

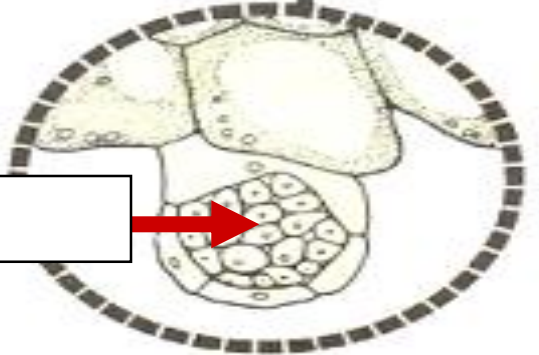
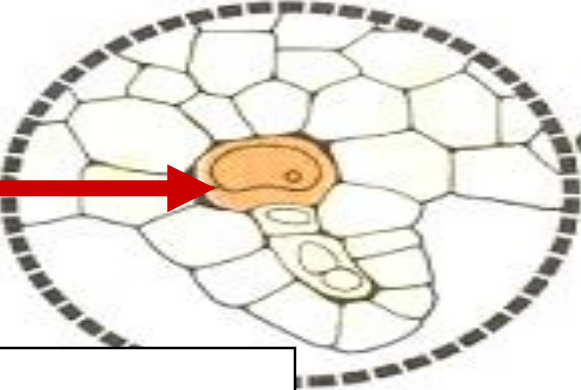
**MATURE
GAMETOPHYTE**



RHIZOIDS

BISEXUAL

RHIZOID REGION



**MATURE
GAMETOPHYTE**

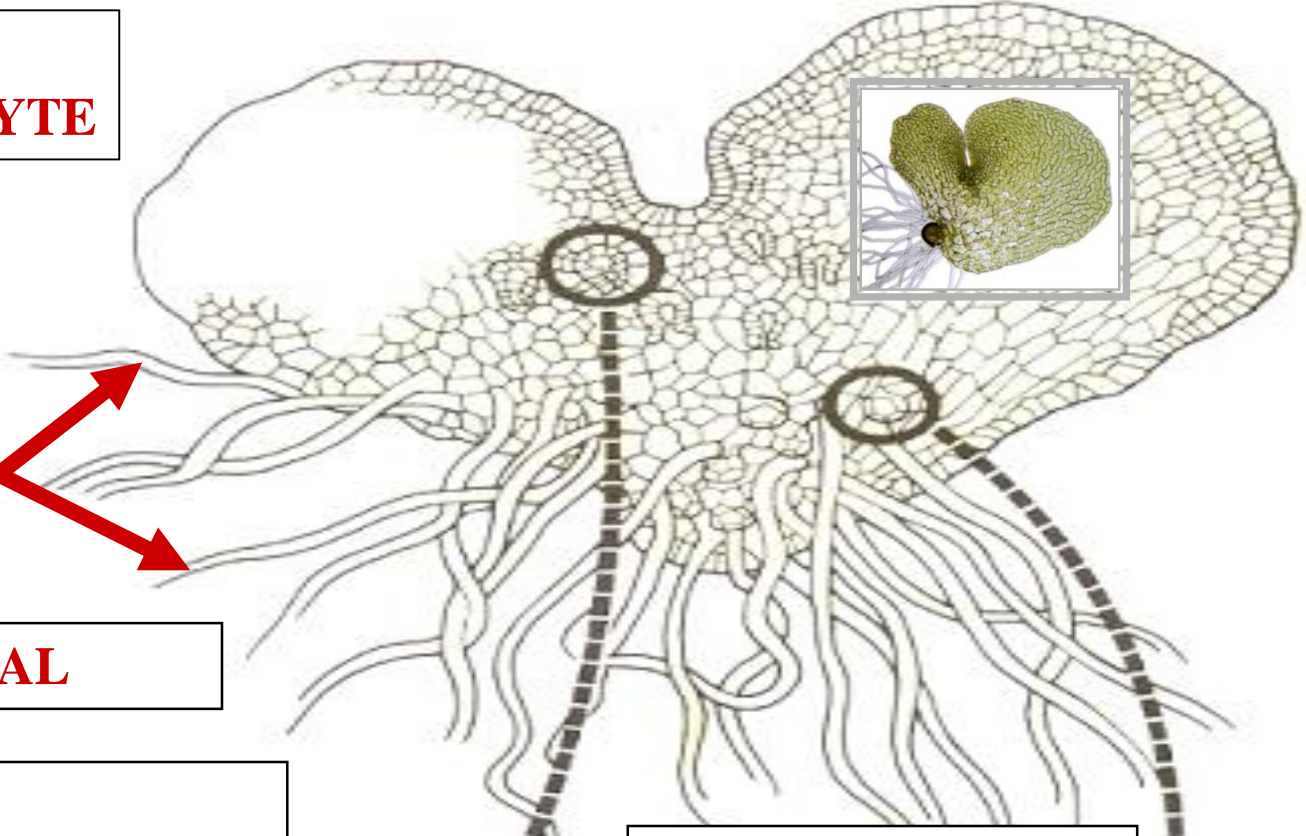
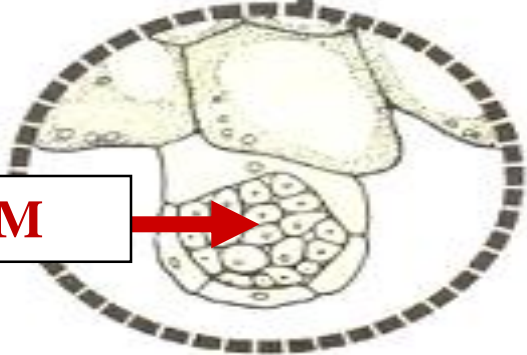
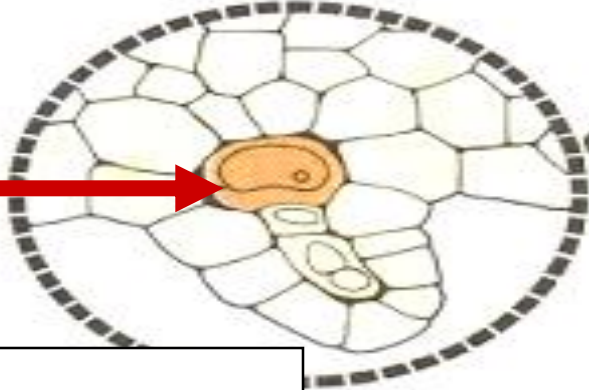


RHIZOIDS

BISEXUAL

RHIZOID REGION

ATHERIDIUM



**MATURE
GAMETOPHYTE**

**ANTHRIDIA
MATURE
BEFORE
ARCHEGONIA**

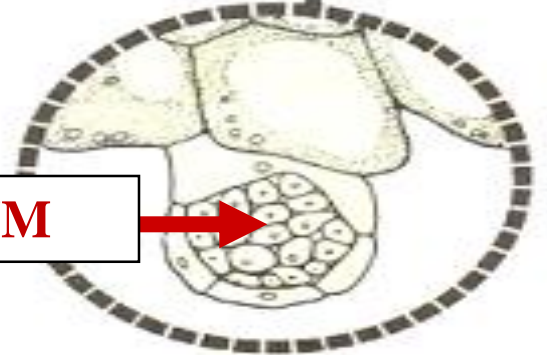
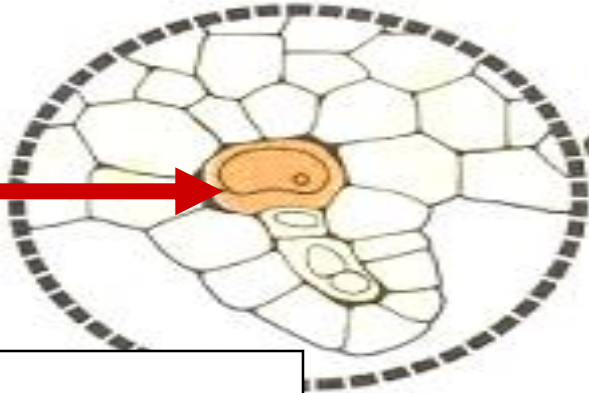
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RHIZOIDS

