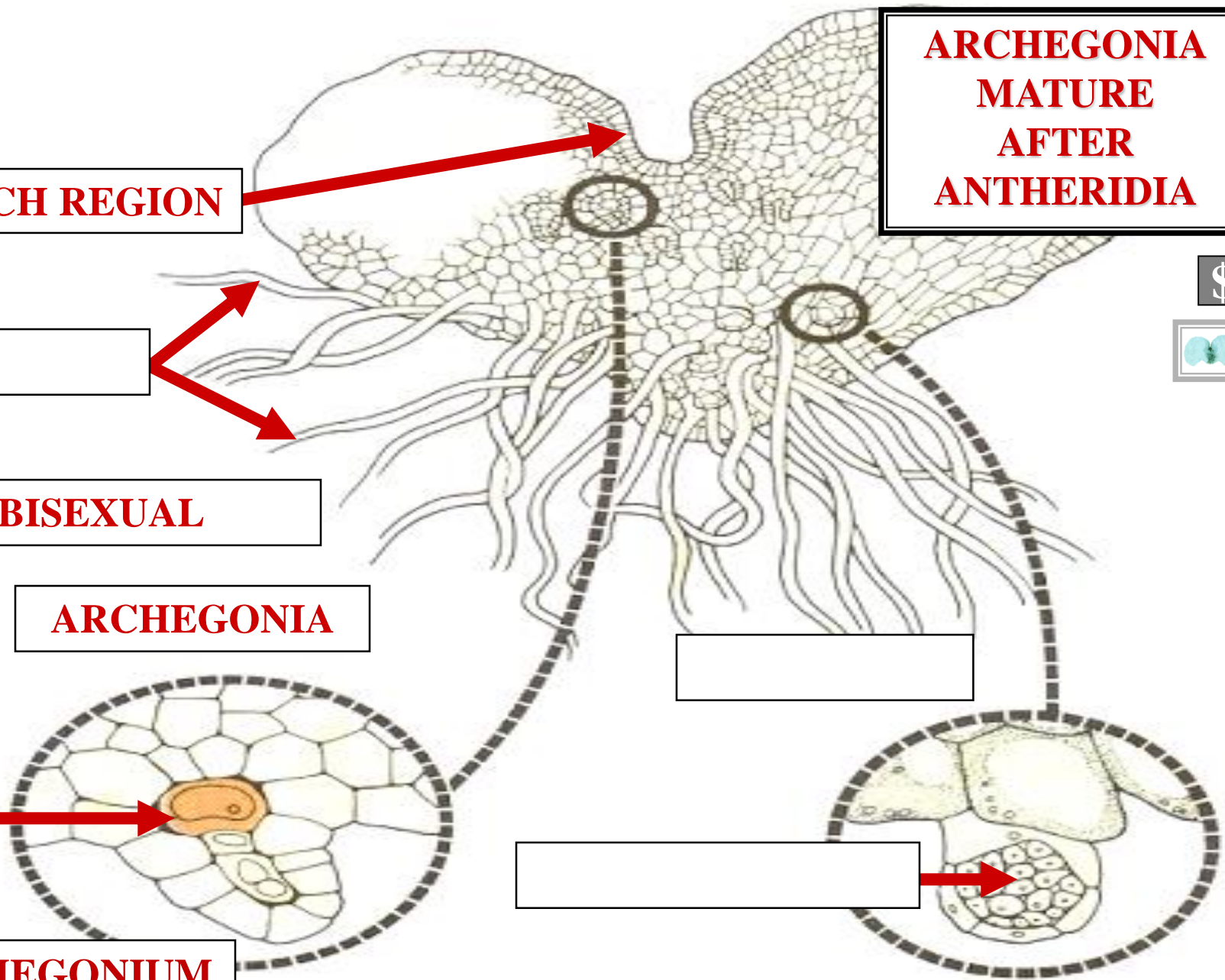
**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