BISEXUAL

RHIZOID REGION

ATHERIDIUM



A

**MATURE
GAMETOPHYTE**

NOTCH REGION

BISEXUAL

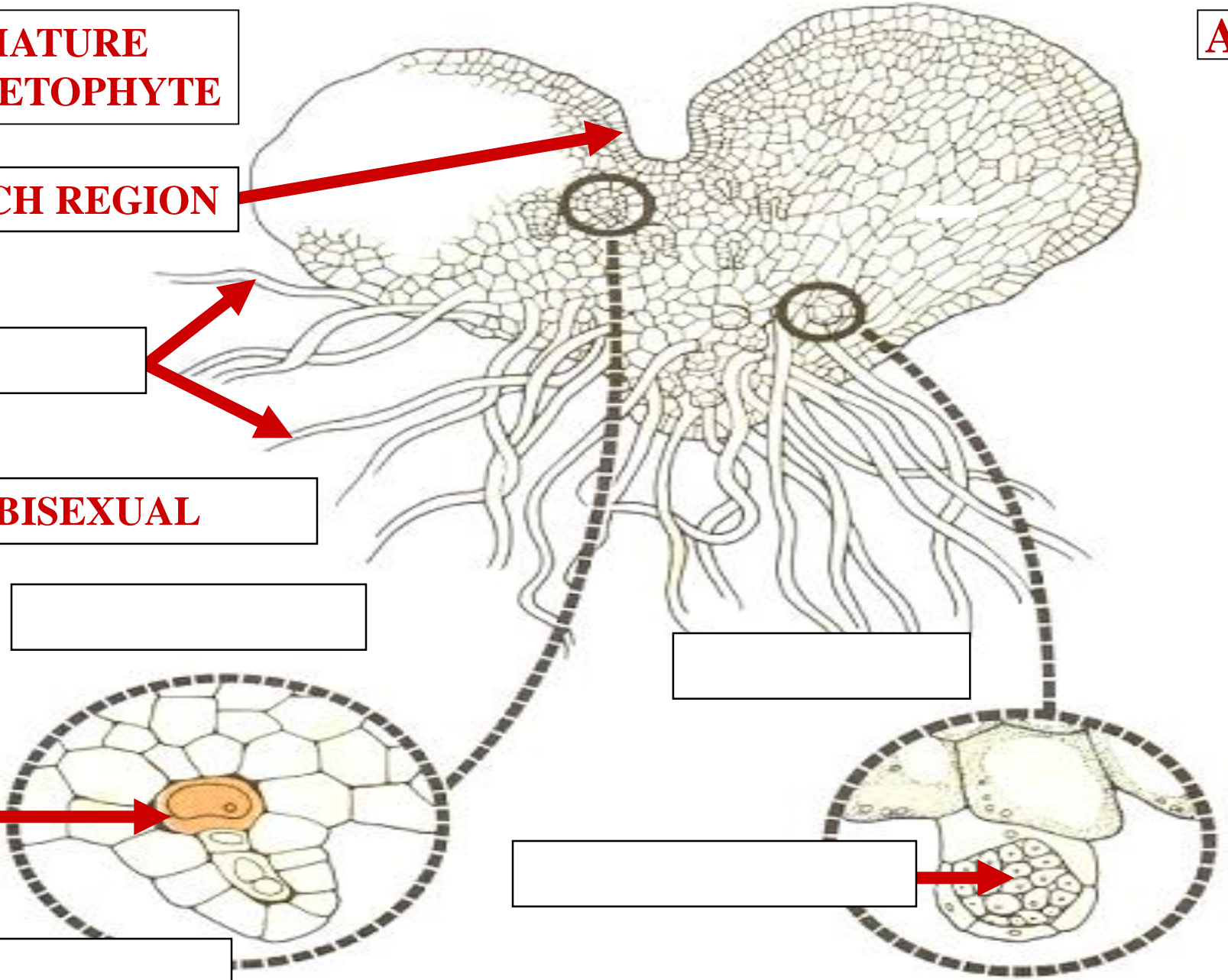
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**MATURE
GAMETOPHYTE**

NOTCH REGION

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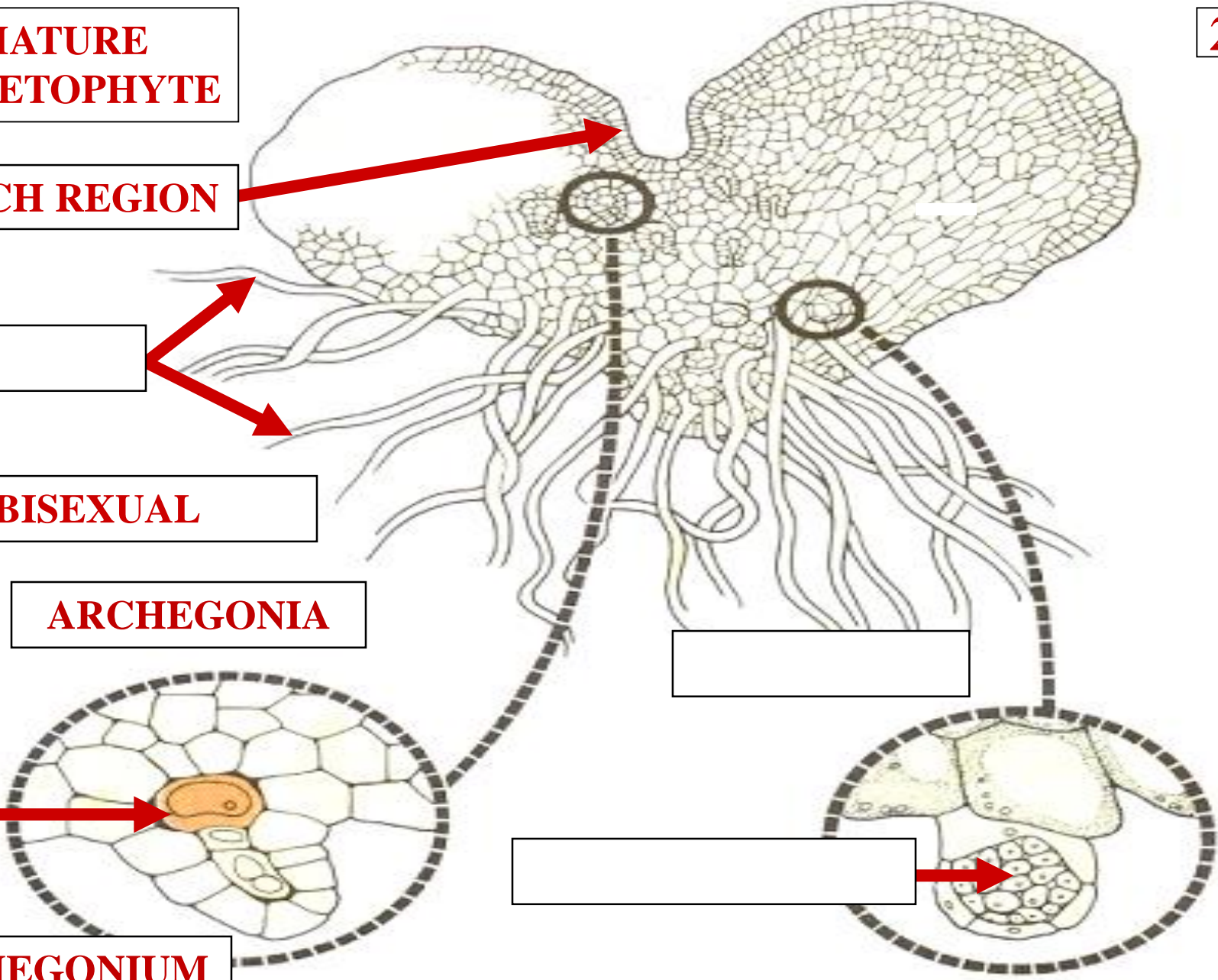
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ARCHEGONIA