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BISEXUAL

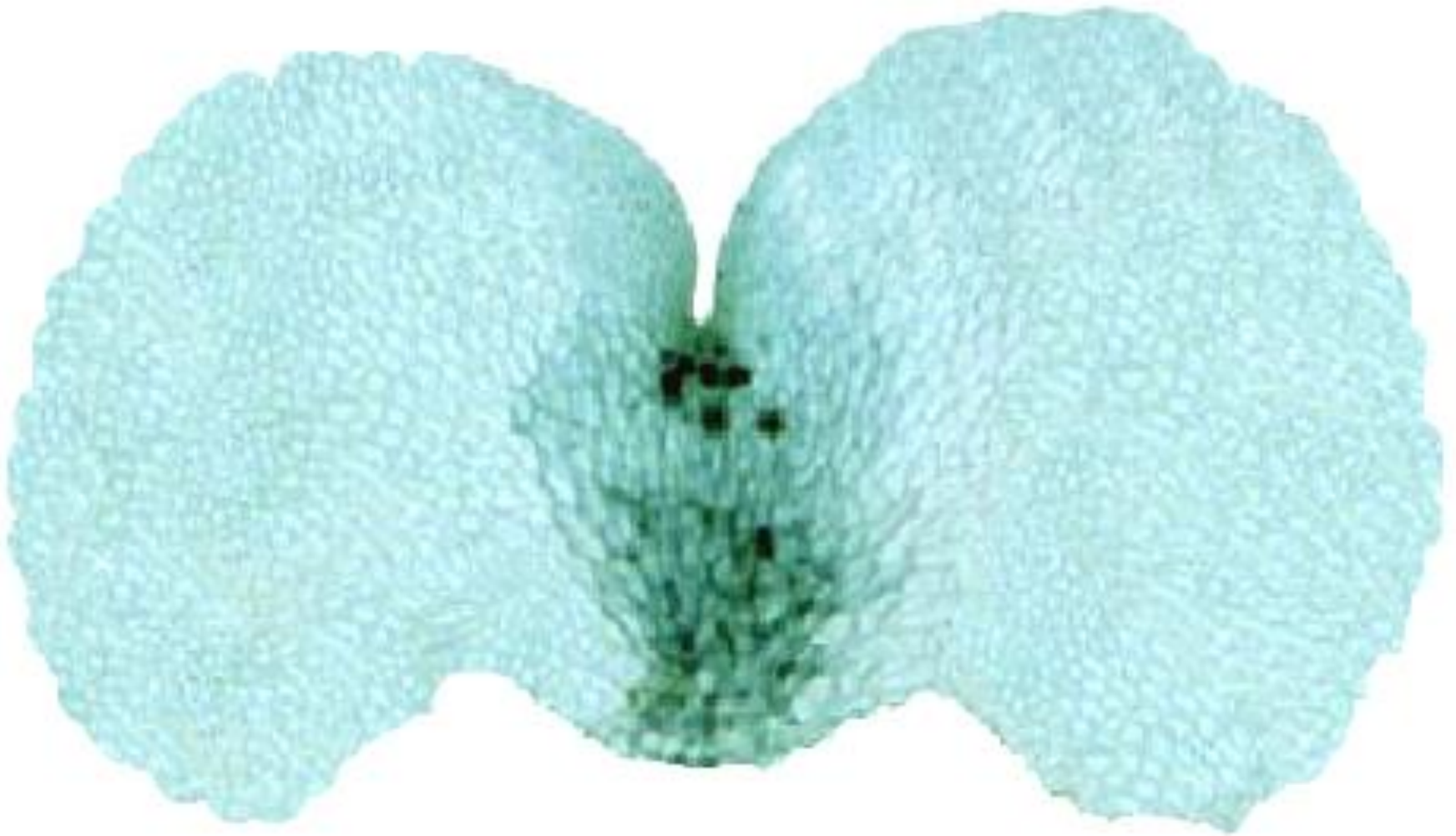
ARCHEGONIA

ARCHEGONIUM

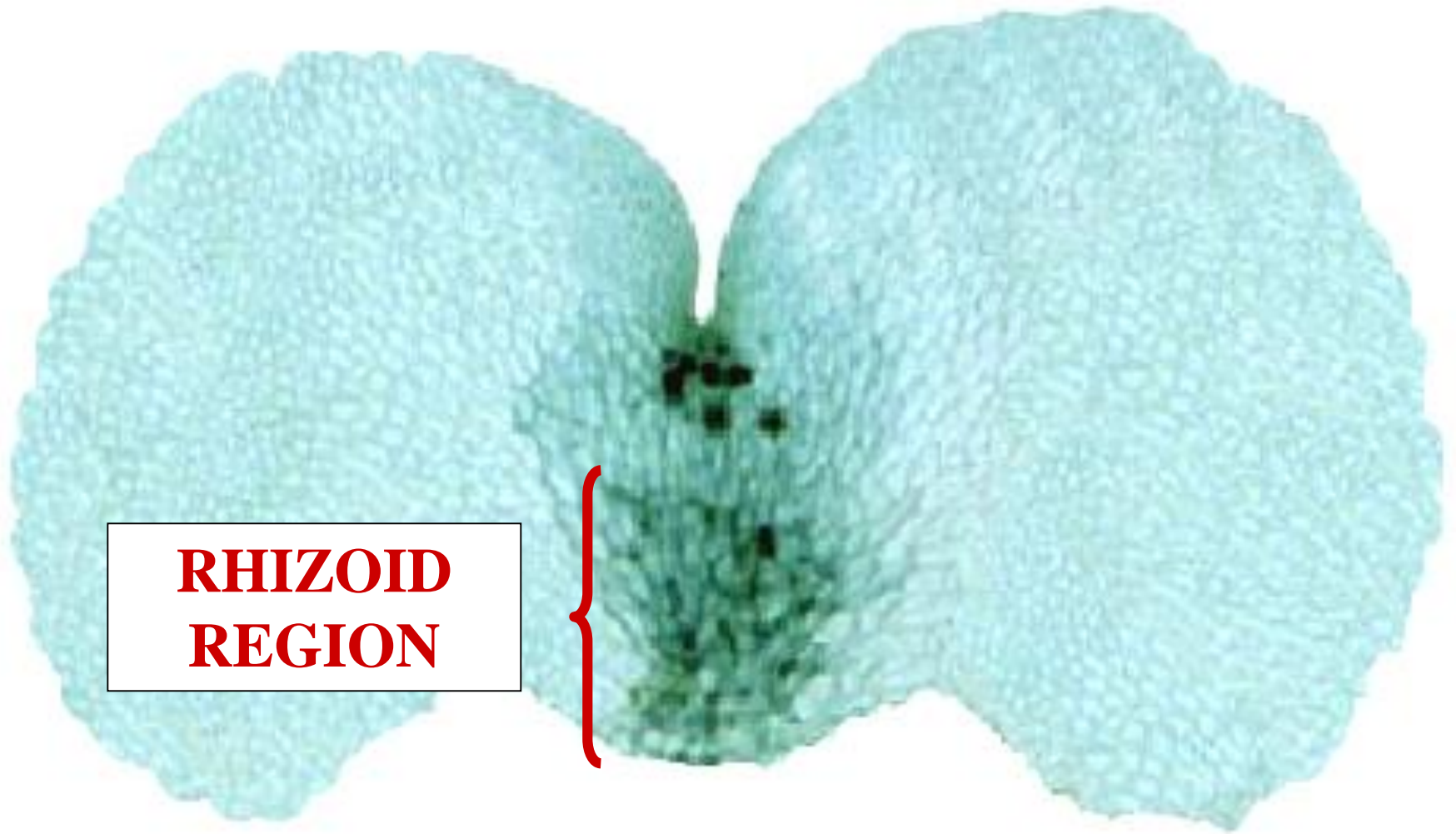


HEART-SHAPE

RR



GAMETOPHYTE



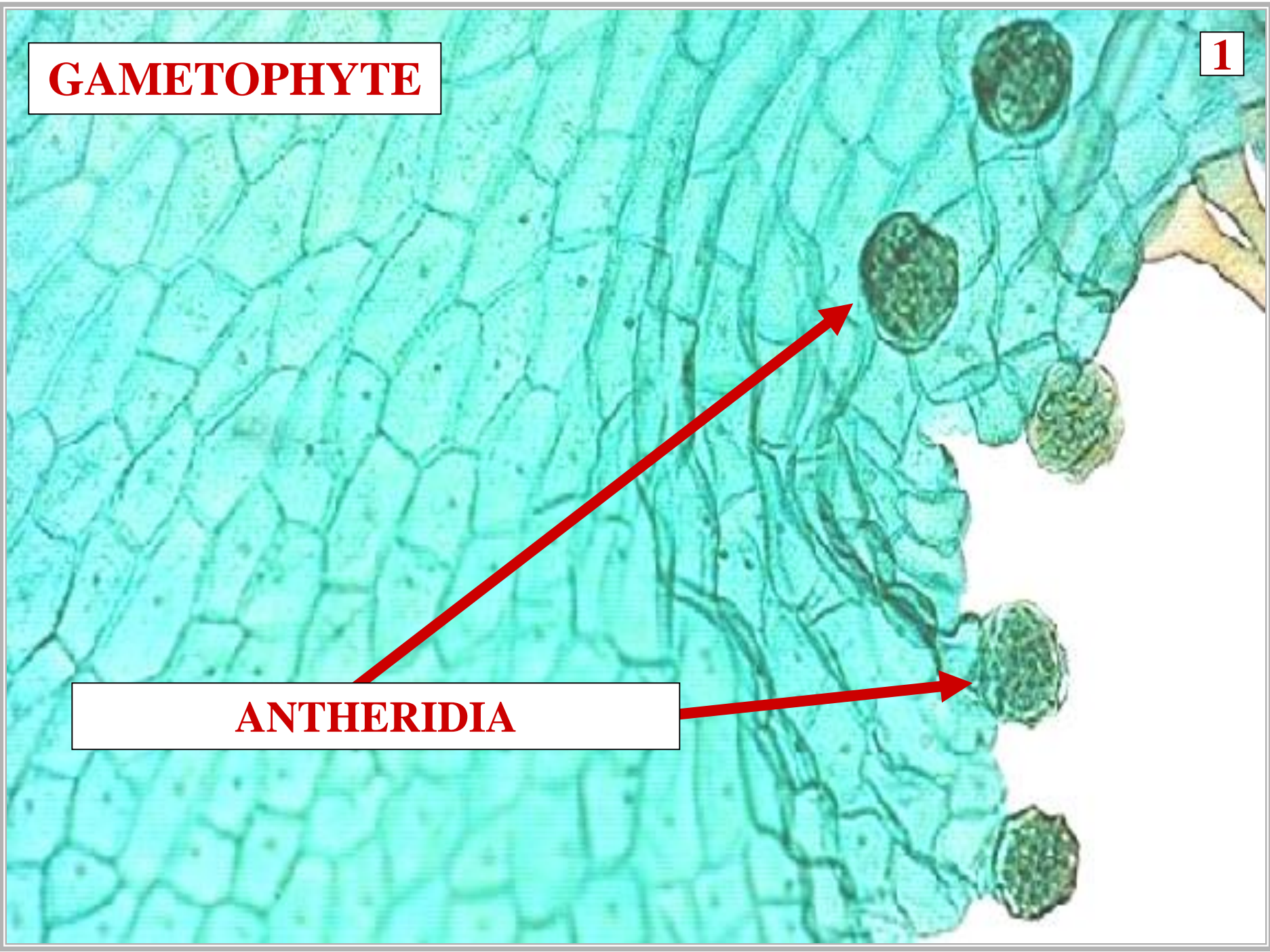
**RHIZOID
REGION**

GAMETOPHYTE

GAMETOPHYTE

1

ANTHERIDIA

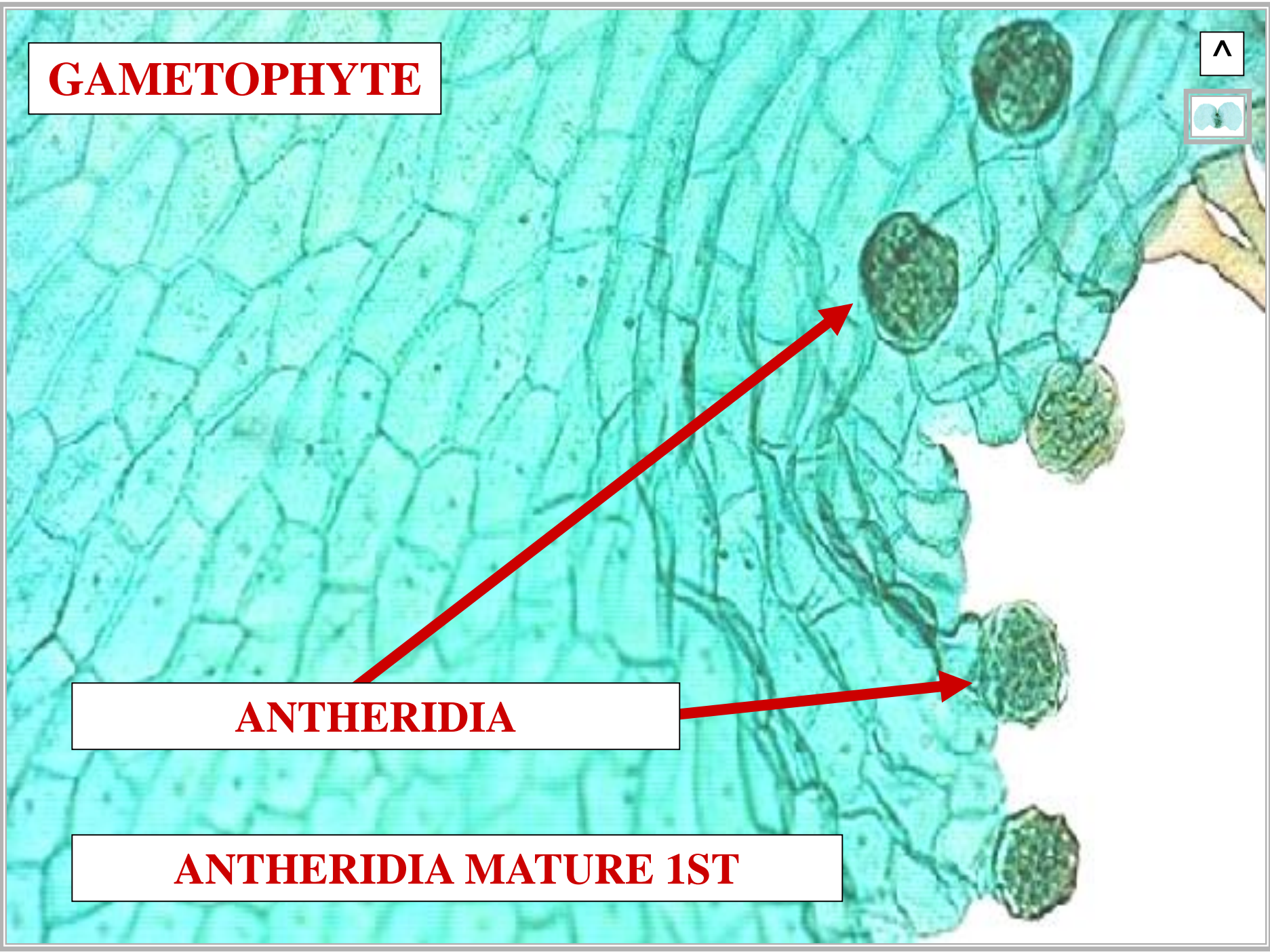


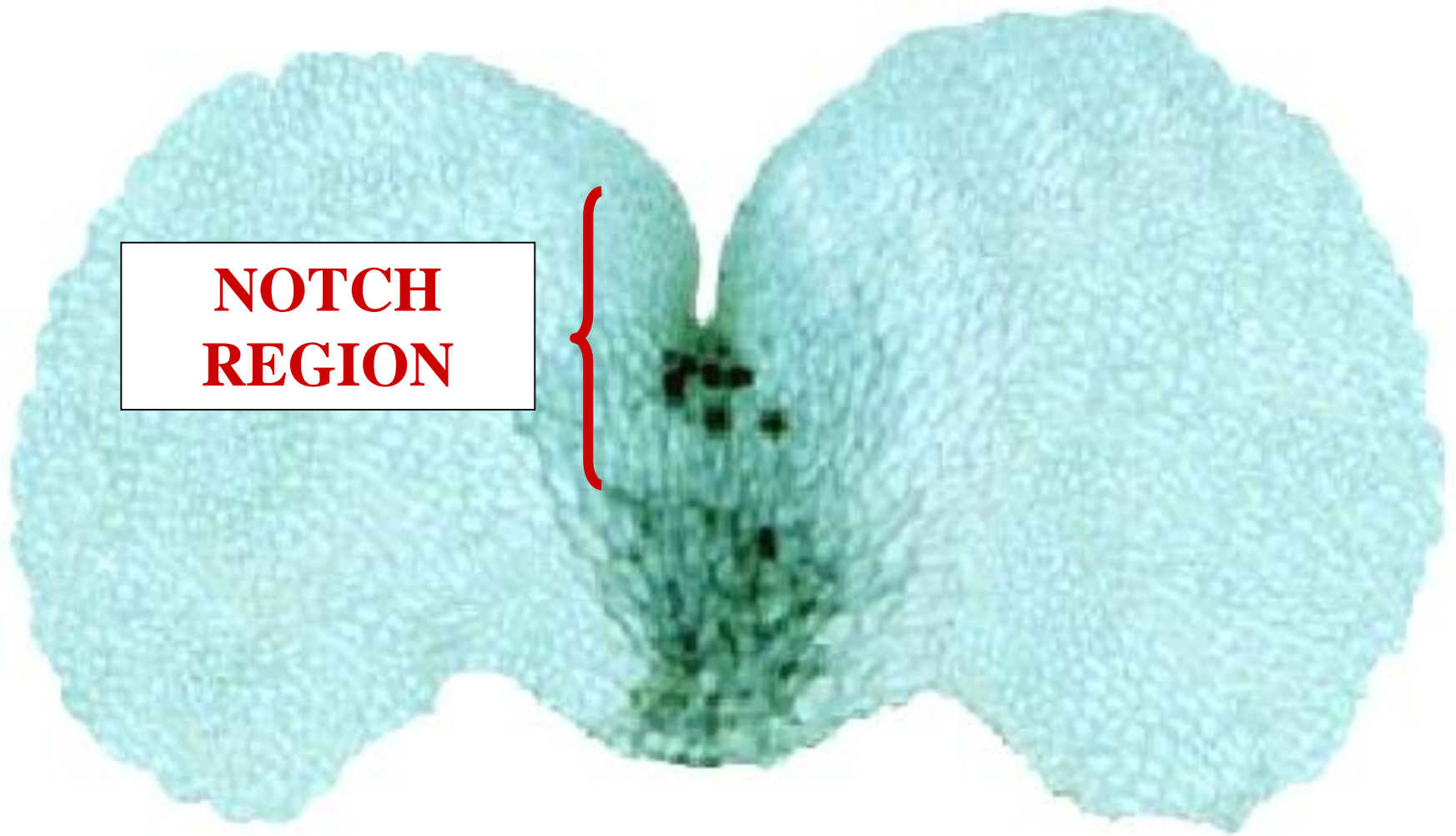
GAMETOPHYTE



ANTHERIDIA

ANTHERIDIA MATURE 1ST



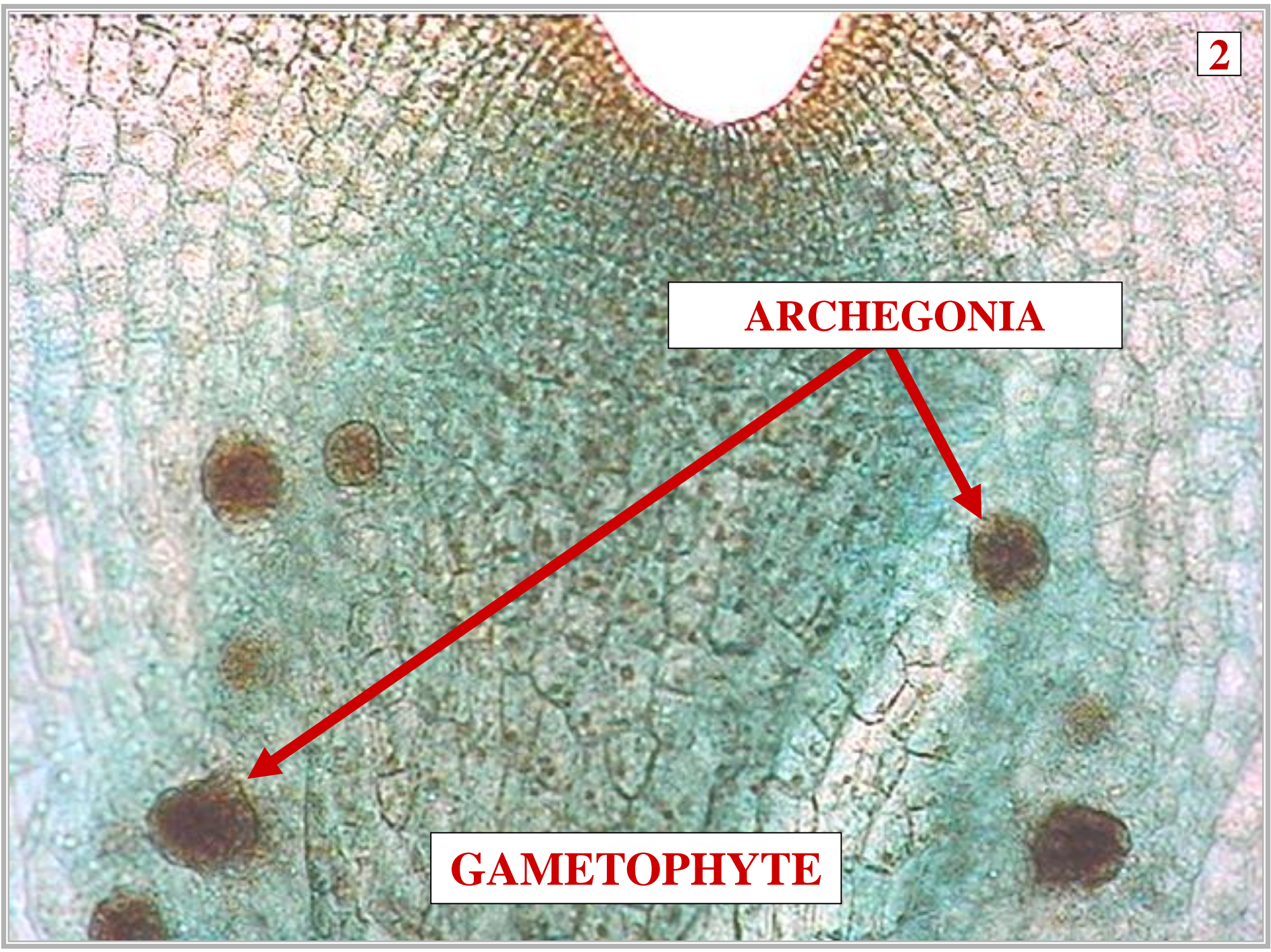


**NOTCH
REGION**

GAMETOPHYTE

ARCHEGONIA

GAMETOPHYTE

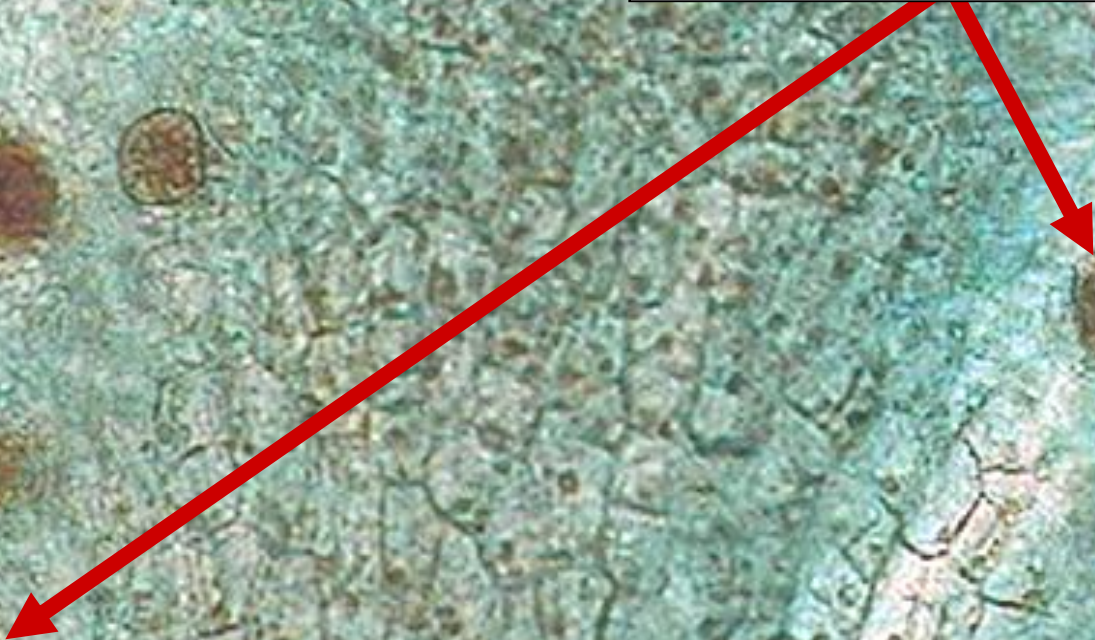




ARCHEGONIA MATURE 2ND

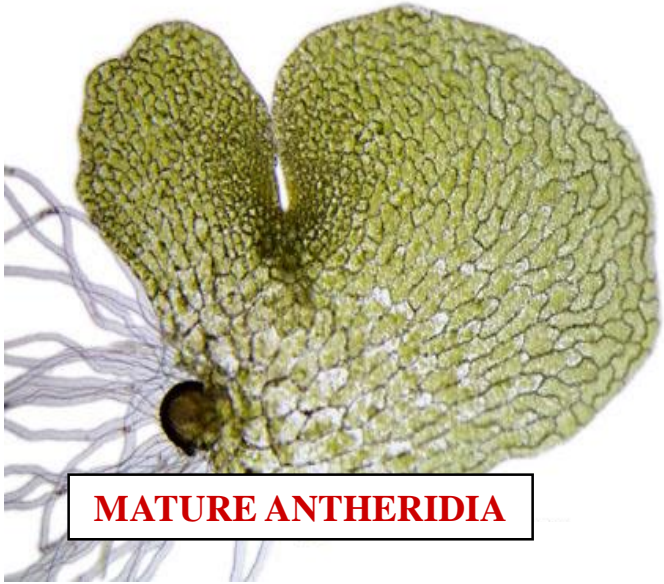
ARCHEGONIA

GAMETOPHYTE





**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

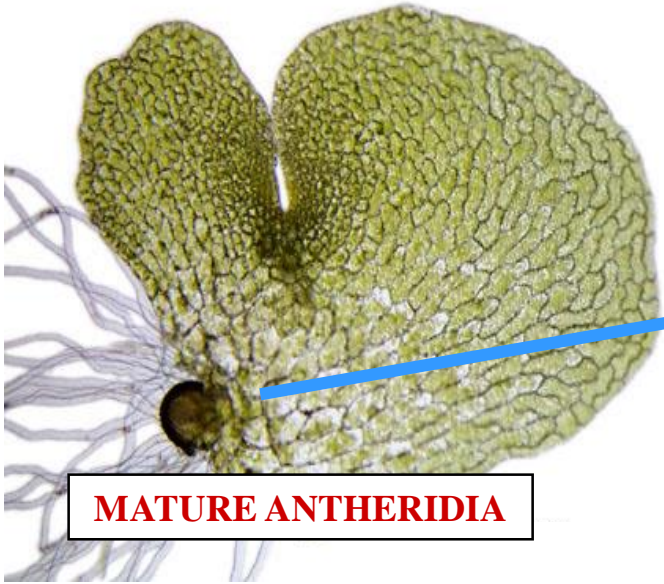


MATURE ANTHERIDIA

1ST GAMETOPHYTE

GAMETANGIA MATURATION: DICHOTOMY

**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

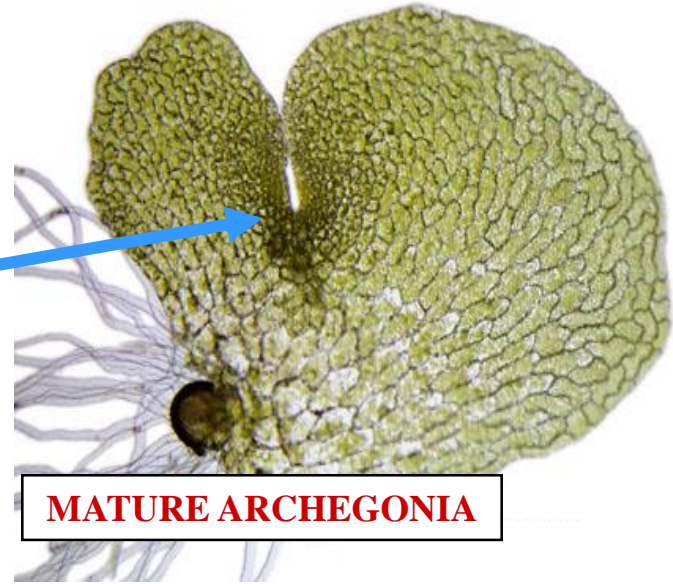


MATURE ANTHERIDIA

1ST GAMETOPHYTE

SPERM

SWIM

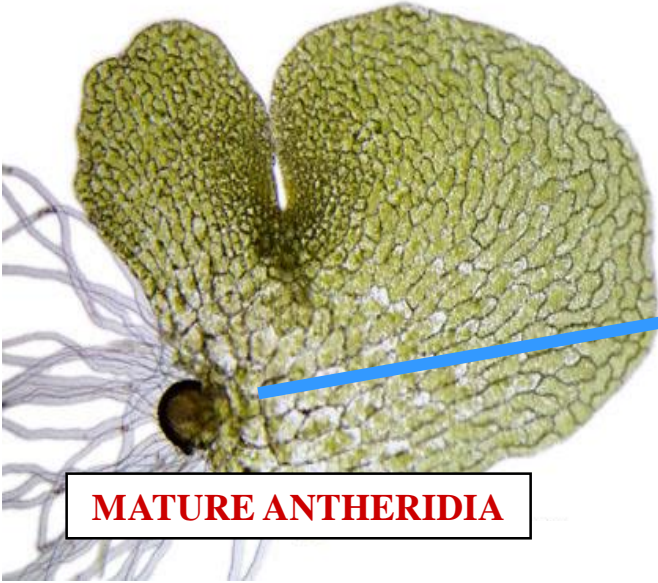


MATURE ARCHEGONIA

2ND GAMETOPHYTE

GAMETANGIA MATURATION: DICHOTOMY

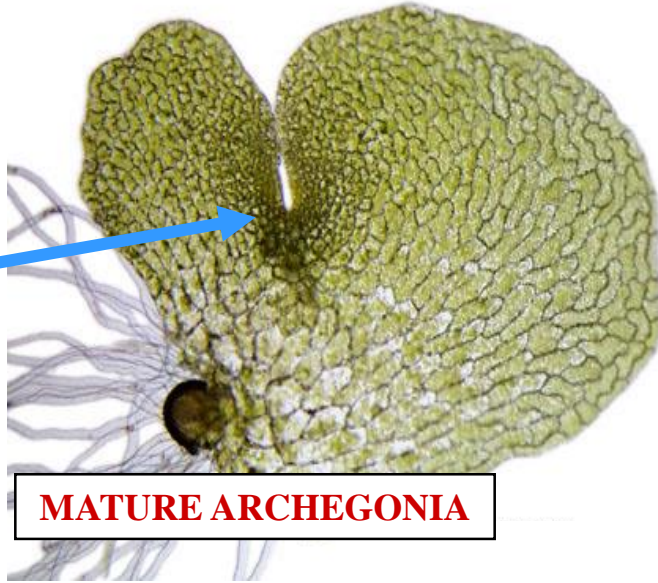
**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



MATURE ANTHERIDIA

1ST GAMETOPHYTE

SYNGAMY



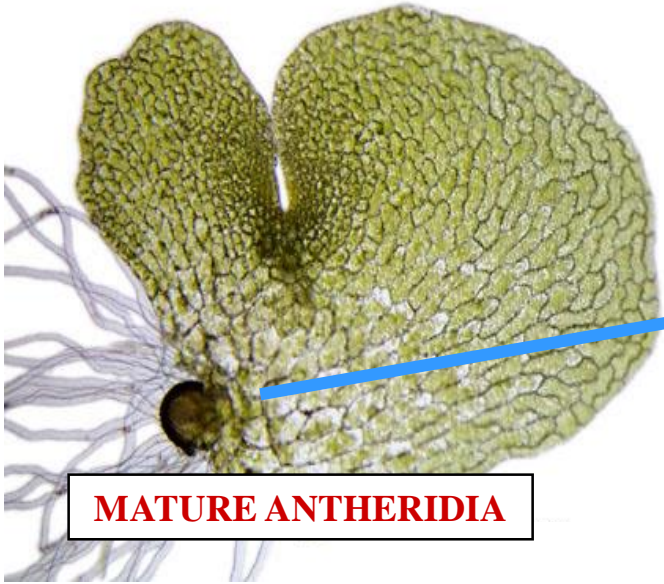
MATURE ARCHEGONIA

2ND GAMETOPHYTE

GAMETANGIA MATURATION: DICHOTOMY



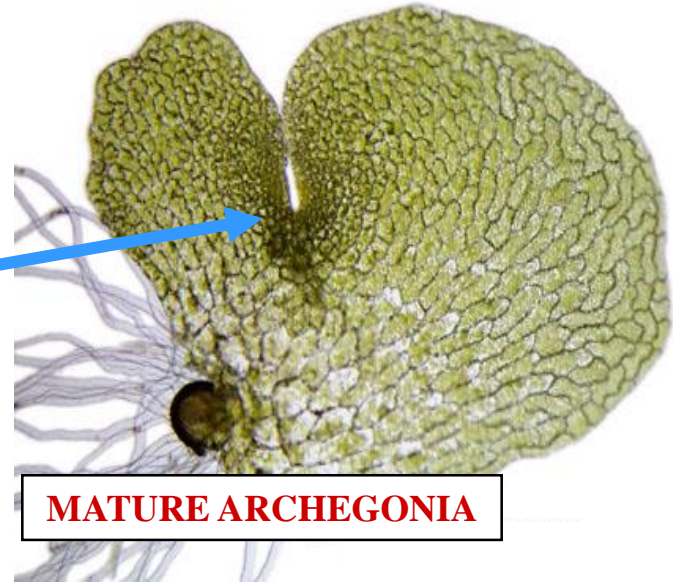
**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



MATURE ANTHERIDIA

1ST GAMETOPHYTE

SYNGAMY



MATURE ARCHEGONIA

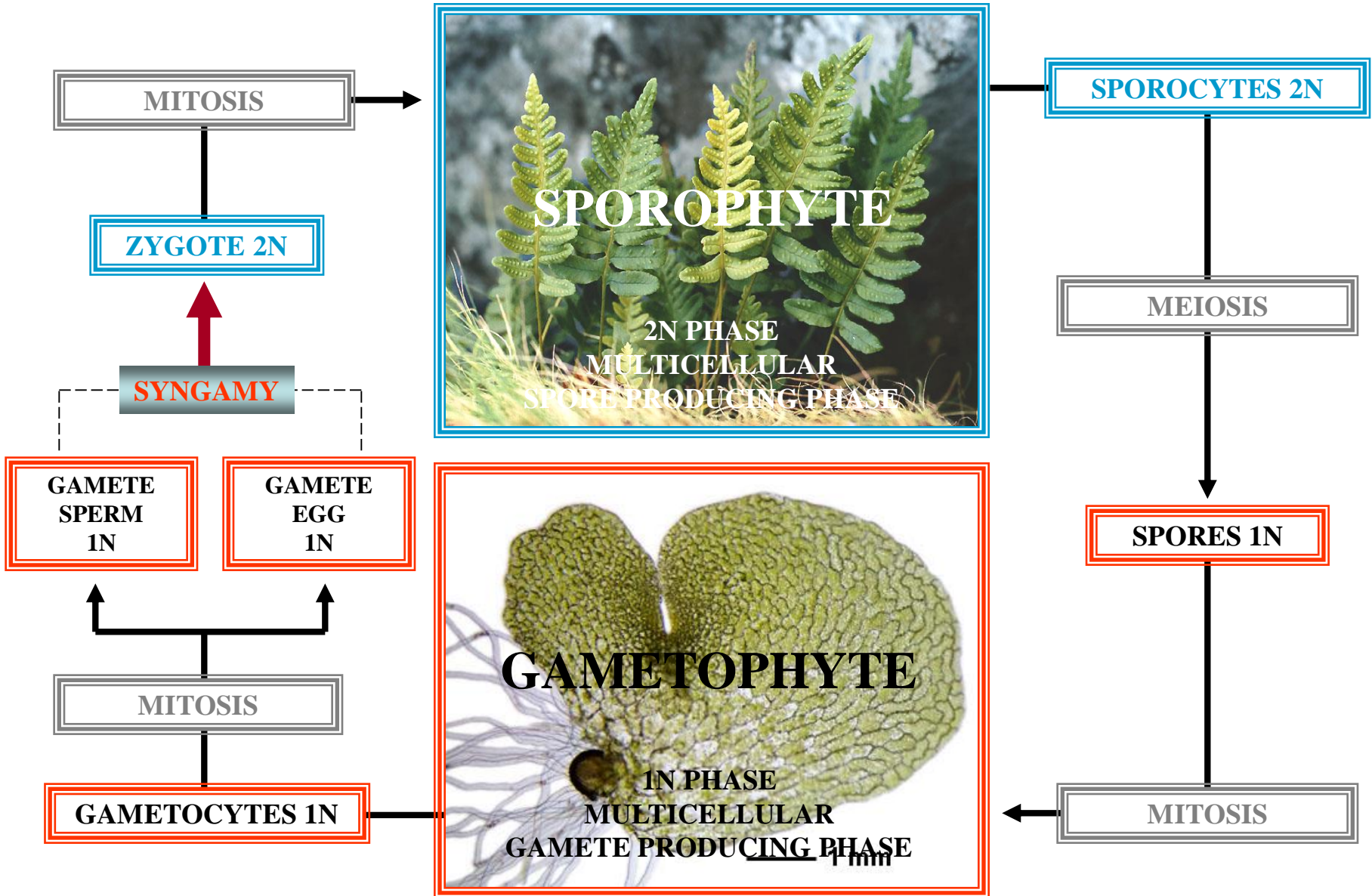
2ND GAMETOPHYTE

**GAMETANGIA MATURATION: DICHOTOMY
ENSURES GAMETOPHYTE “OUT-CROSSING”**



**ENSURES
GENETIC DIVERSITY**

PTERIDALES LIFE CYCLE



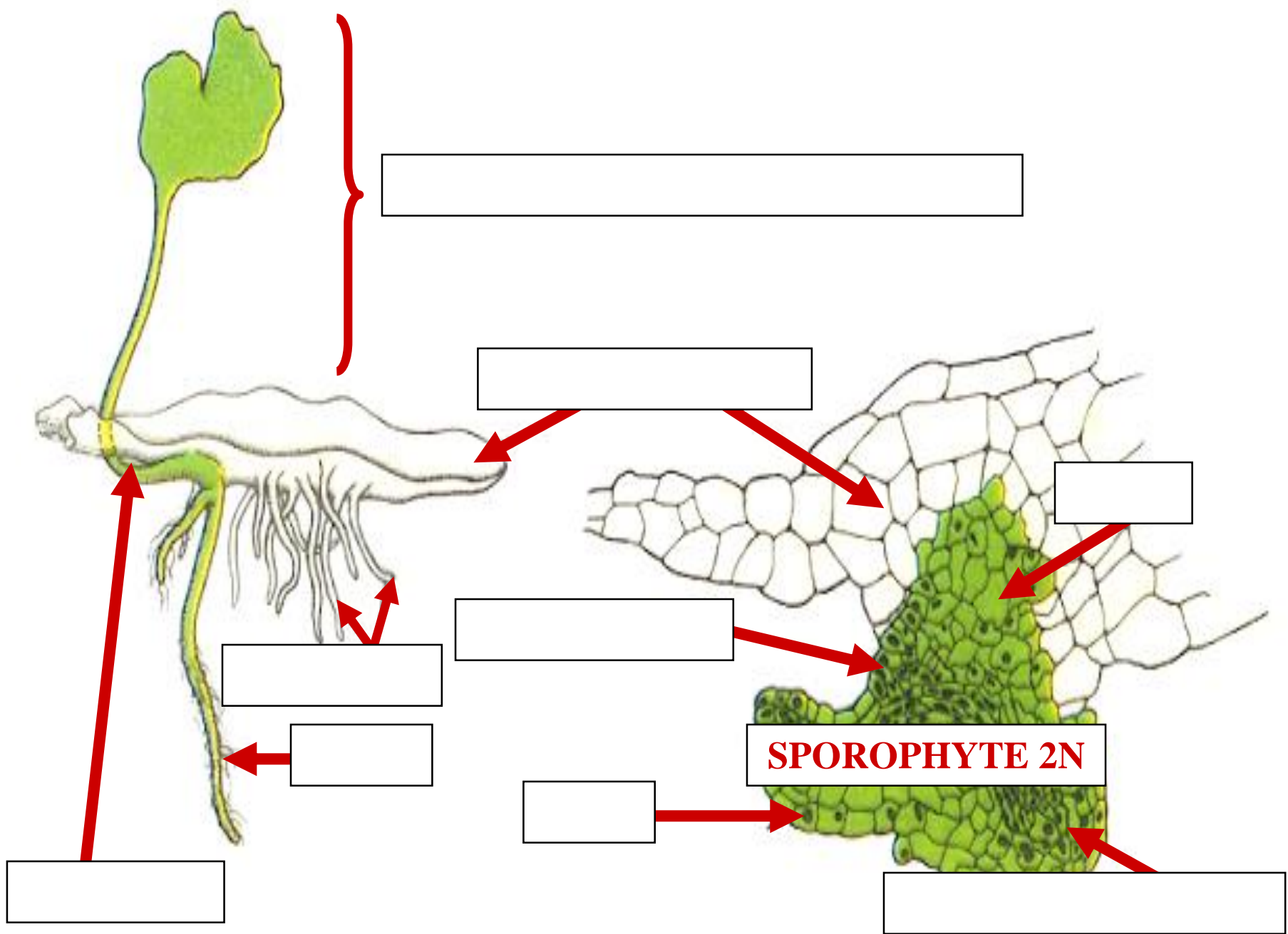


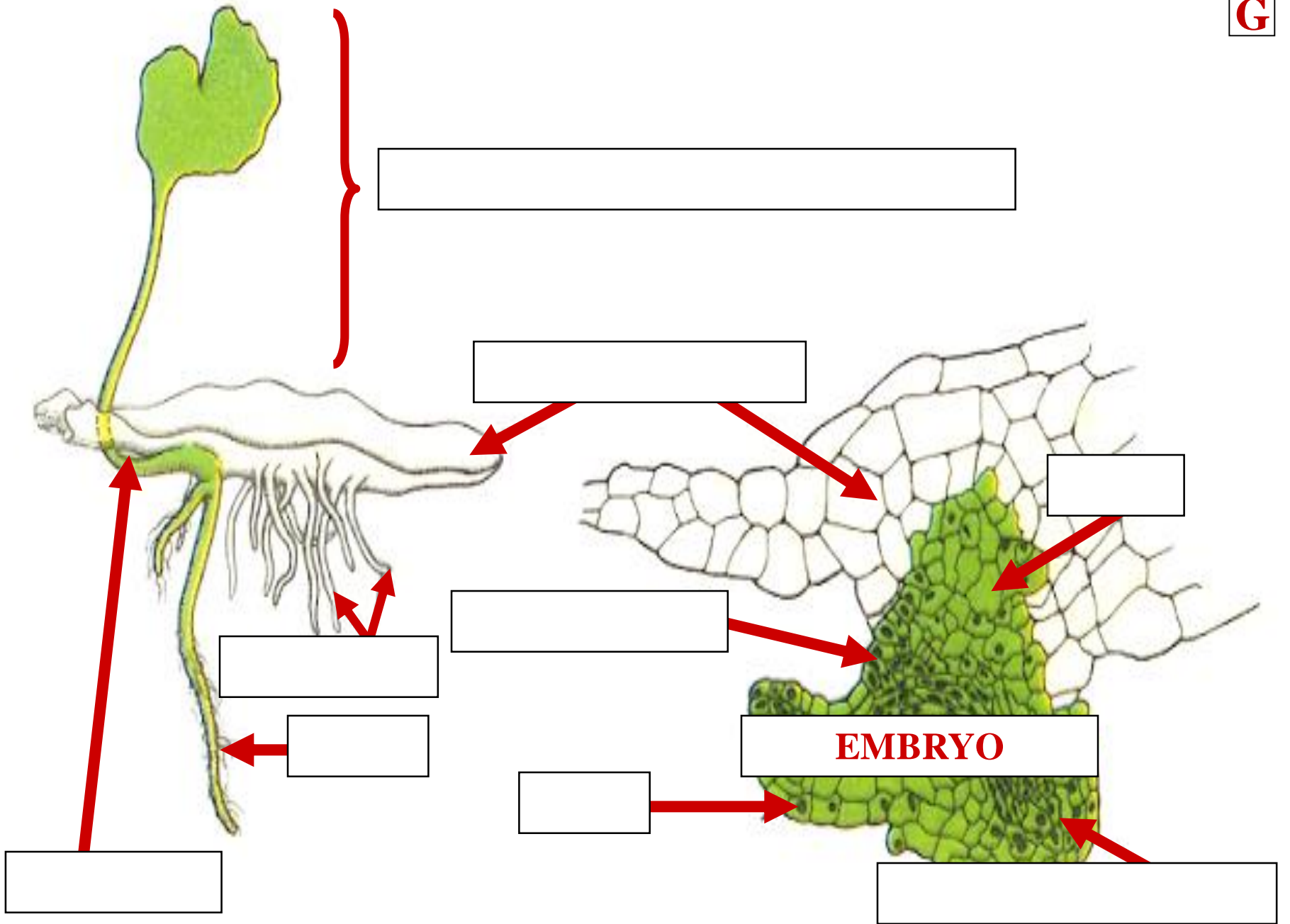
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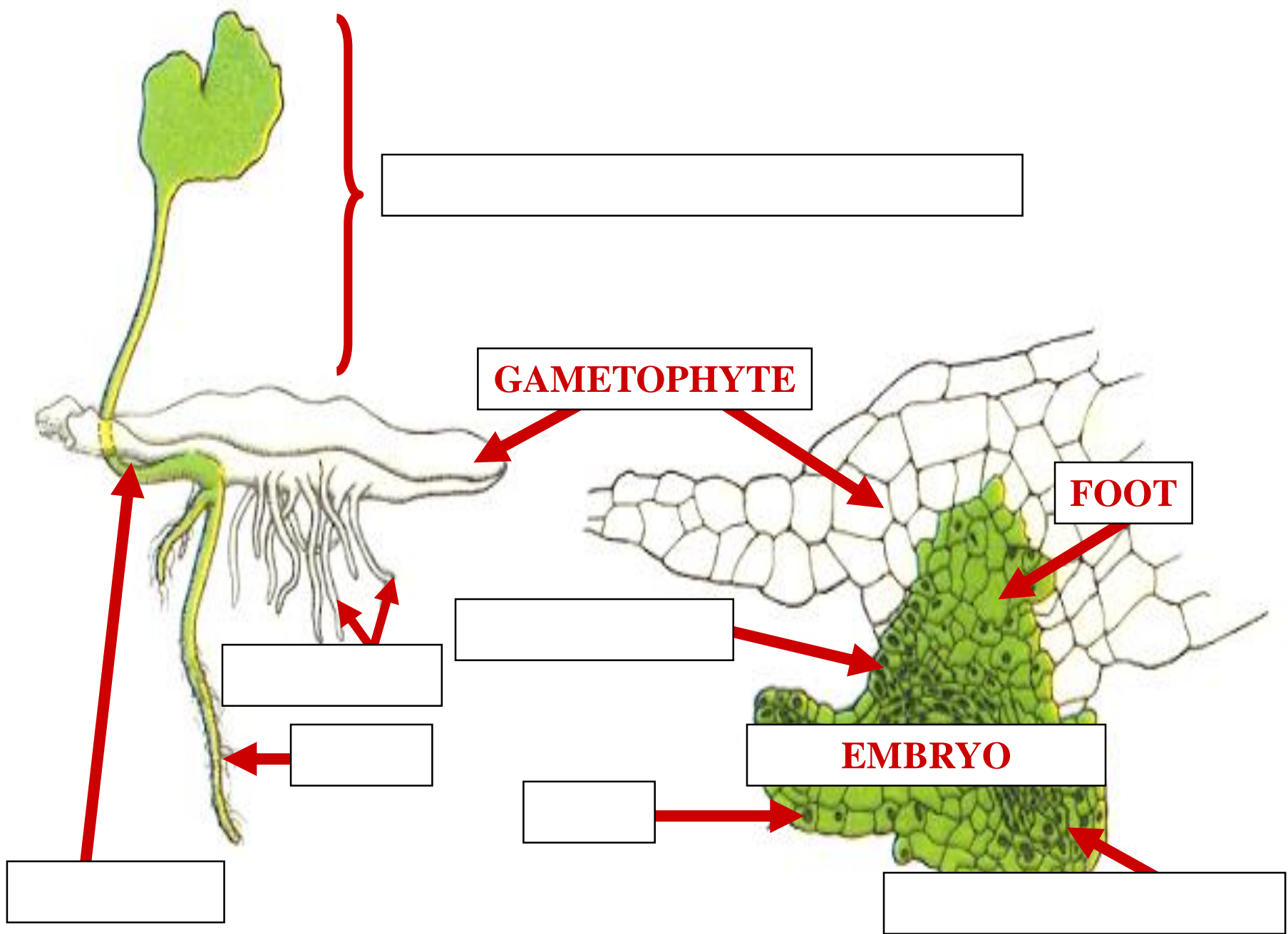
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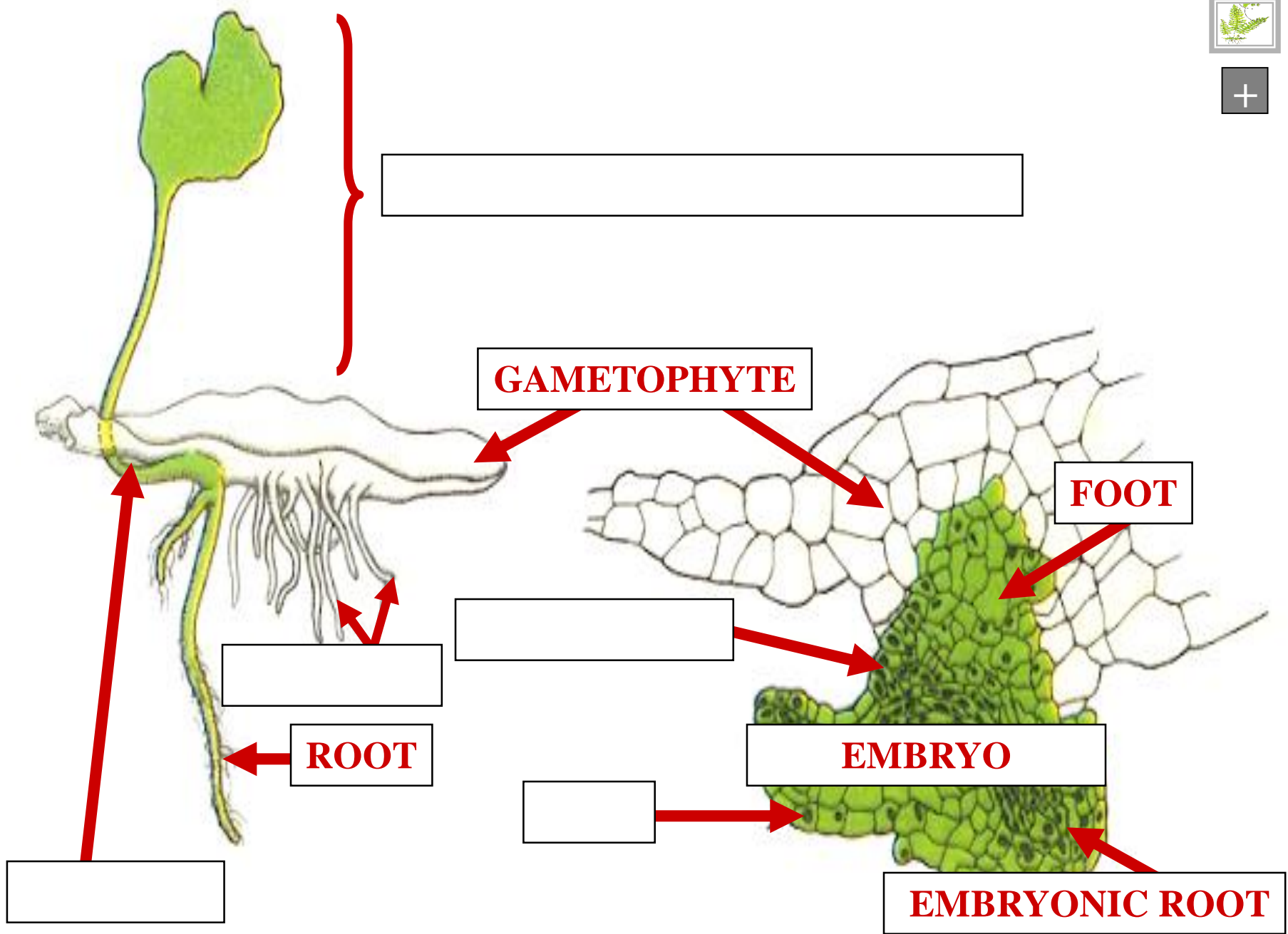
LIFE CYCLE