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ARCHEGONIUM



**MATURE
GAMETOPHYTE**

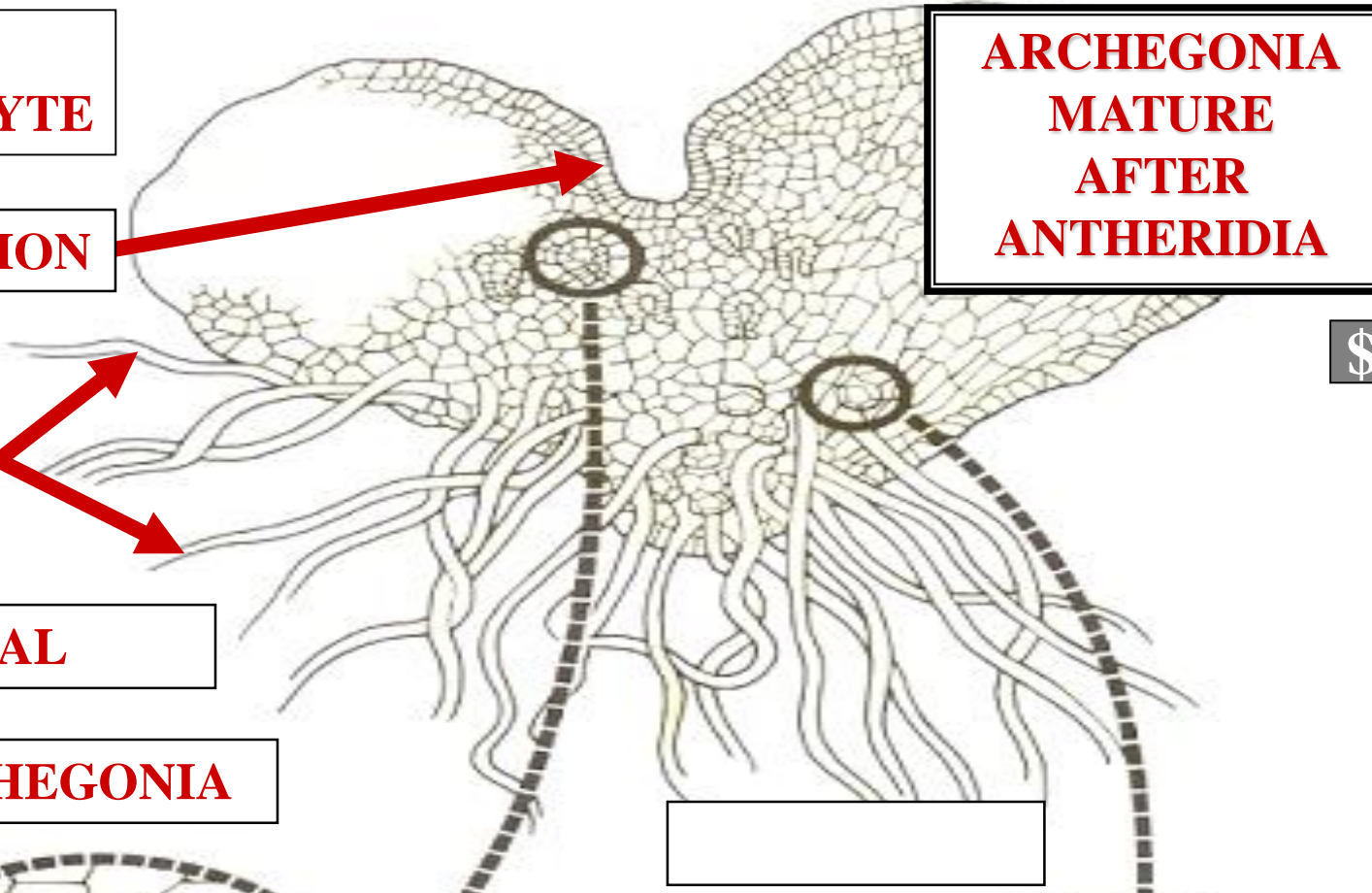
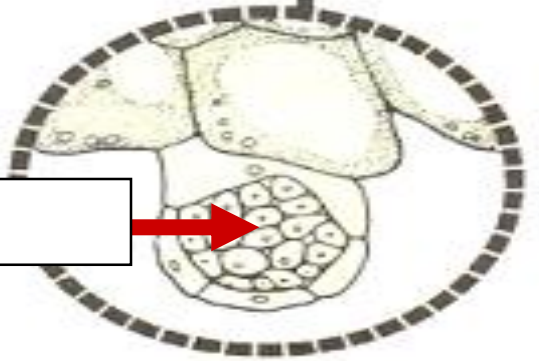
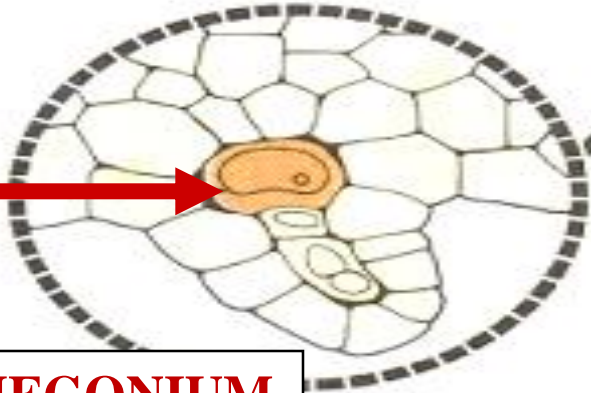
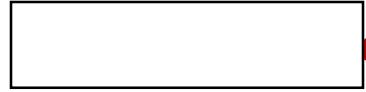
NOTCH REGION