PAGE 422









GAMETOPHYTE

FOOT

ROOT

EMBRYO

EMBRYONIC ROOT

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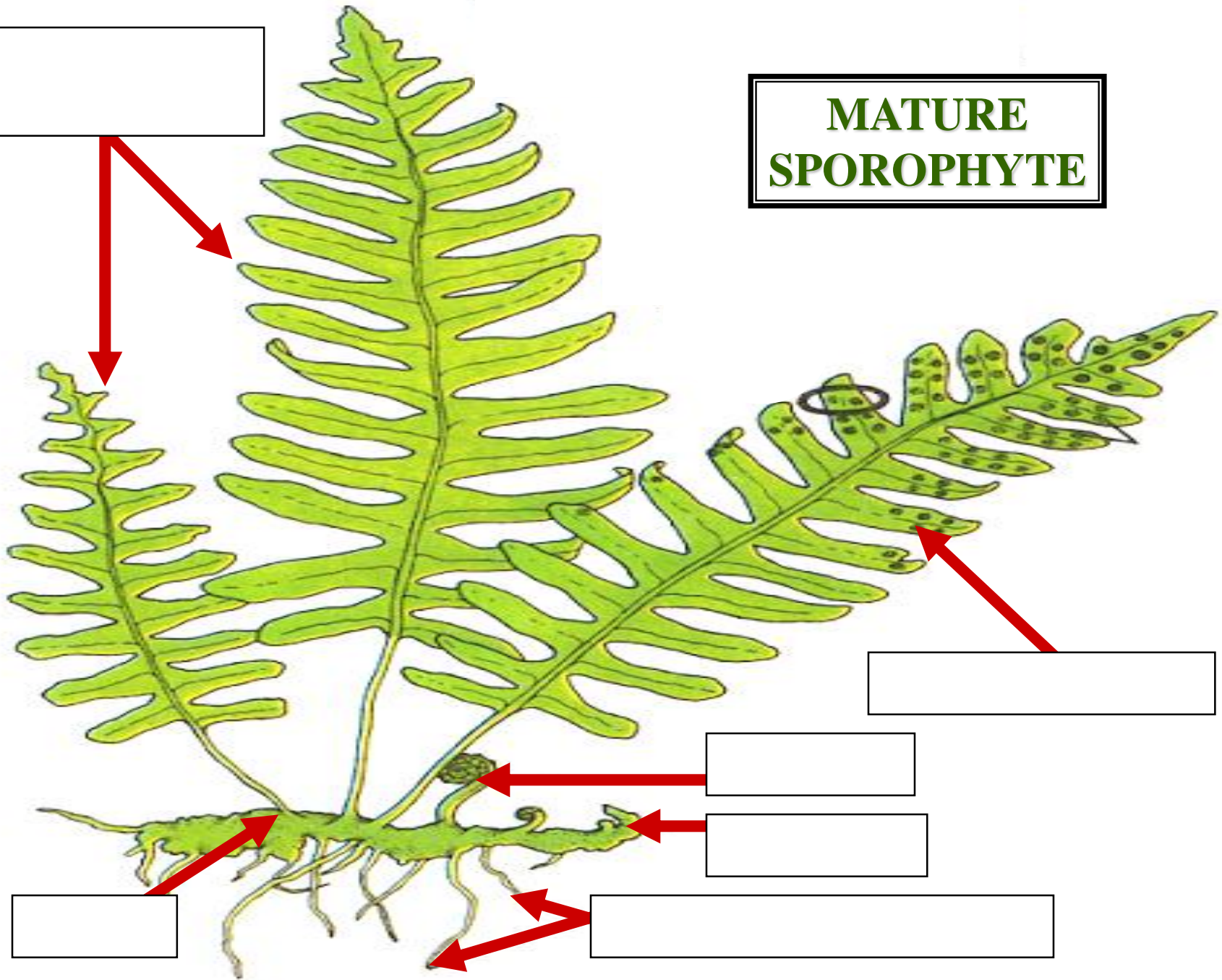
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**MATURE
SPOROPHYTE**

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**MATURE
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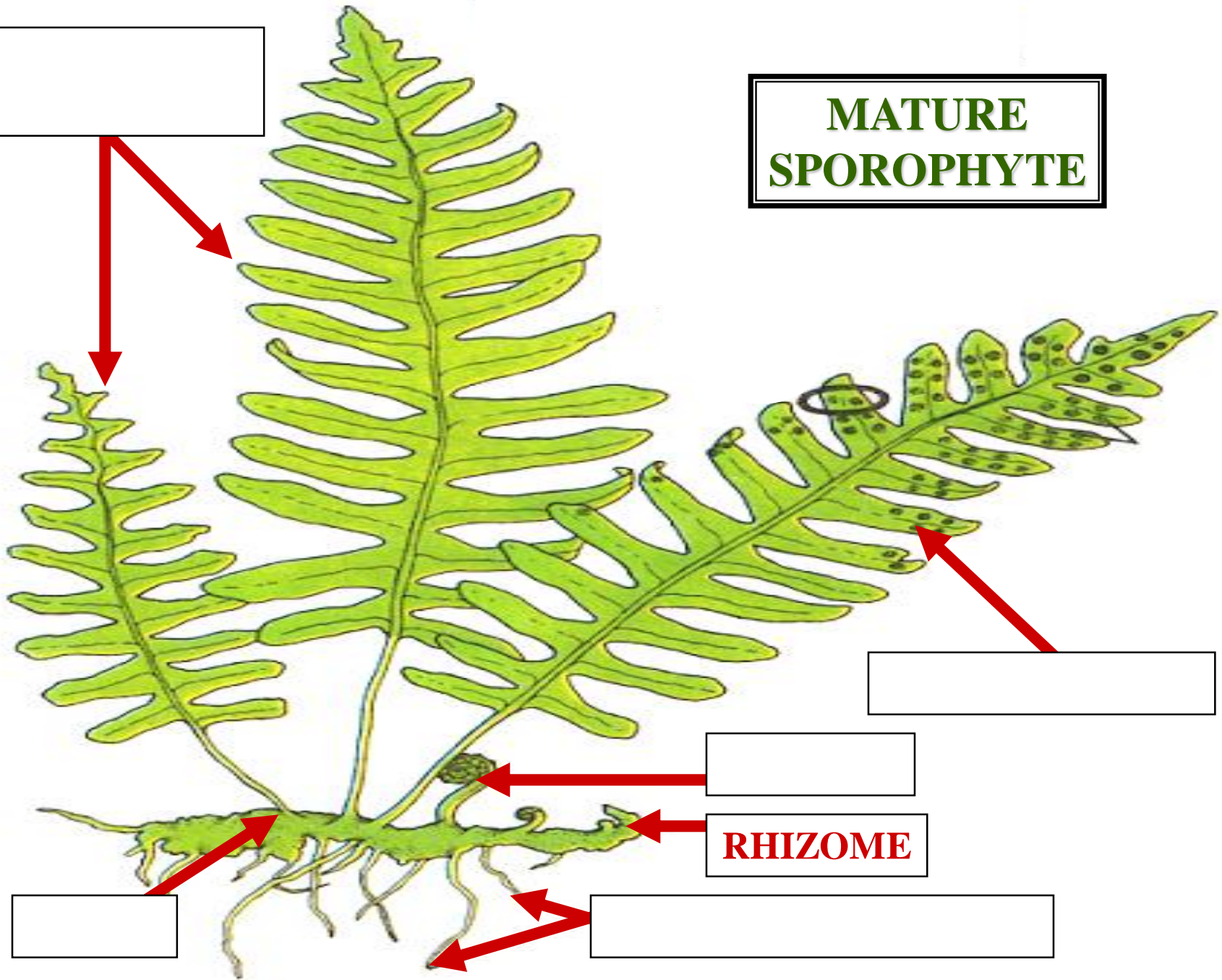
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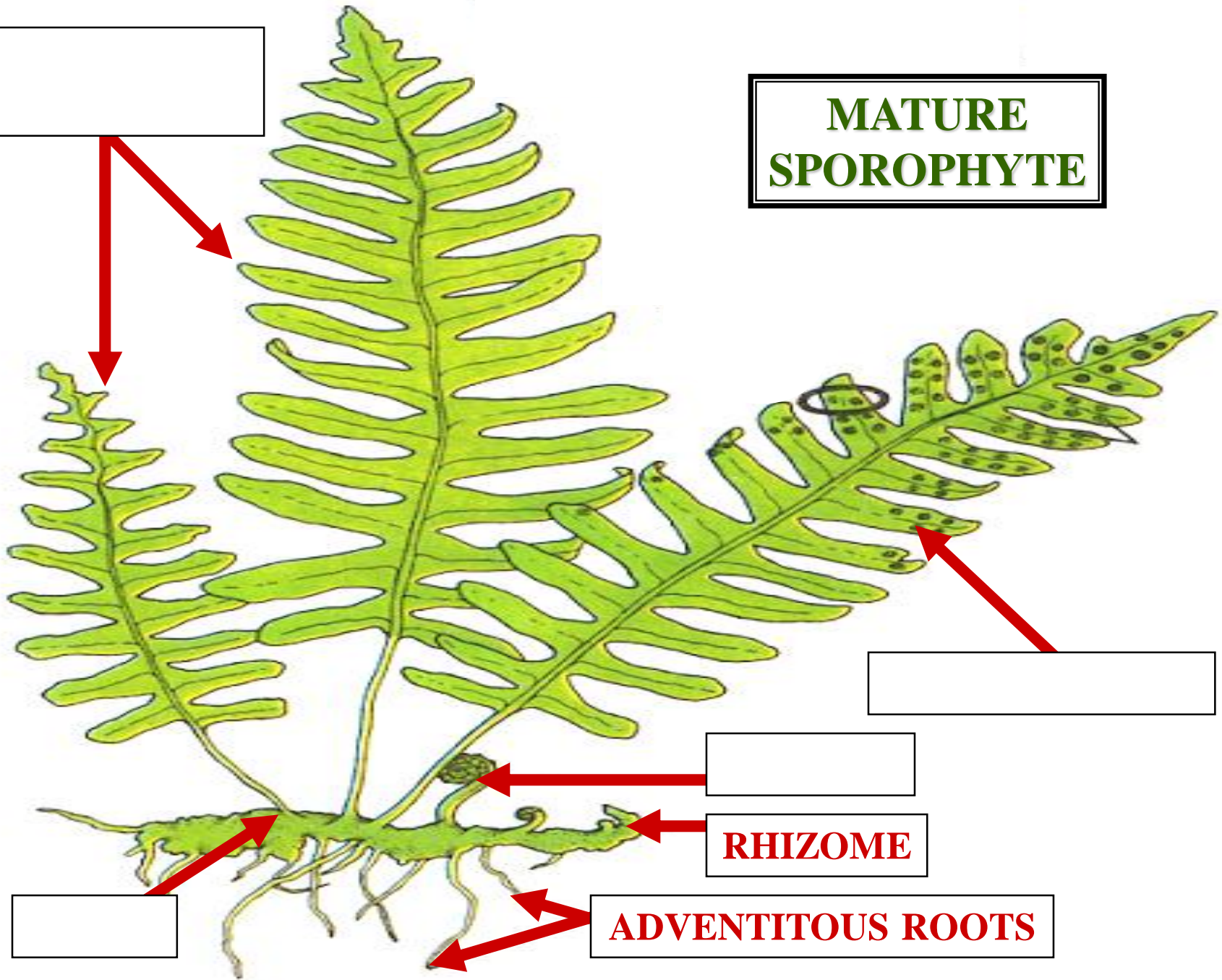
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**MATURE
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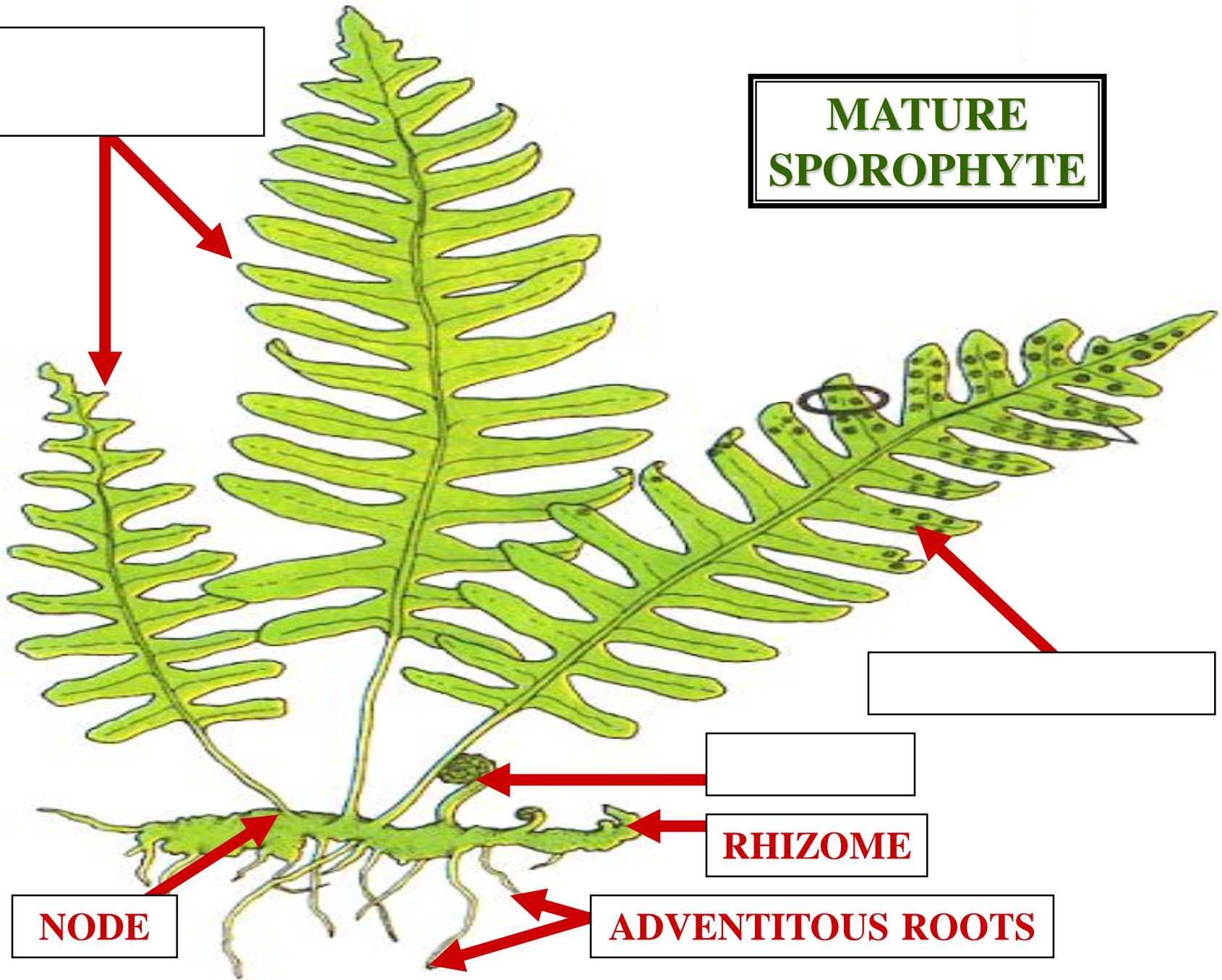
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ADVENTITIOUS ROOTS