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

BISEXUAL

ARCHEGONIA

ARCHEGONIUM



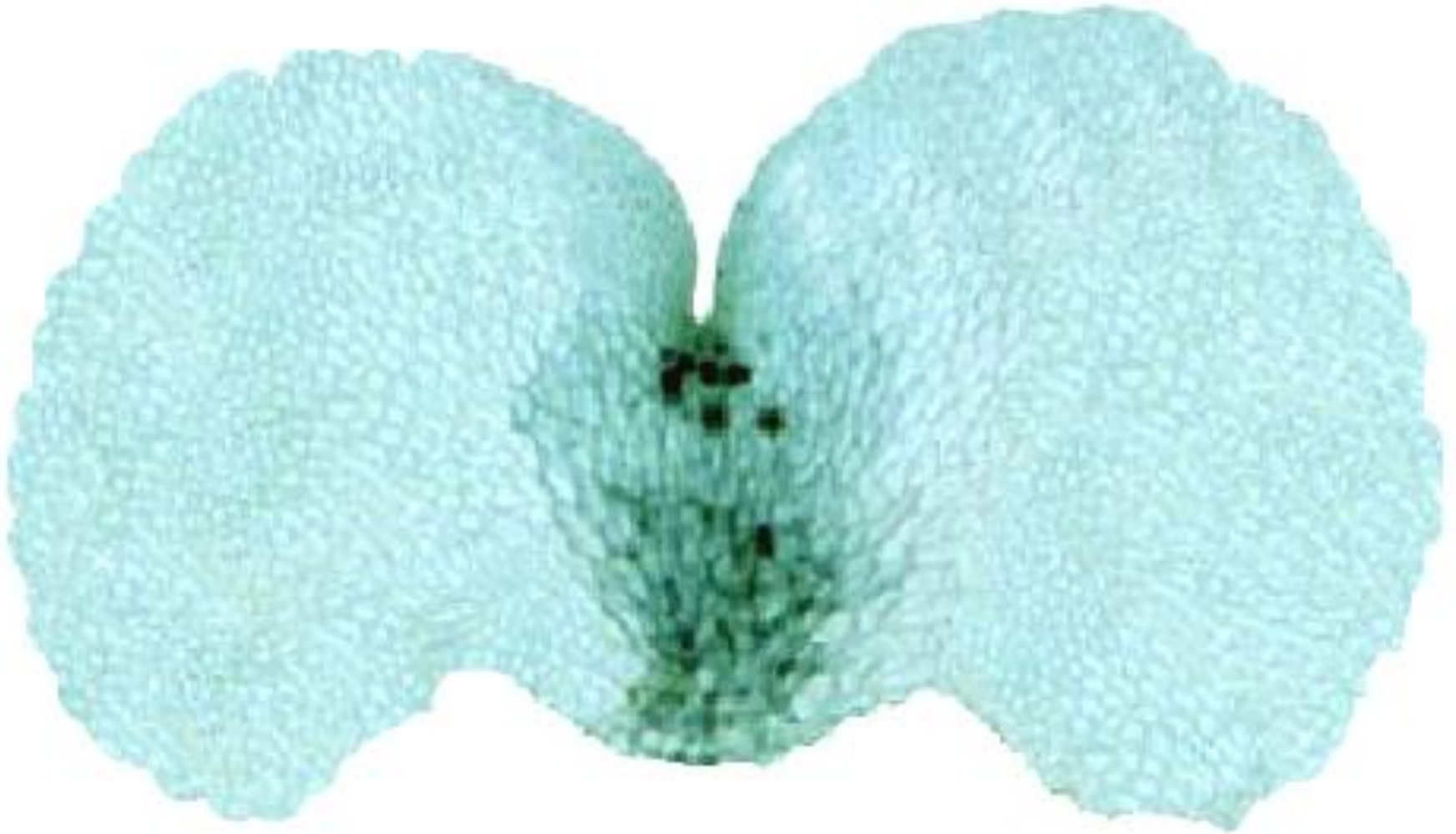


GAMETOPHYTE CHARACTERS SUMMARY

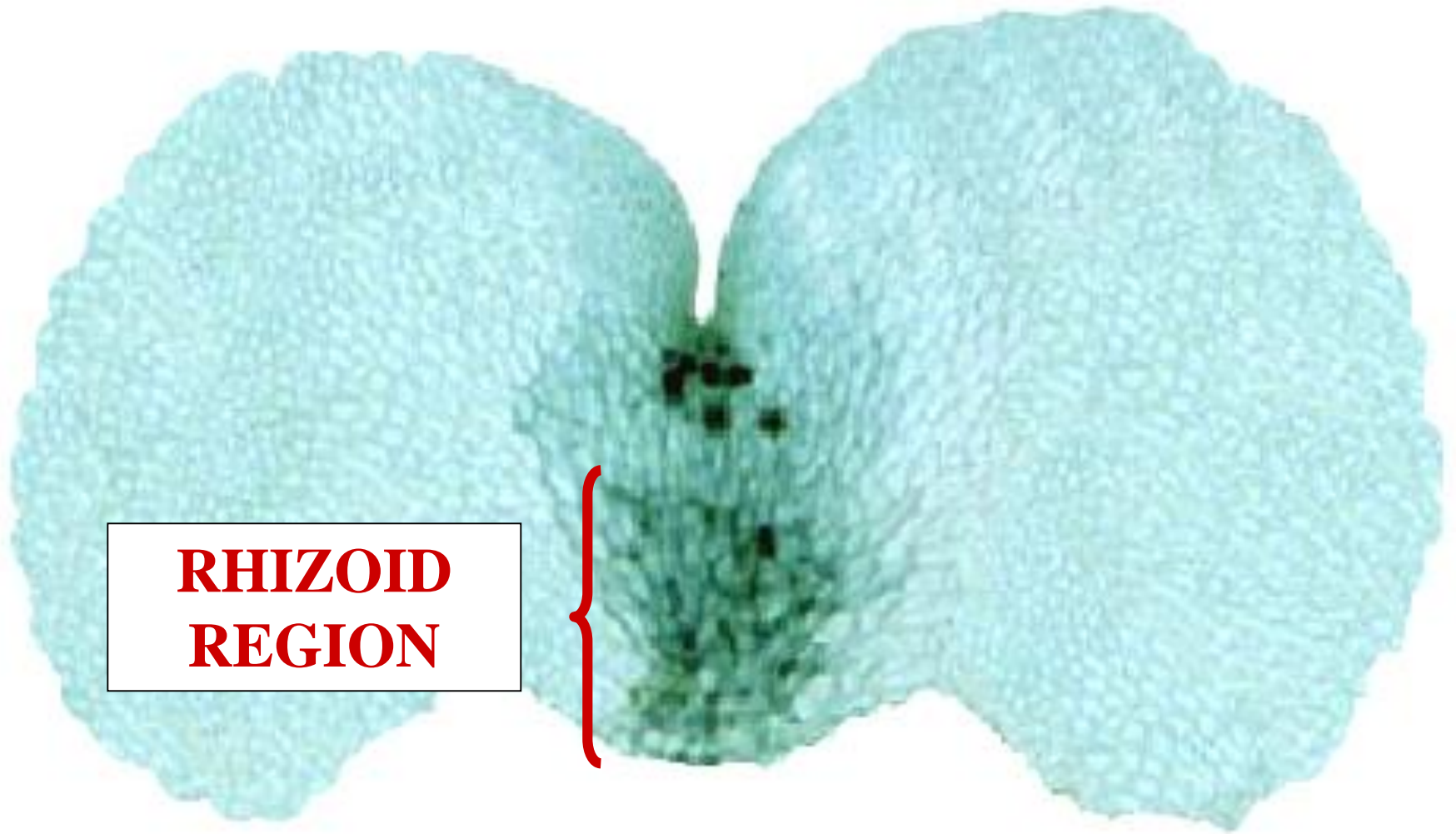
HEART-SHAPE

+

R