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SPOROPHYTE**

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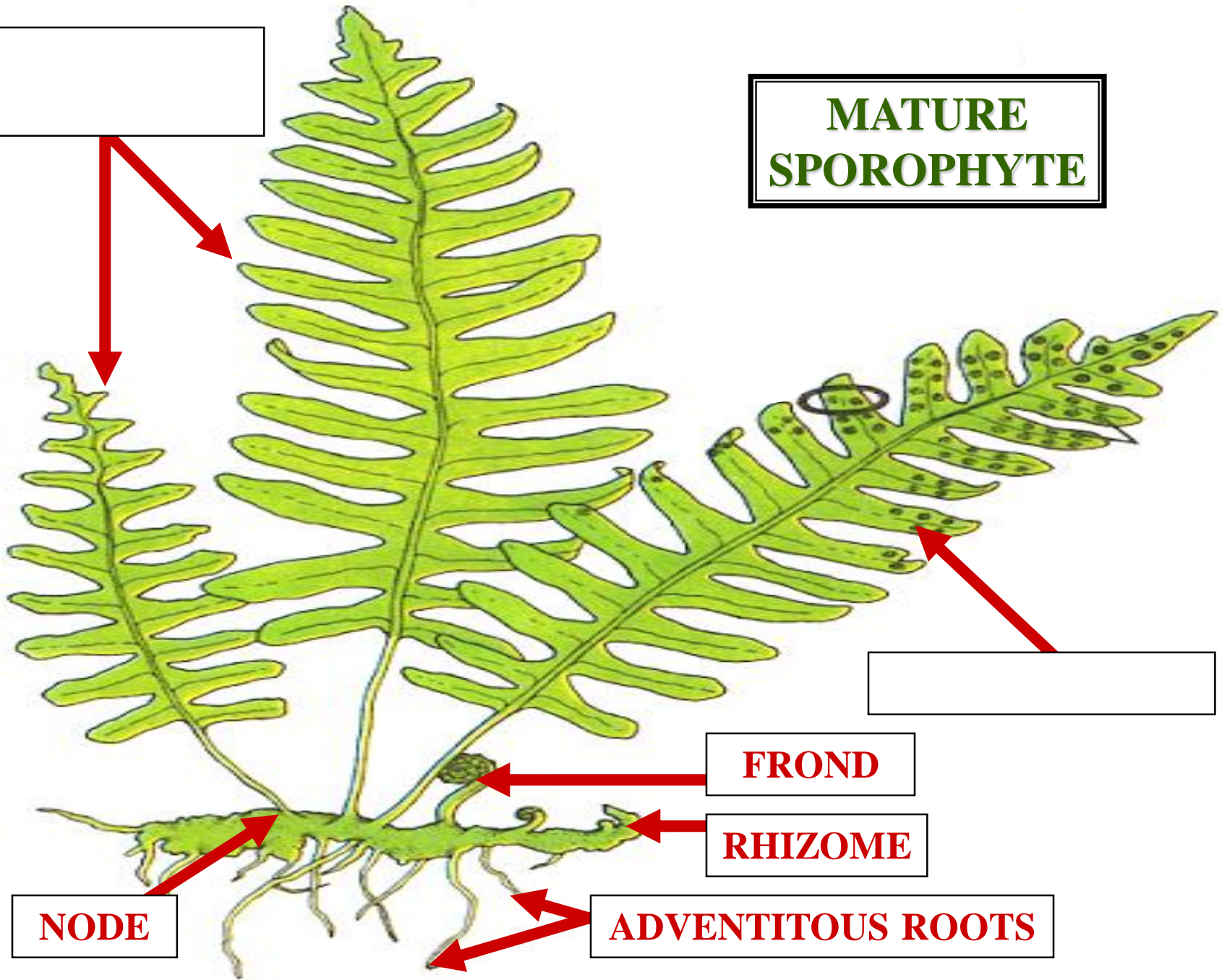
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ADVENTITIOUS ROOTS

**MATURE
SPOROPHYTE**

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FROND

RHIZOME

NODE

ADVENTITIOUS ROOTS

**MATURE
SPOROPHYTE**

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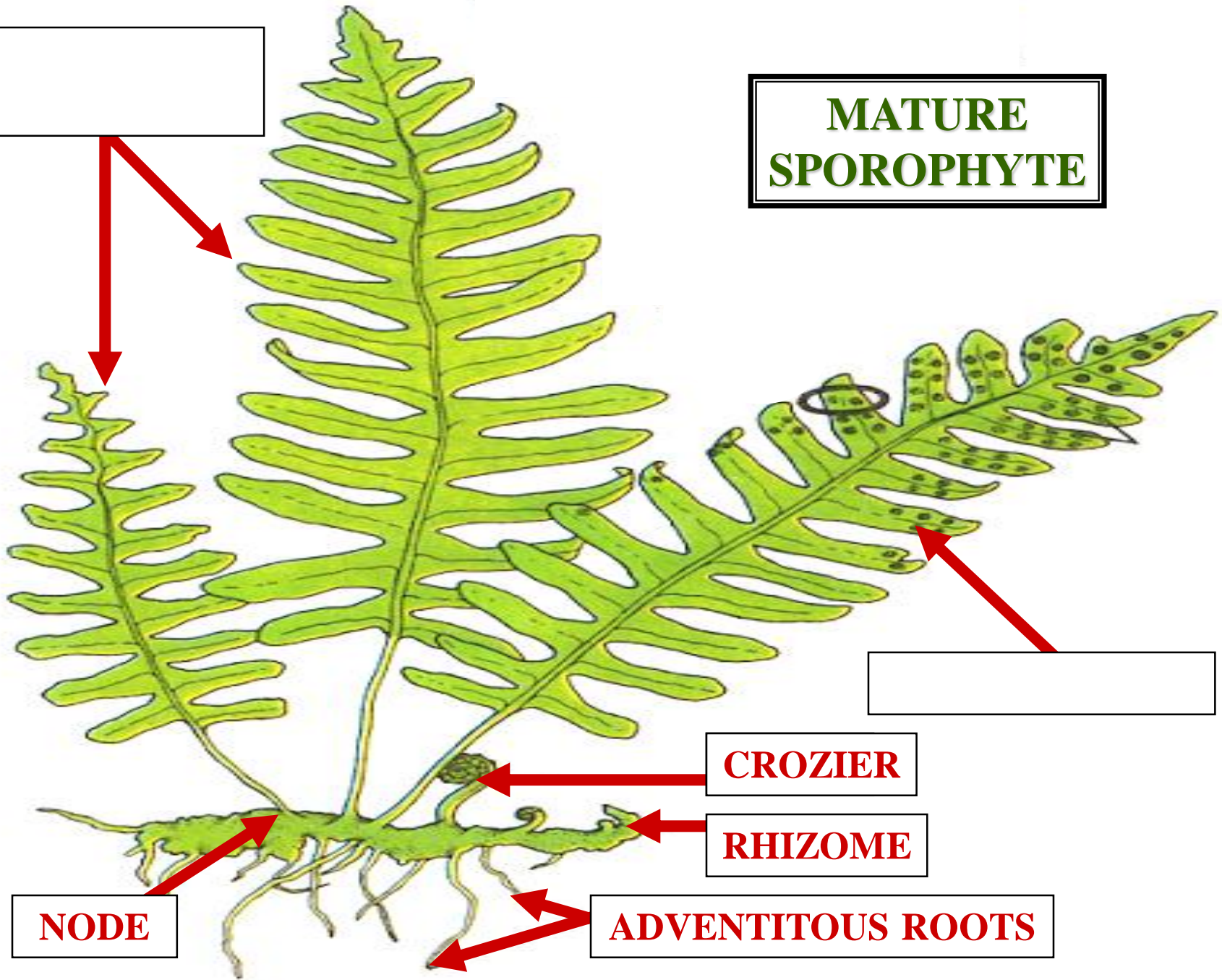
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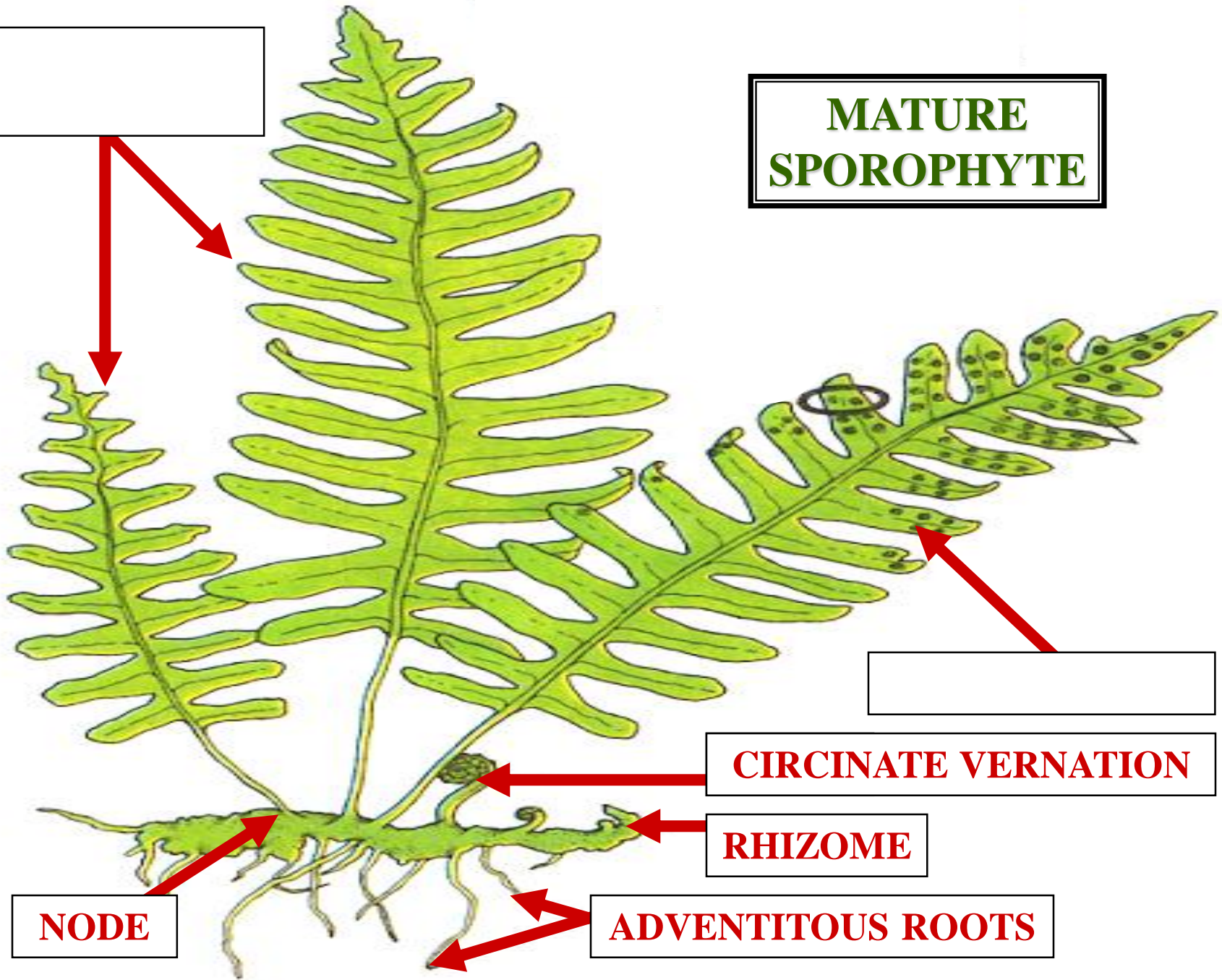
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ADVENTITIOUS ROOTS