GAMETOPHYTE



**RHIZOID
REGION**

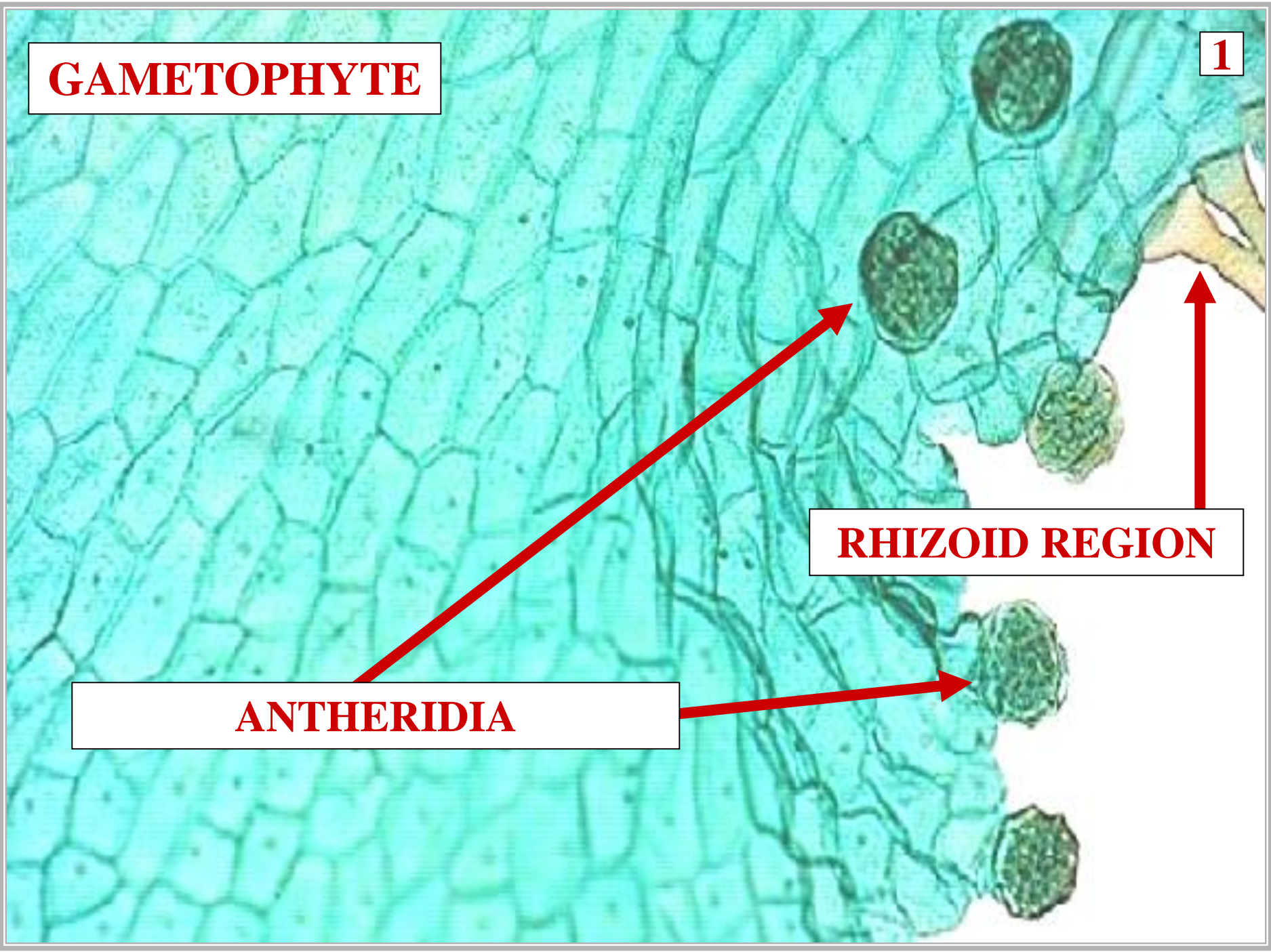
GAMETOPHYTE

GAMETOPHYTE

1

RHIZOID REGION

ANTHERIDIA



GAMETOPHYTE

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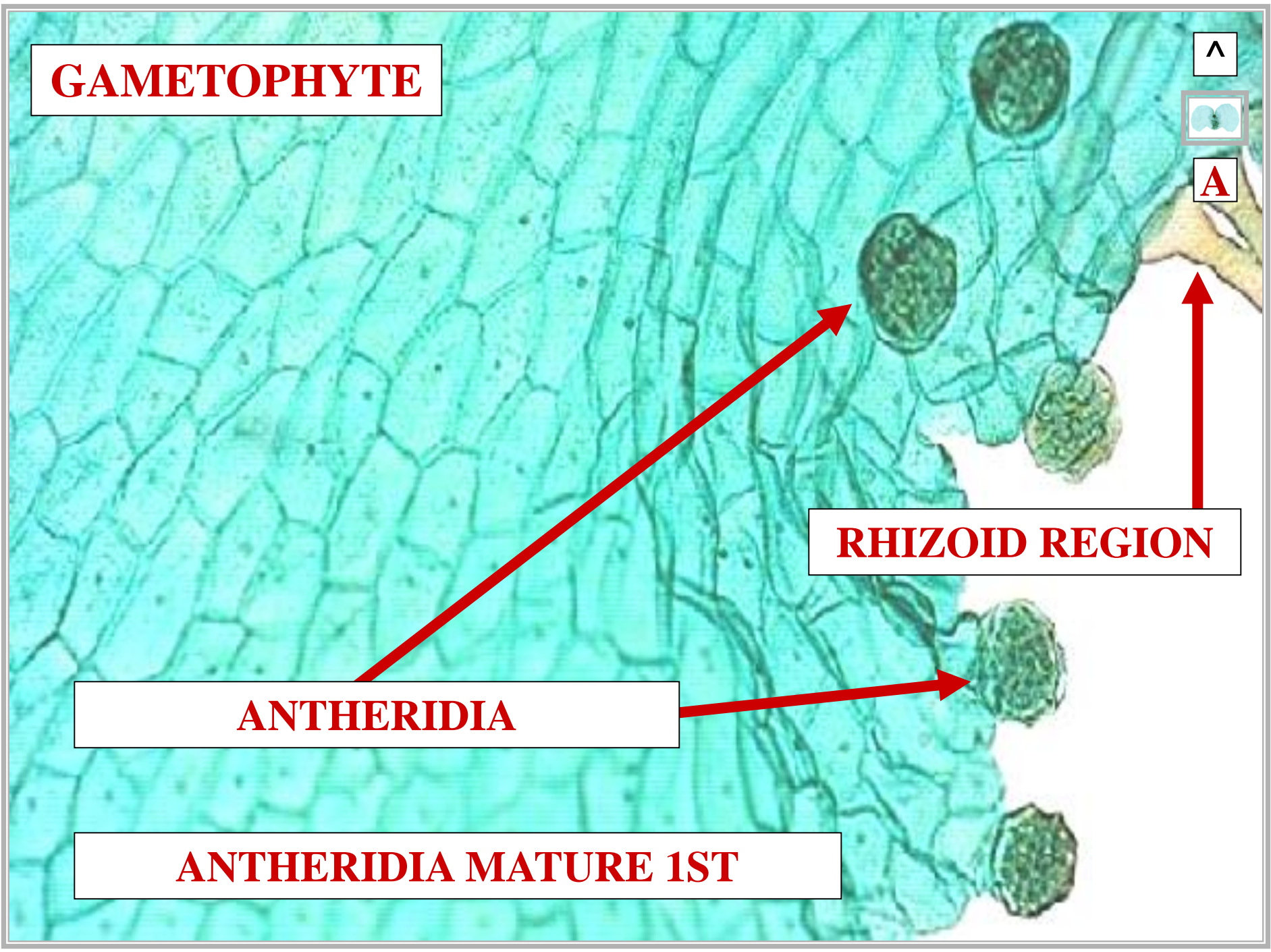


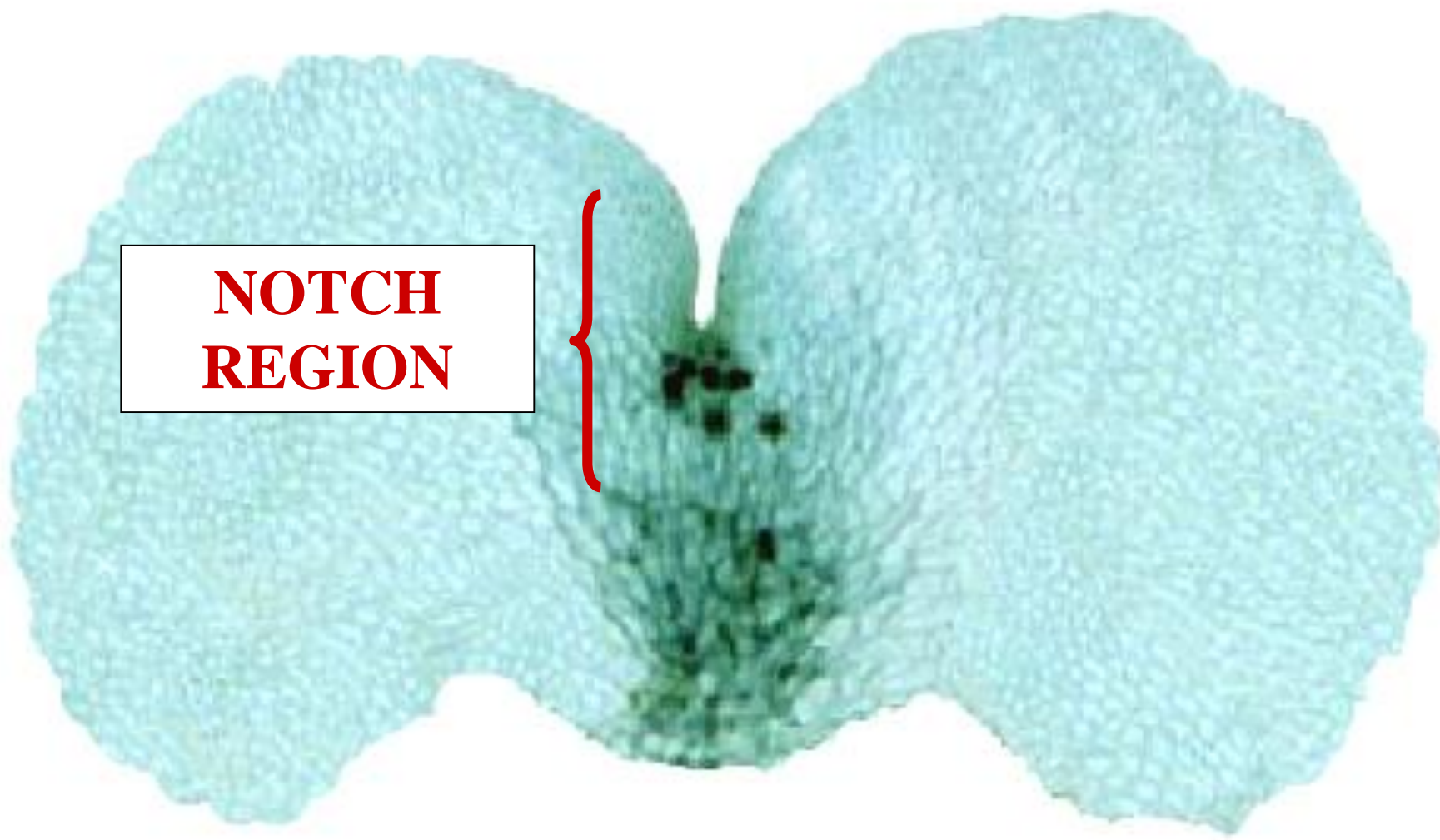
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RHIZOID REGION