**MATURE
SPOROPHYTE**

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CIRCINATE VERNATION

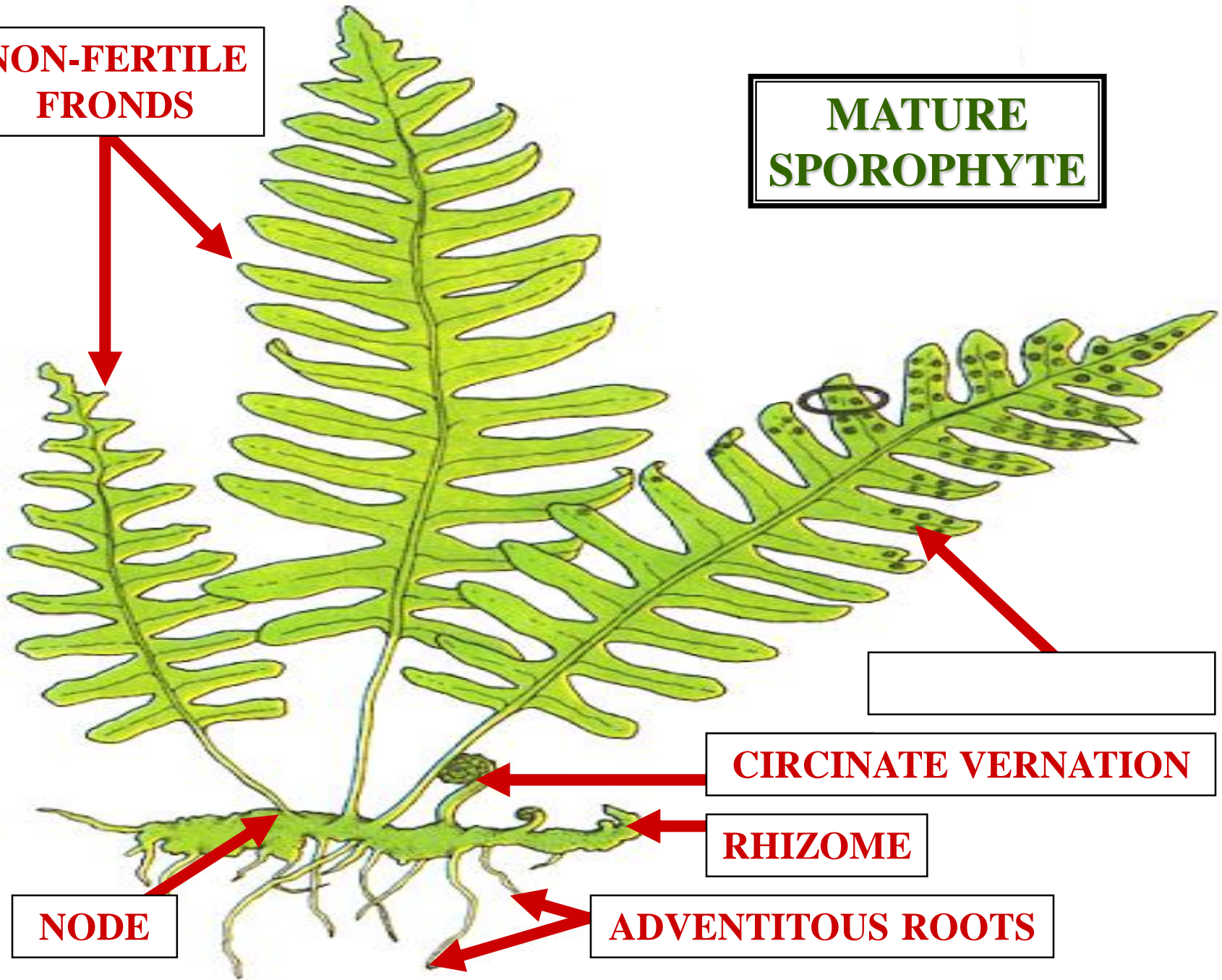
RHIZOME

NODE

ADVENTITIOUS ROOTS

**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**



CIRCINATE VERNATION

RHIZOME

NODE

ADVENTITIOUS ROOTS

**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**

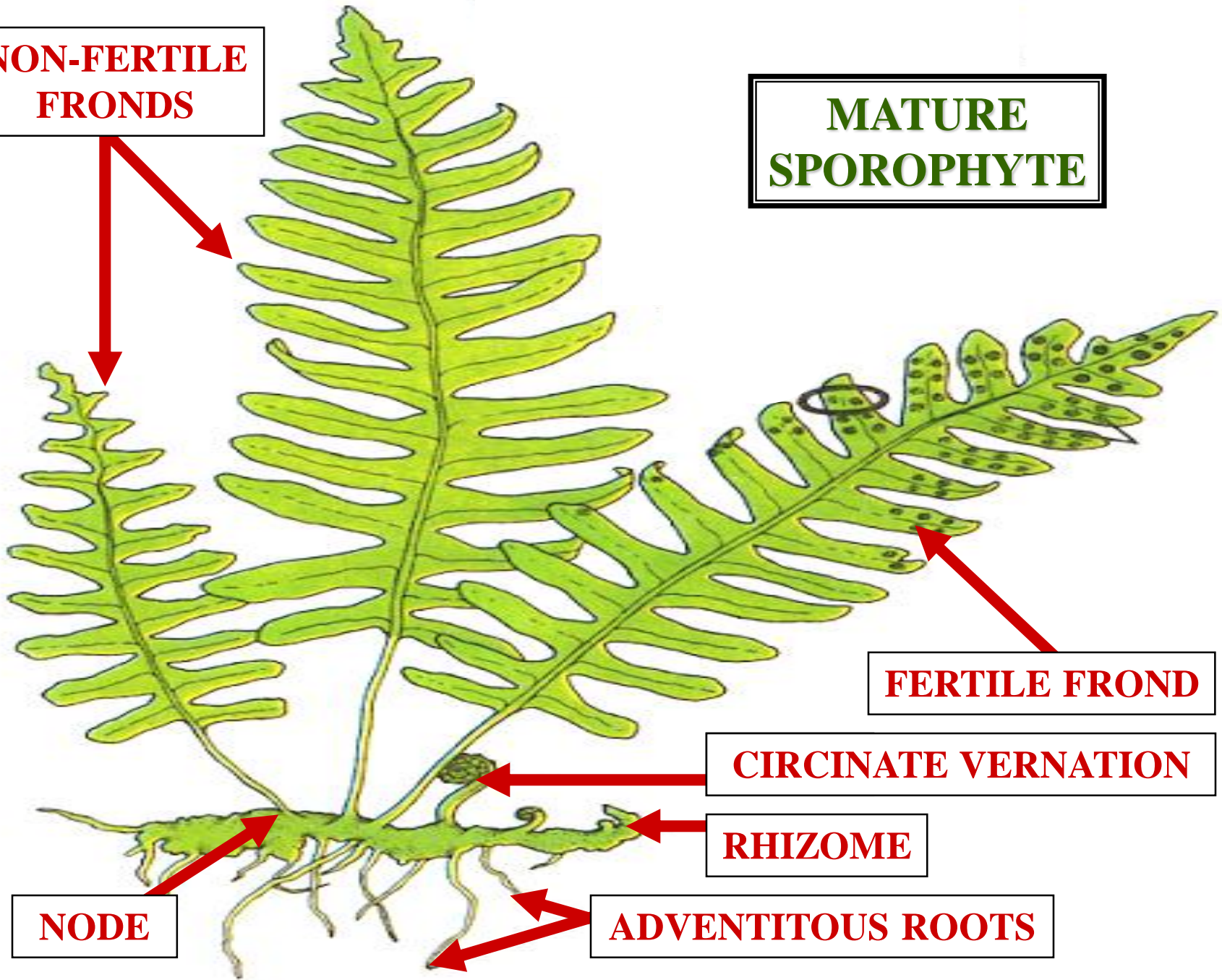
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CIRCINATE VERNATION

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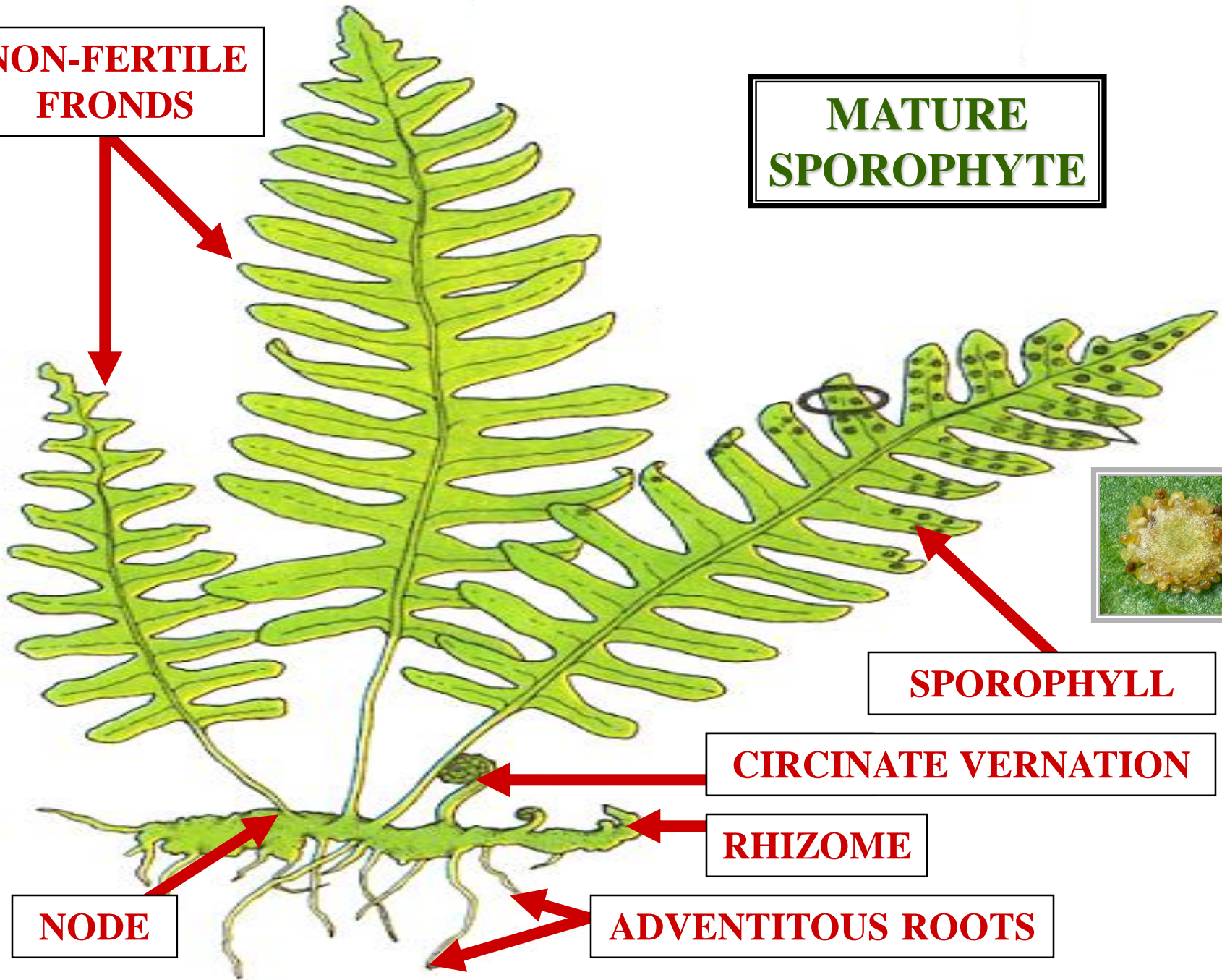
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ADVENTITIOUS ROOTS



**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**



SPOROPHYLL

CIRCINATE VERNATION

RHIZOME

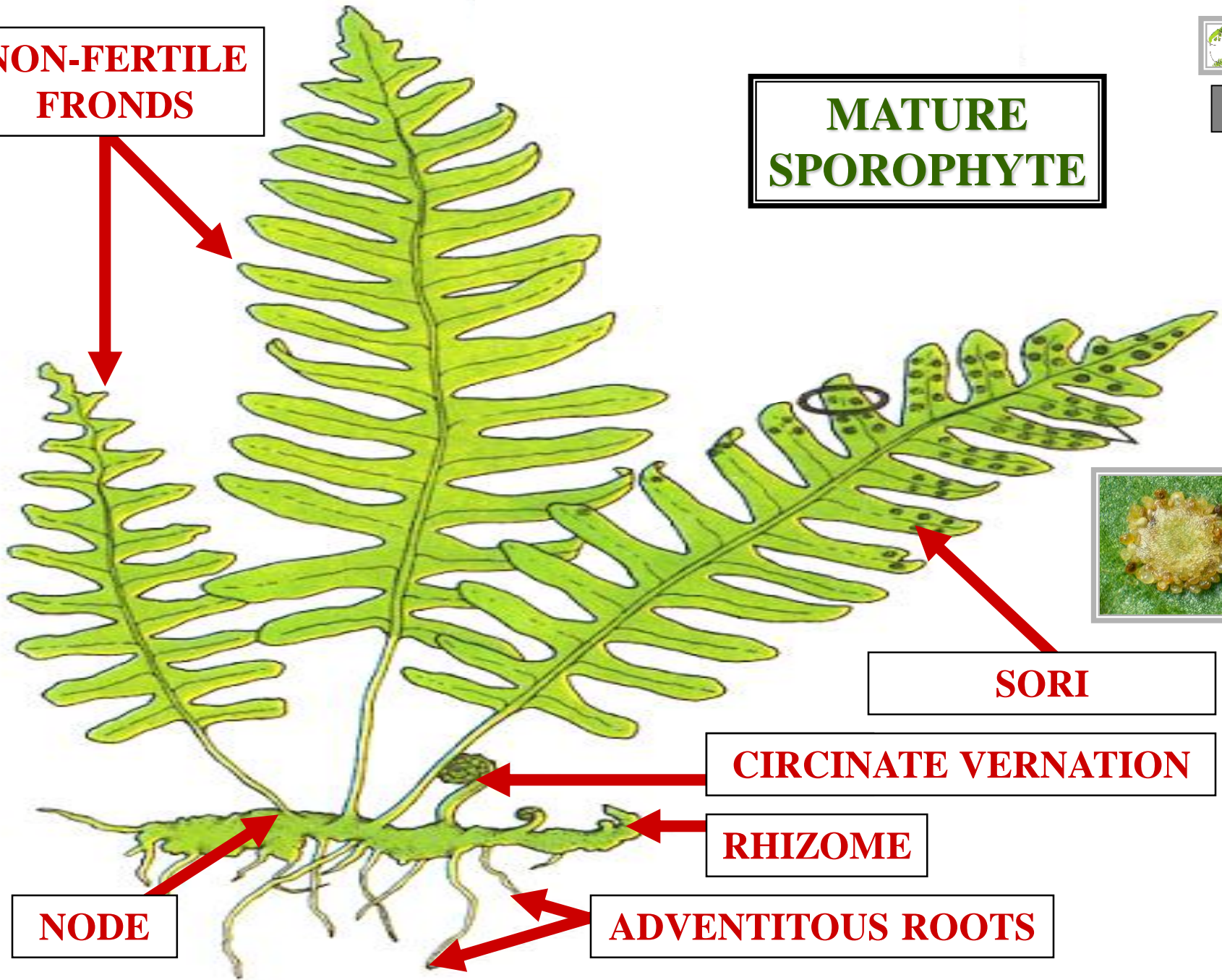
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ADVENTITIOUS ROOTS



NON-FERTILE FRONDS

MATURE SPOROPHYTE



SORI

CIRCINATE VERNATION

RHIZOME

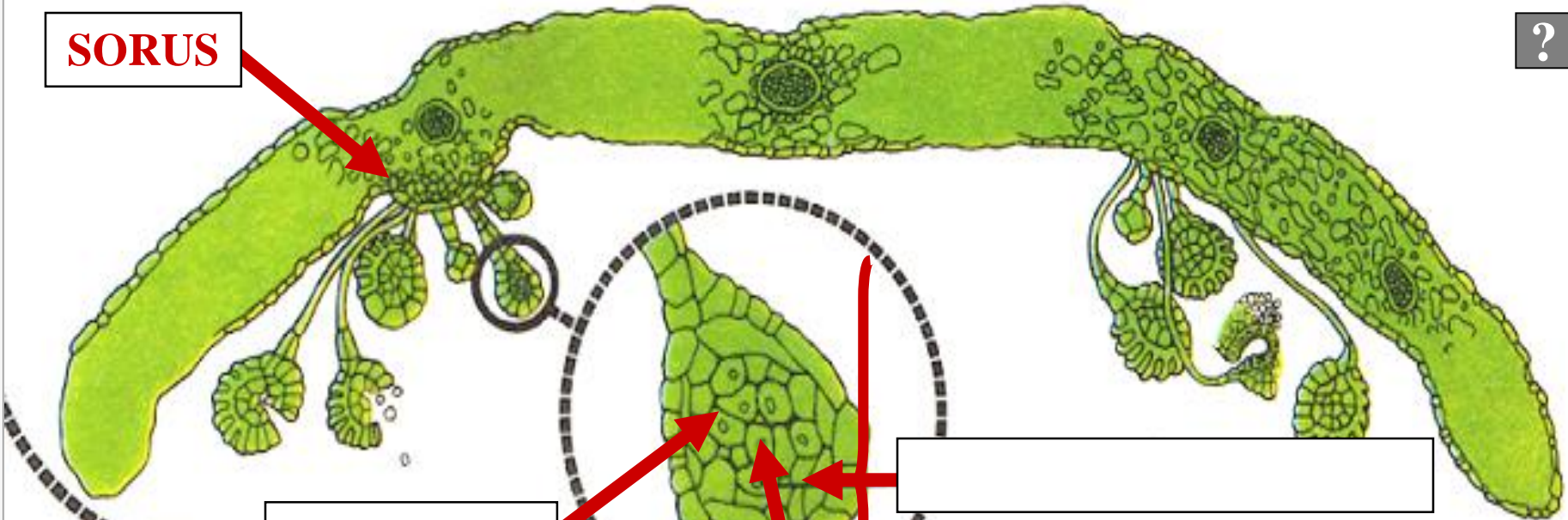
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ADVENTITIOUS ROOTS



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SORUS



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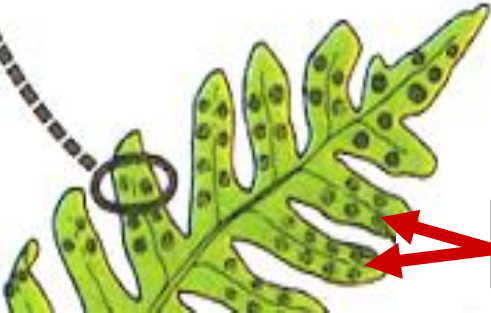
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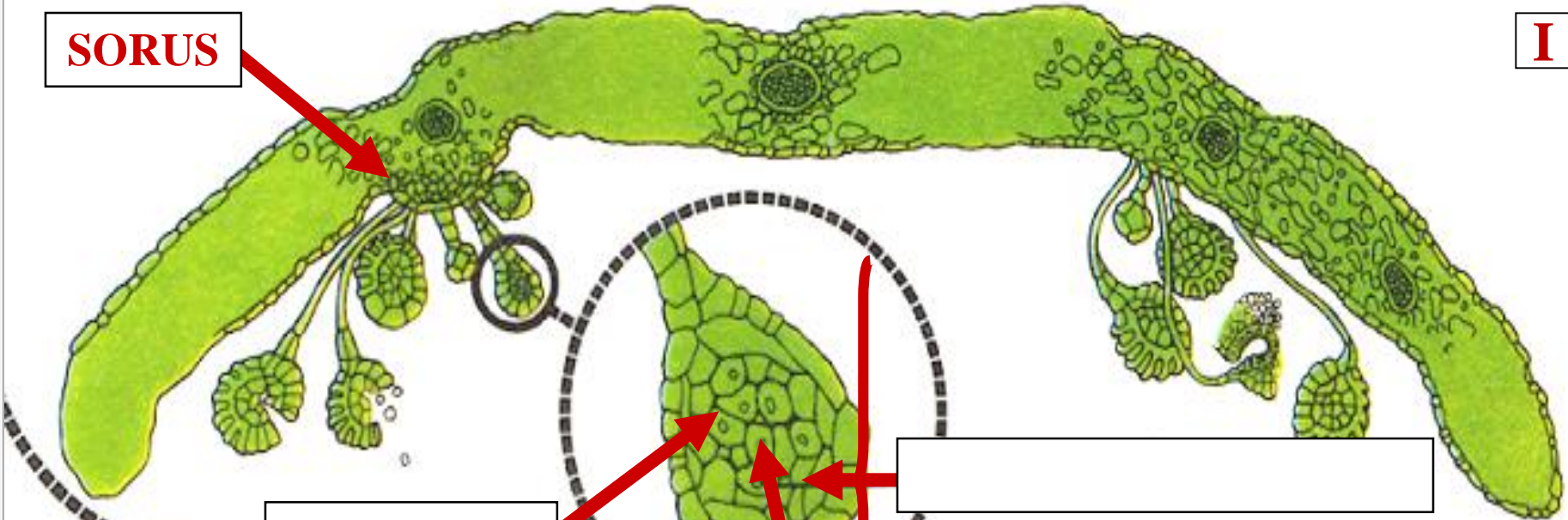
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**MATURE
SPOROPHYTE**