ANTHERIDIA

ANTHERIDIA MATURE 1ST





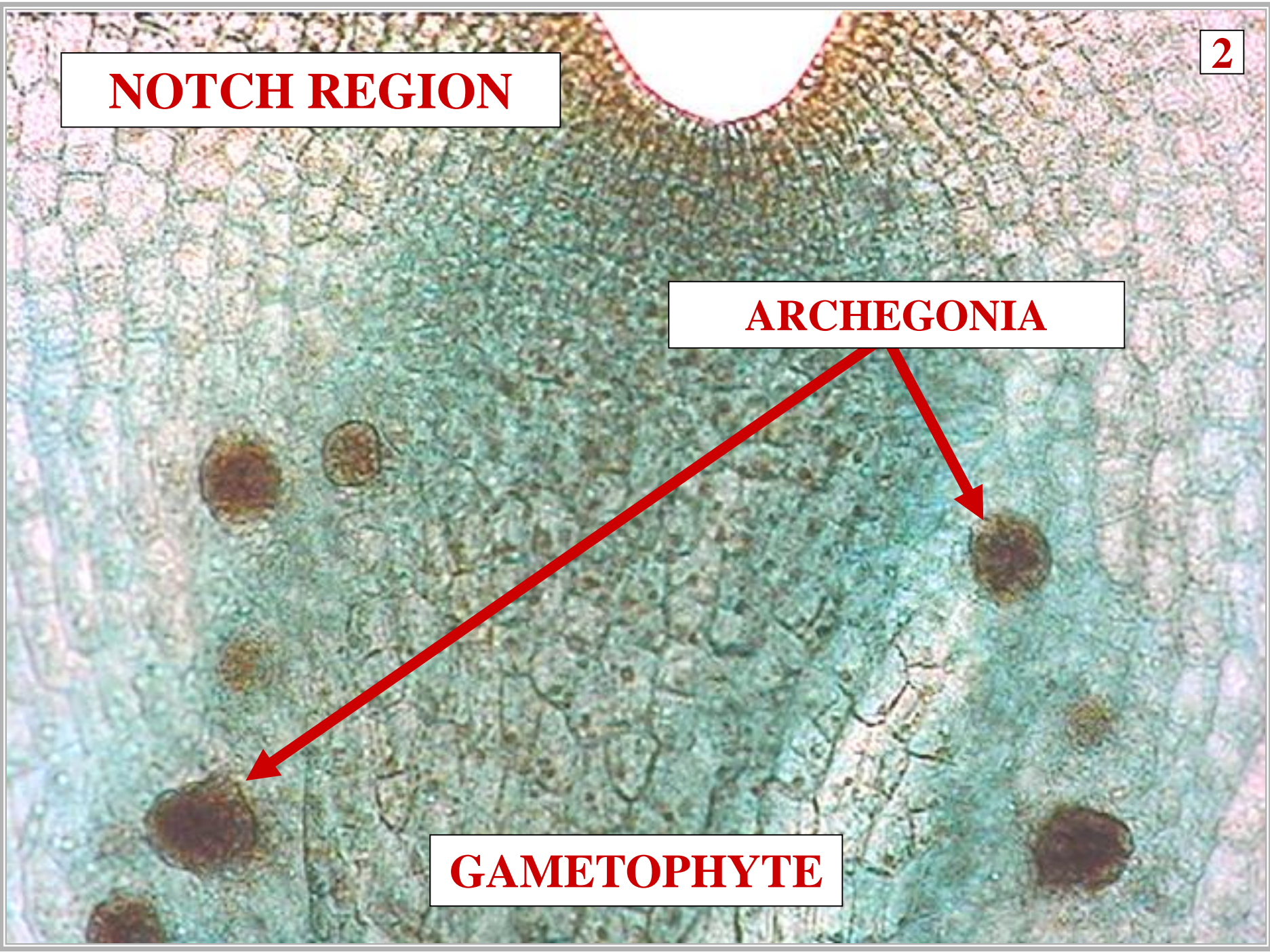
**NOTCH
REGION**

GAMETOPHYTE

NOTCH REGION

ARCHEGONIA

GAMETOPHYTE



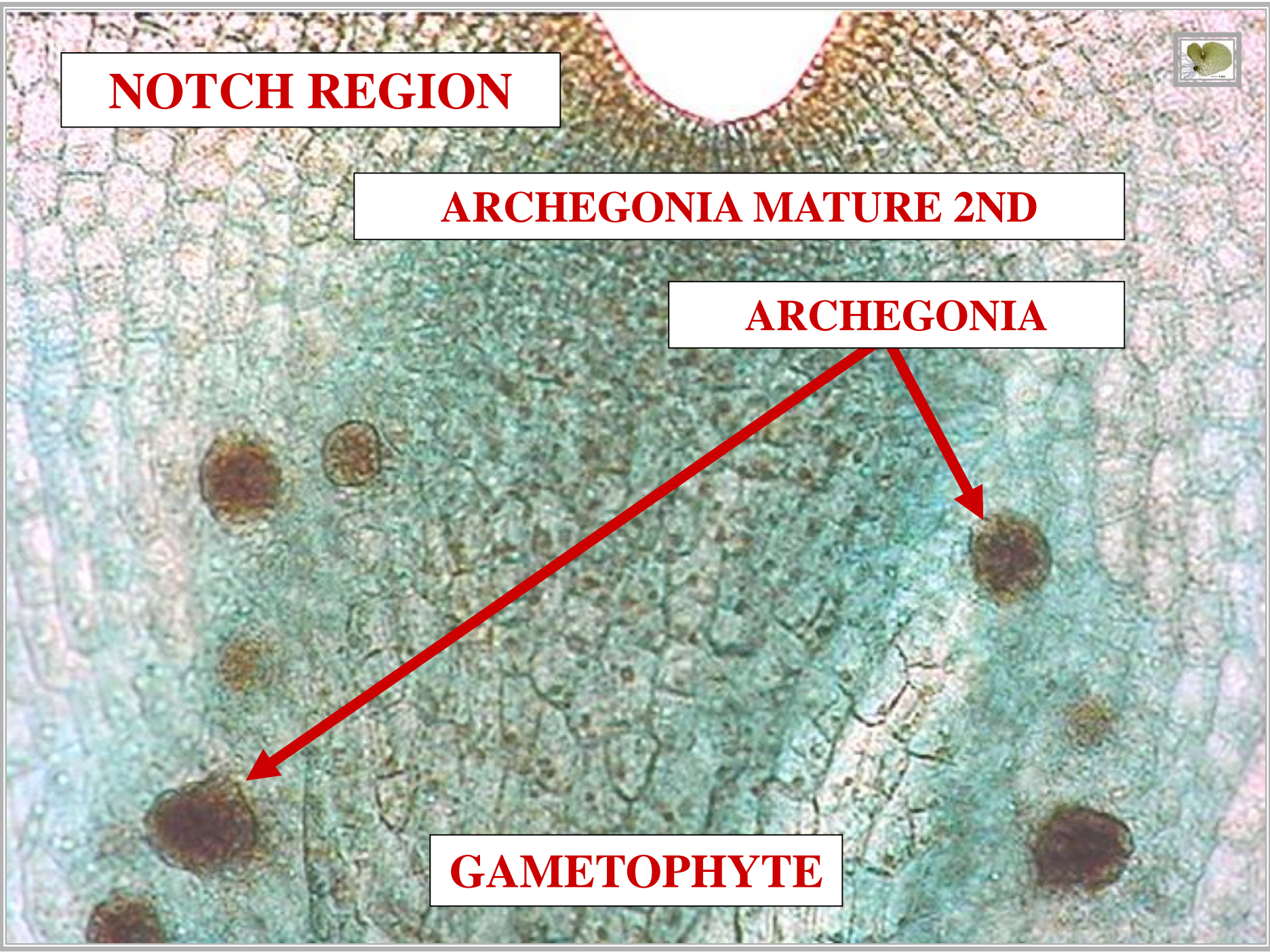


NOTCH REGION

ARCHEGONIA MATURE 2ND

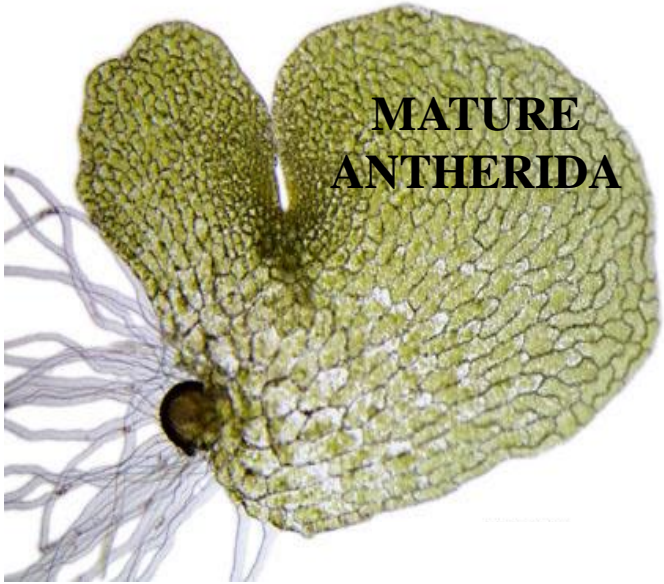
ARCHEGONIA

GAMETOPHYTE





**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



**MATURE
ANTHERIDA**

GAMETOPHYTE

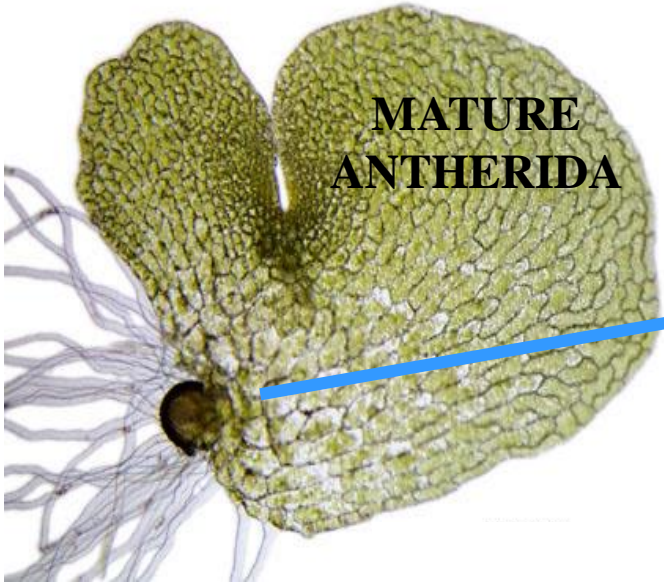


**MATURE
ARCHEGONIA**

GAMETOPHYTE

GAMETANGIA MATURATION: DICHOTOMY

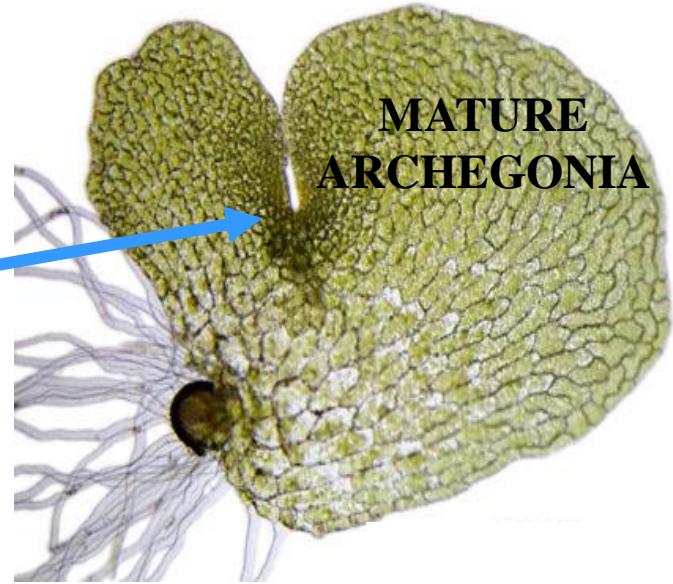