SORI



SORUS



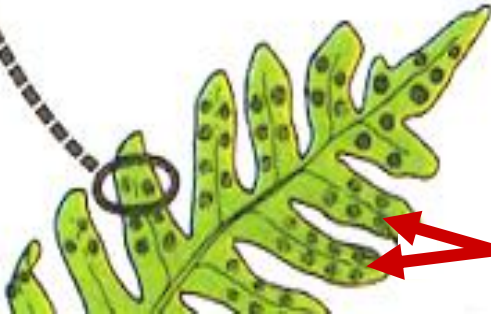
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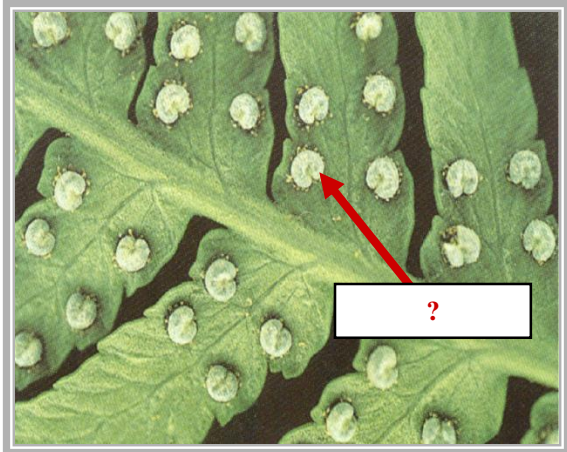
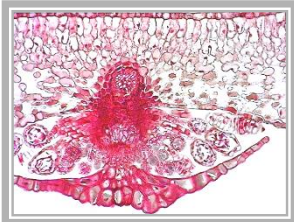
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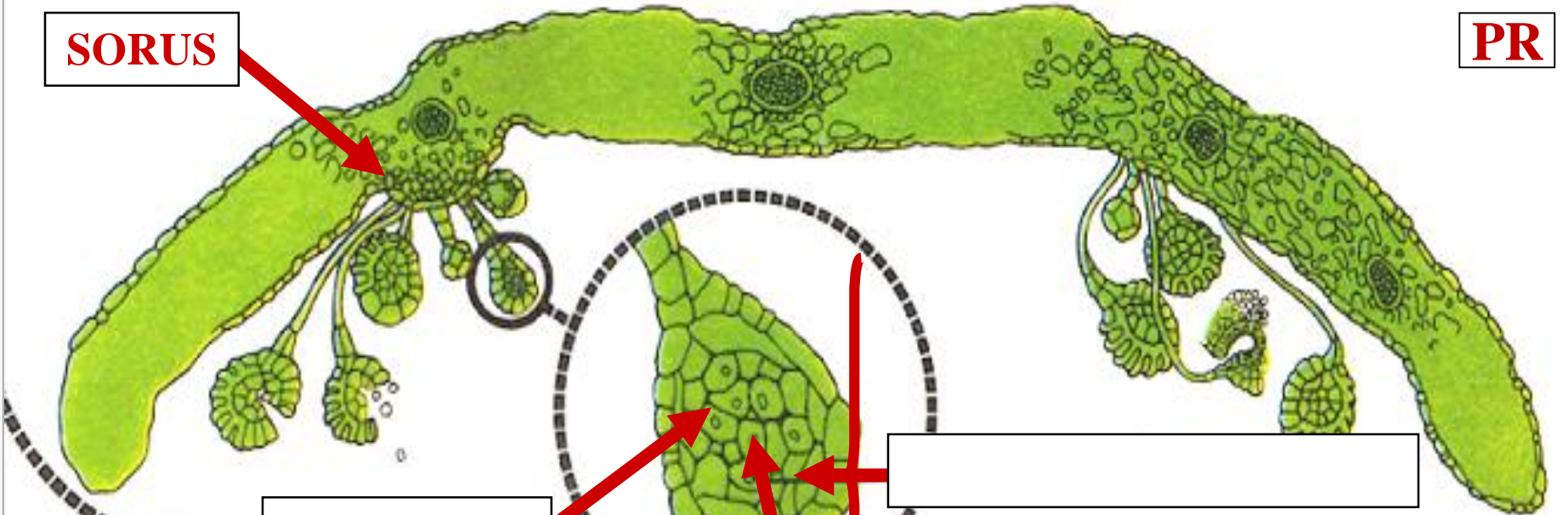
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SORUS

PR



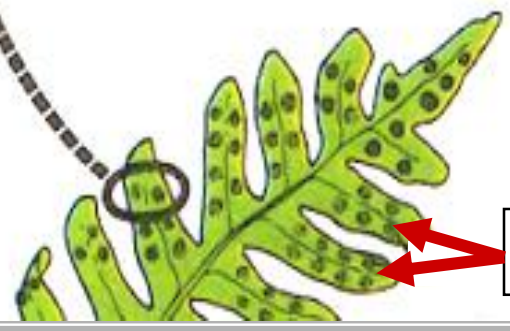
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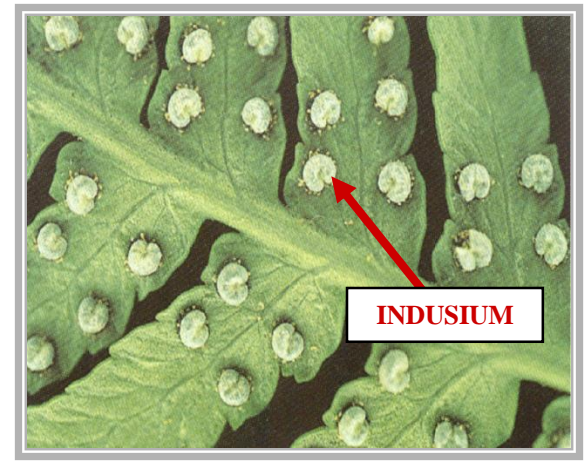
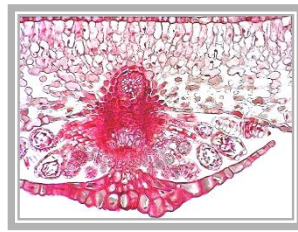
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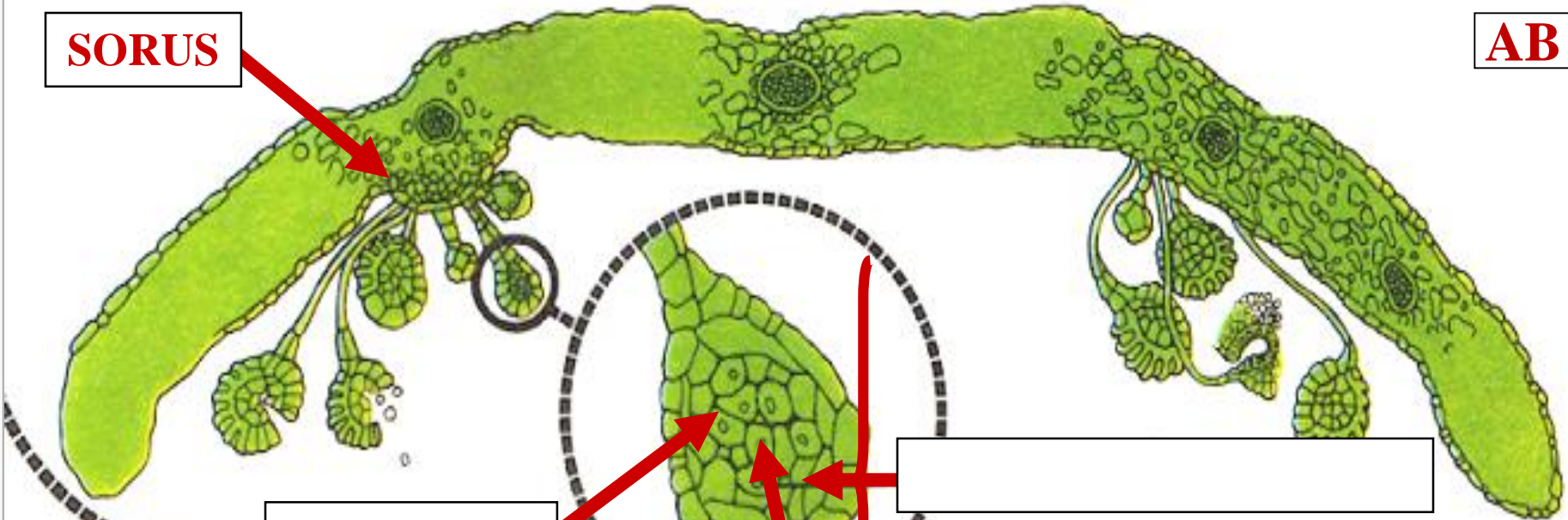
SORI



INDUSIUM

SORUS

AB



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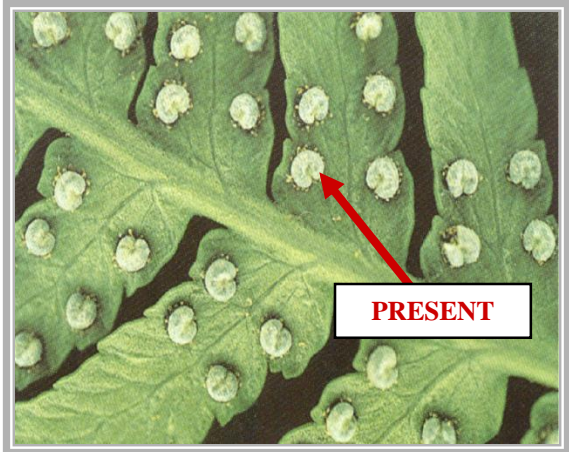
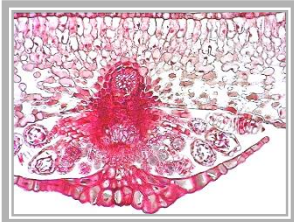
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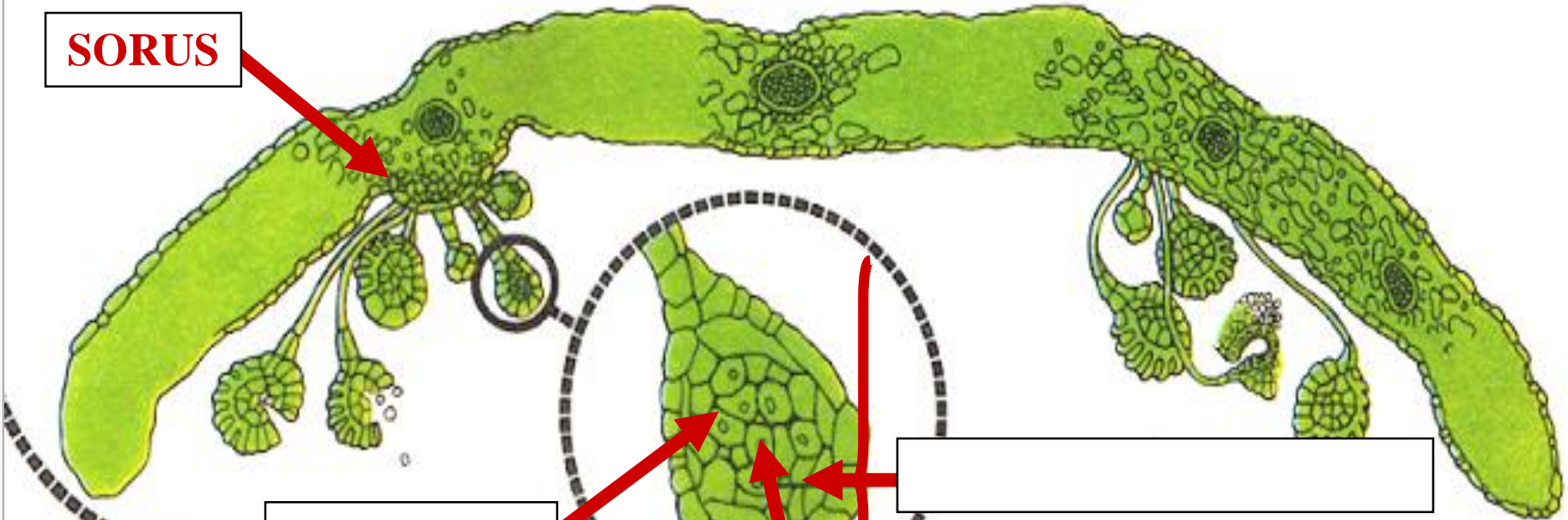


SORI



PRESENT

SORUS



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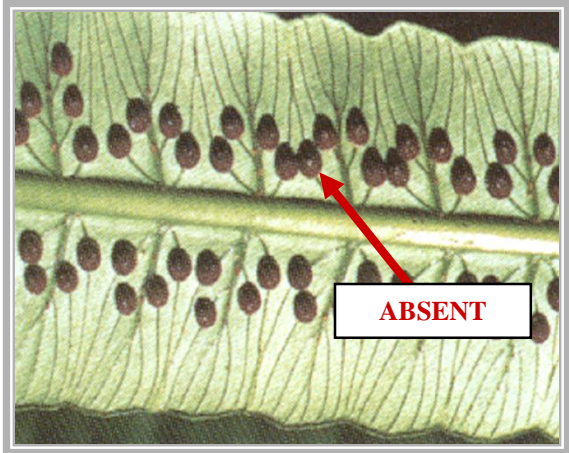
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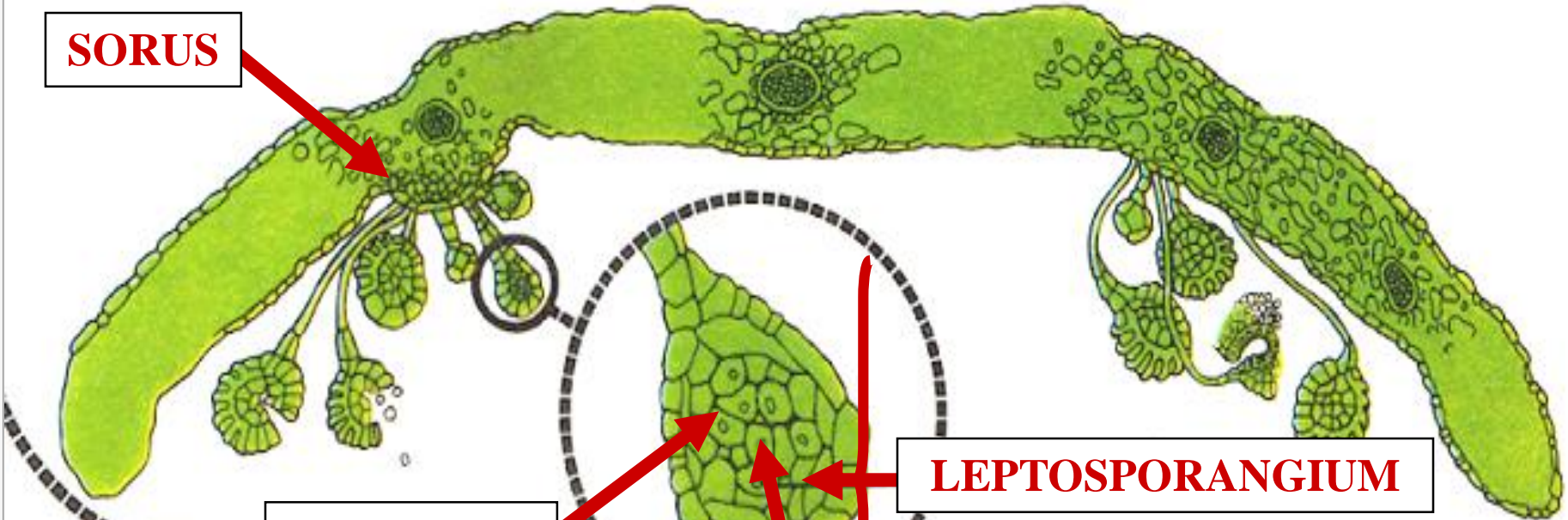


SORI



ABSENT

SORUS



LEPTOSPORANGIUM

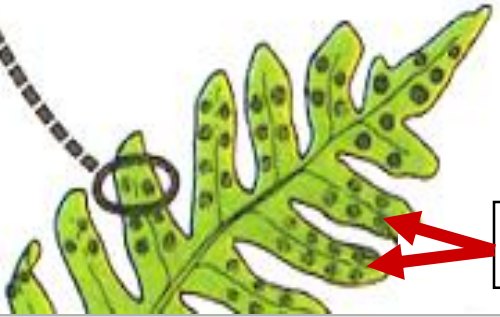
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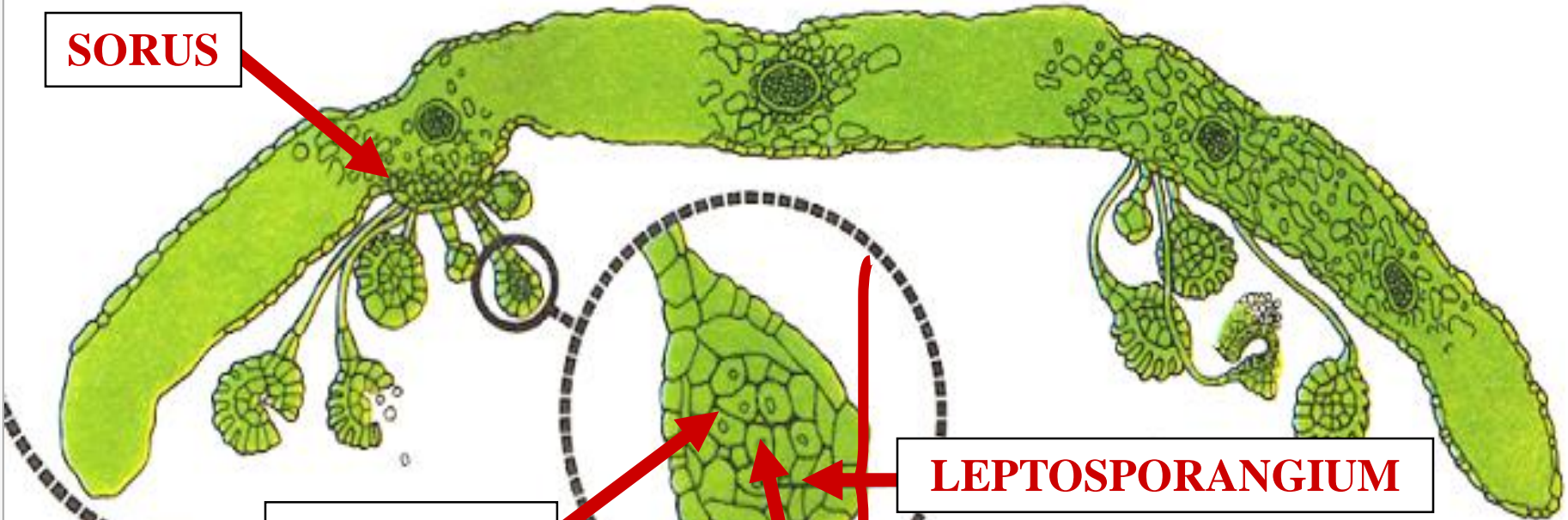
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**MATURE
SPOROPHYTE**



SORI

SORUS



LEPTOSPORANGIUM

ABAXIAL SURFACE

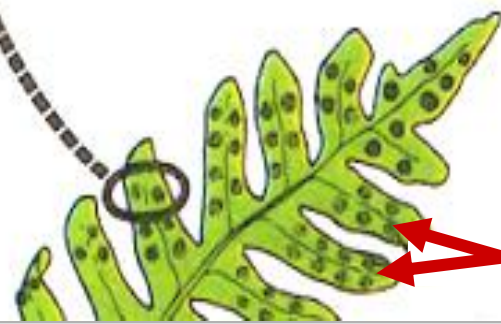
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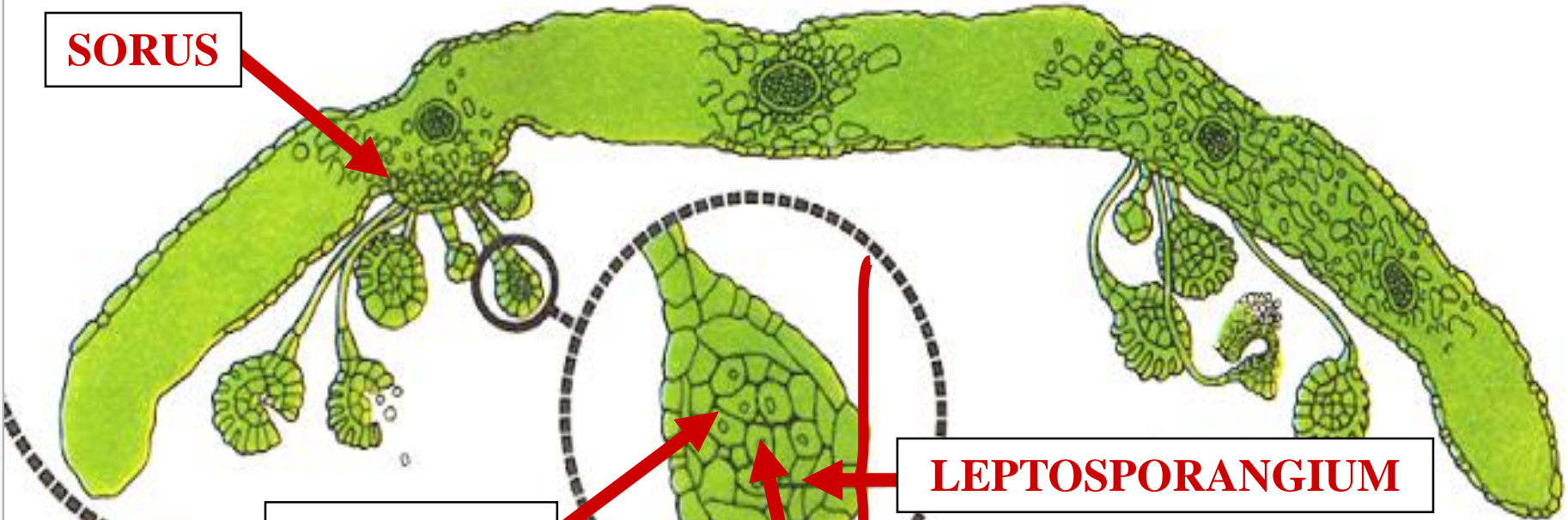
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MATURE SPOROPHYTE

SORI



SORUS



LEPTOSPORANGIUM

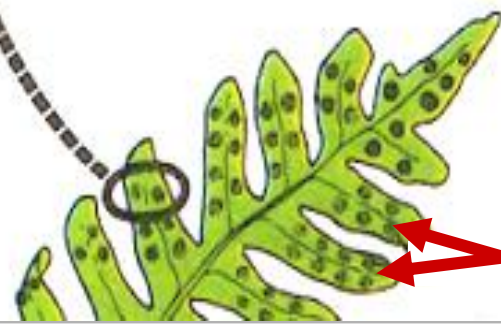
ABAXIAL SURFACE

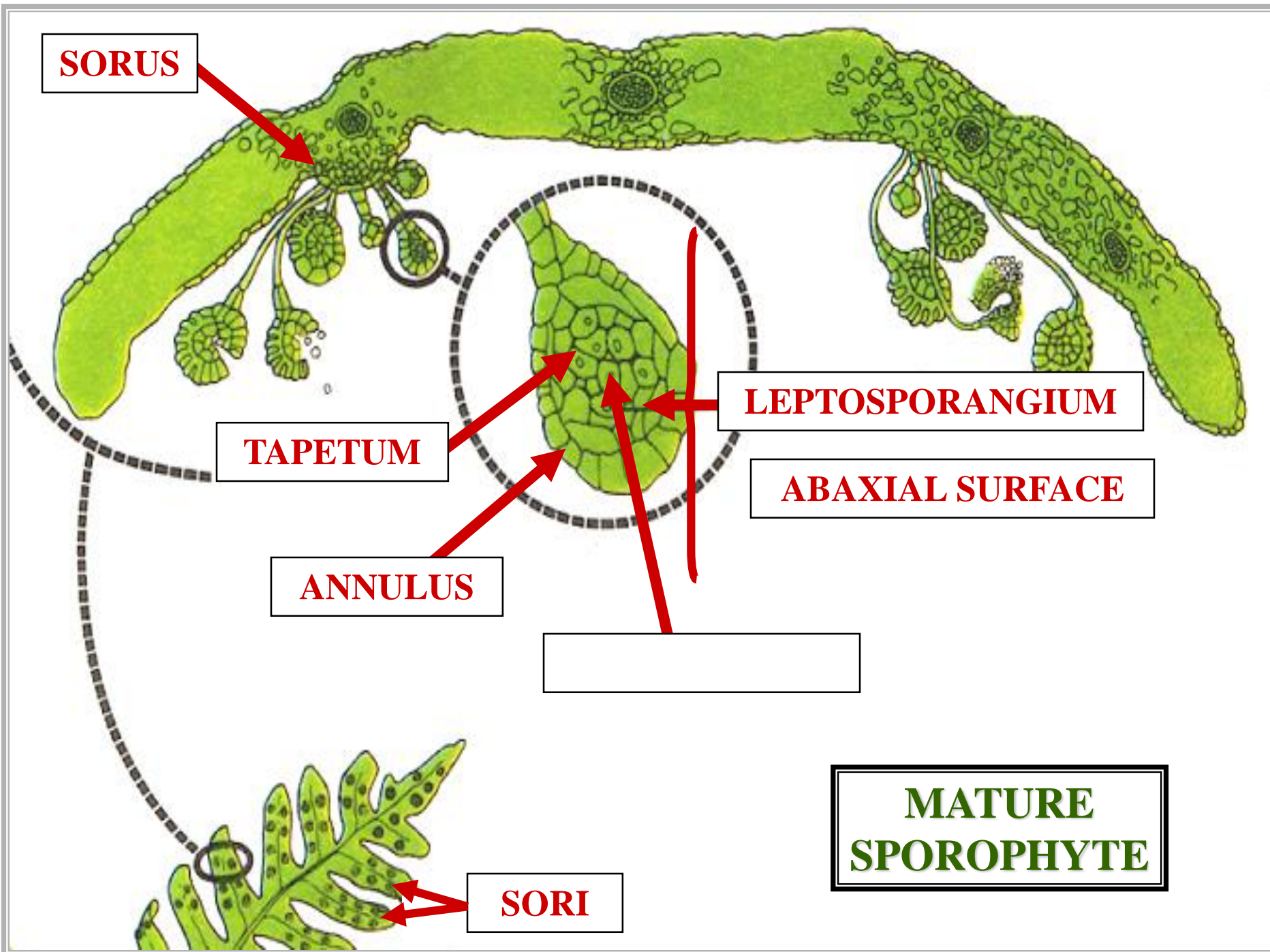
ANNULUS



MATURE SPOROPHYTE

SORI





SORUS

TAPETUM

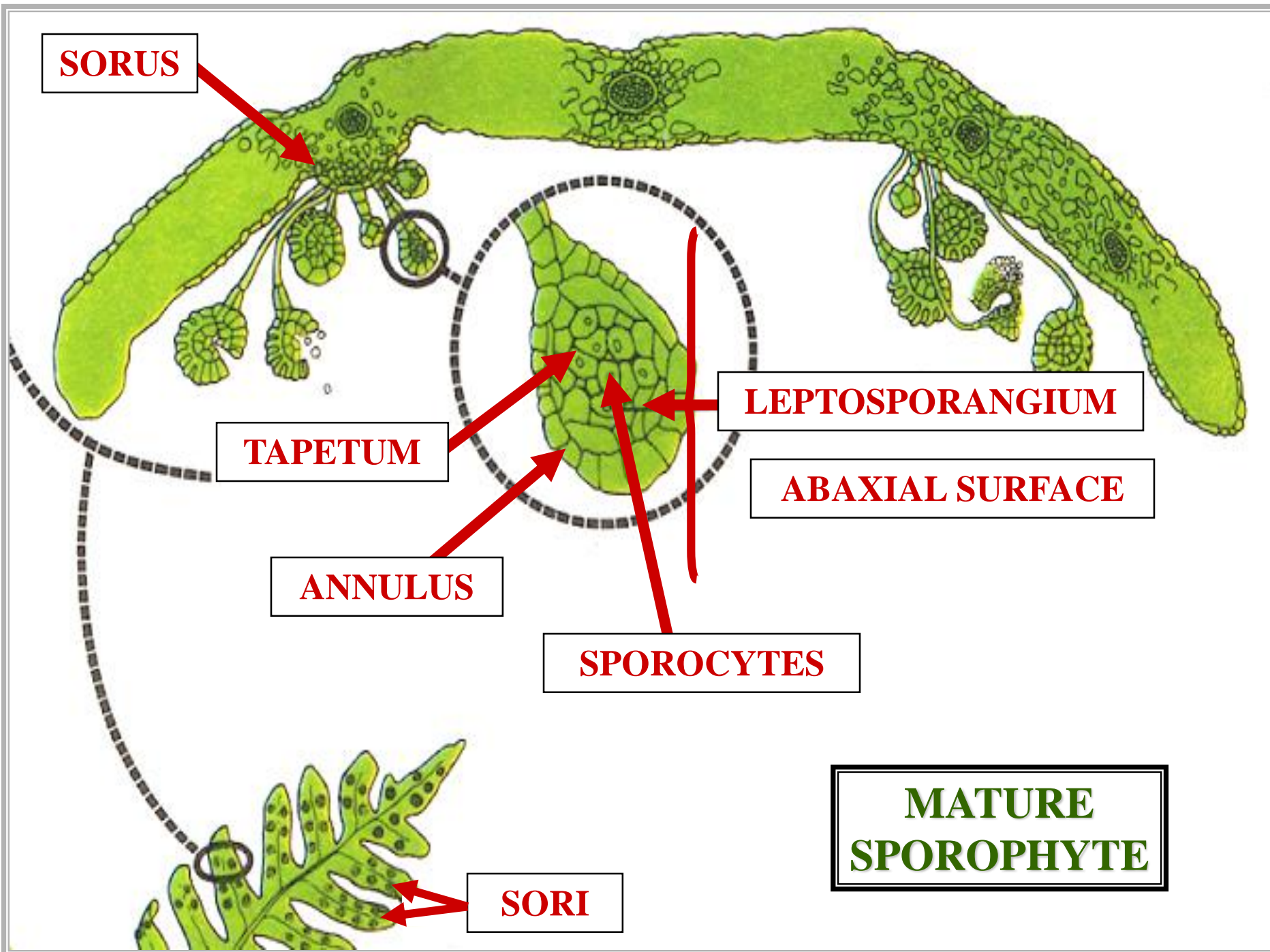
ANNULUS

LEPTOSPORANGIUM

ABAXIAL SURFACE

MATURE SPOROPHYTE

SORI



SORUS

LEPTOSPORANGIUM

TAPETUM

ABAXIAL SURFACE

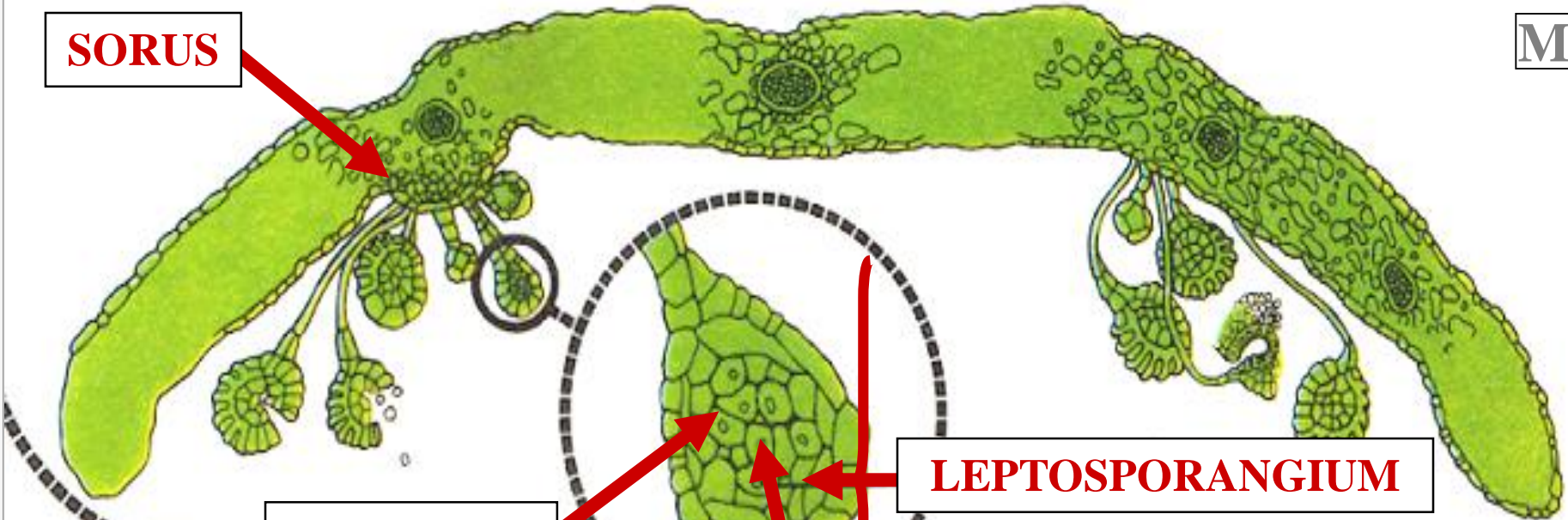
ANNULUS

SPOROXYTES

MATURE SPOROPHYTE

SORI

SORUS



TAPETUM

LEPTOSPORANGIUM

ABAXIAL SURFACE

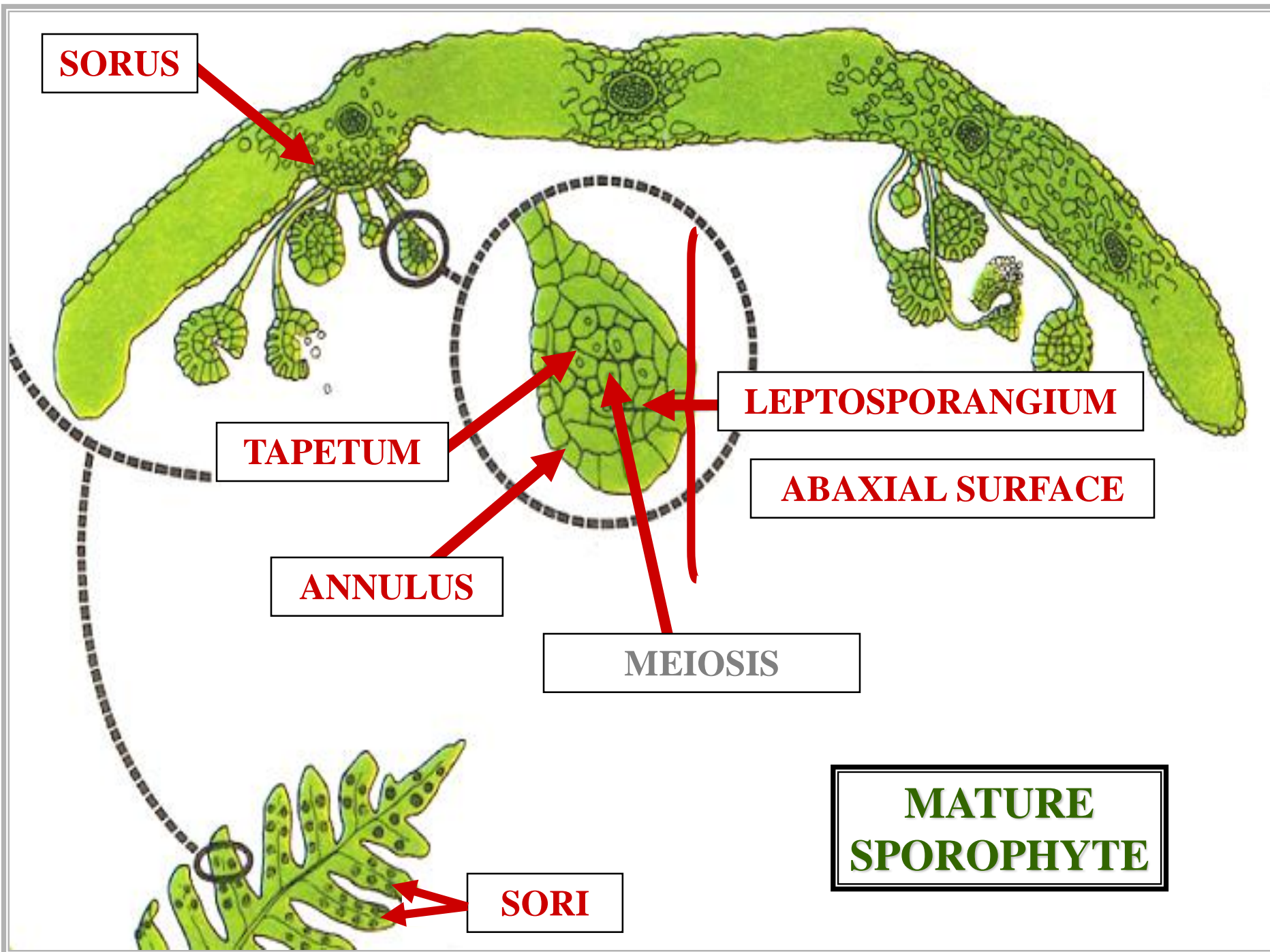
ANNULUS

2N

MATURE SPOROPHYTE

SORI





SORUS

TAPETUM

ANNULUS

LEPTOSPORANGIUM

ABAXIAL SURFACE

MEIOSIS

MATURE SPOROPHYTE

SORI