**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



**MATURE
ANTHERIDA**

SPERM

GAMETOPHYTE

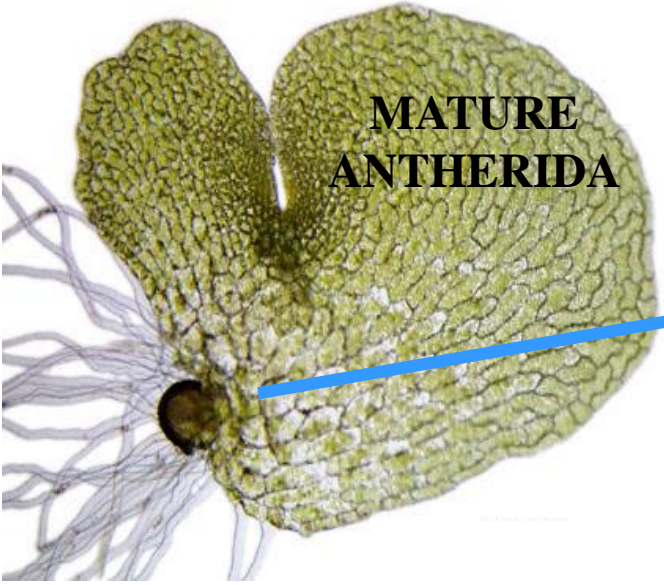


**MATURE
ARCHEGONIA**

GAMETOPHYTE

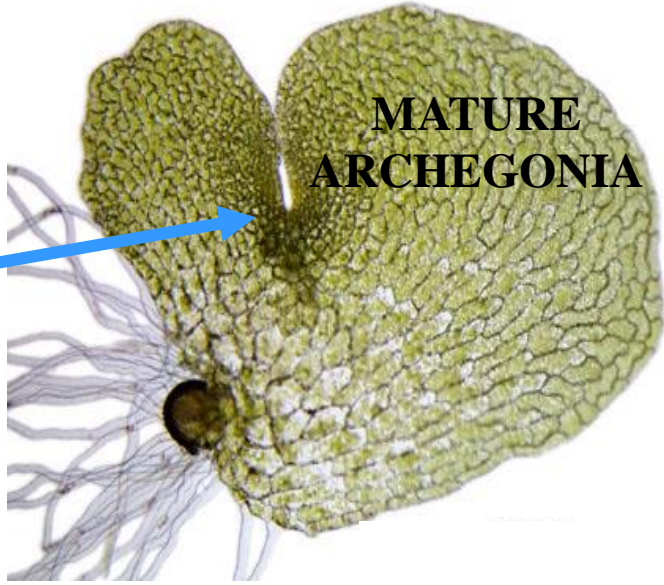
GAMETANGIA MATURATION: DICHOTOMY

**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



GAMETOPHYTE

SYNGAMY

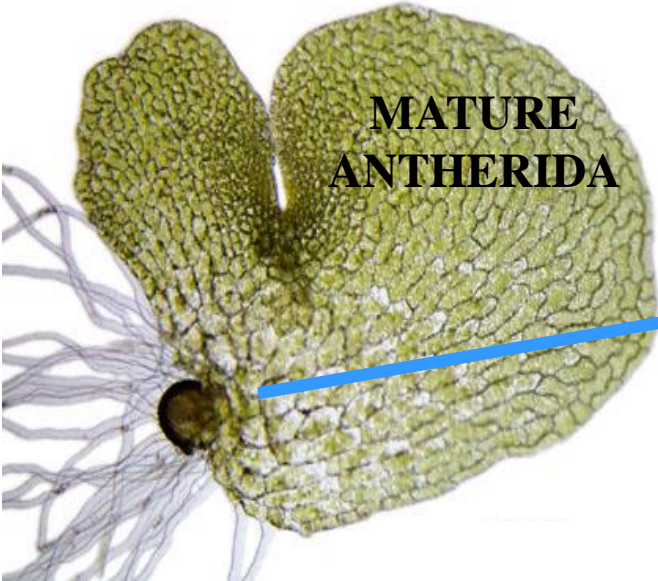


GAMETOPHYTE

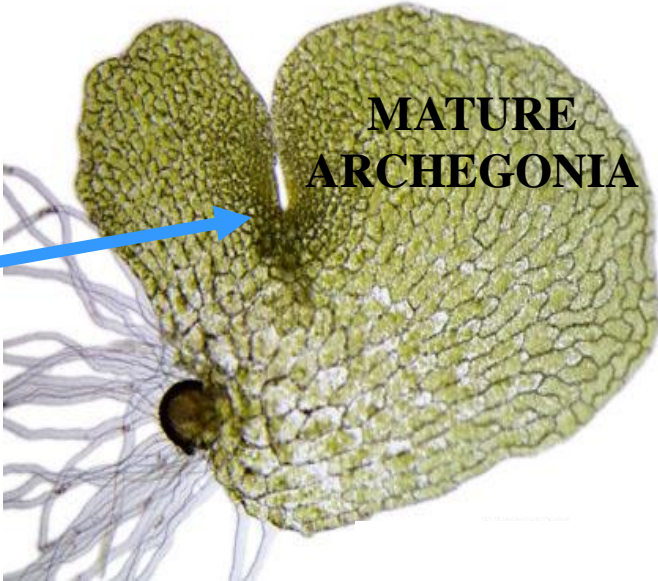
GAMETANGIA MATURATION: DICHOTOMY



**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**



SYNGAMY



GAMETOPHYTE

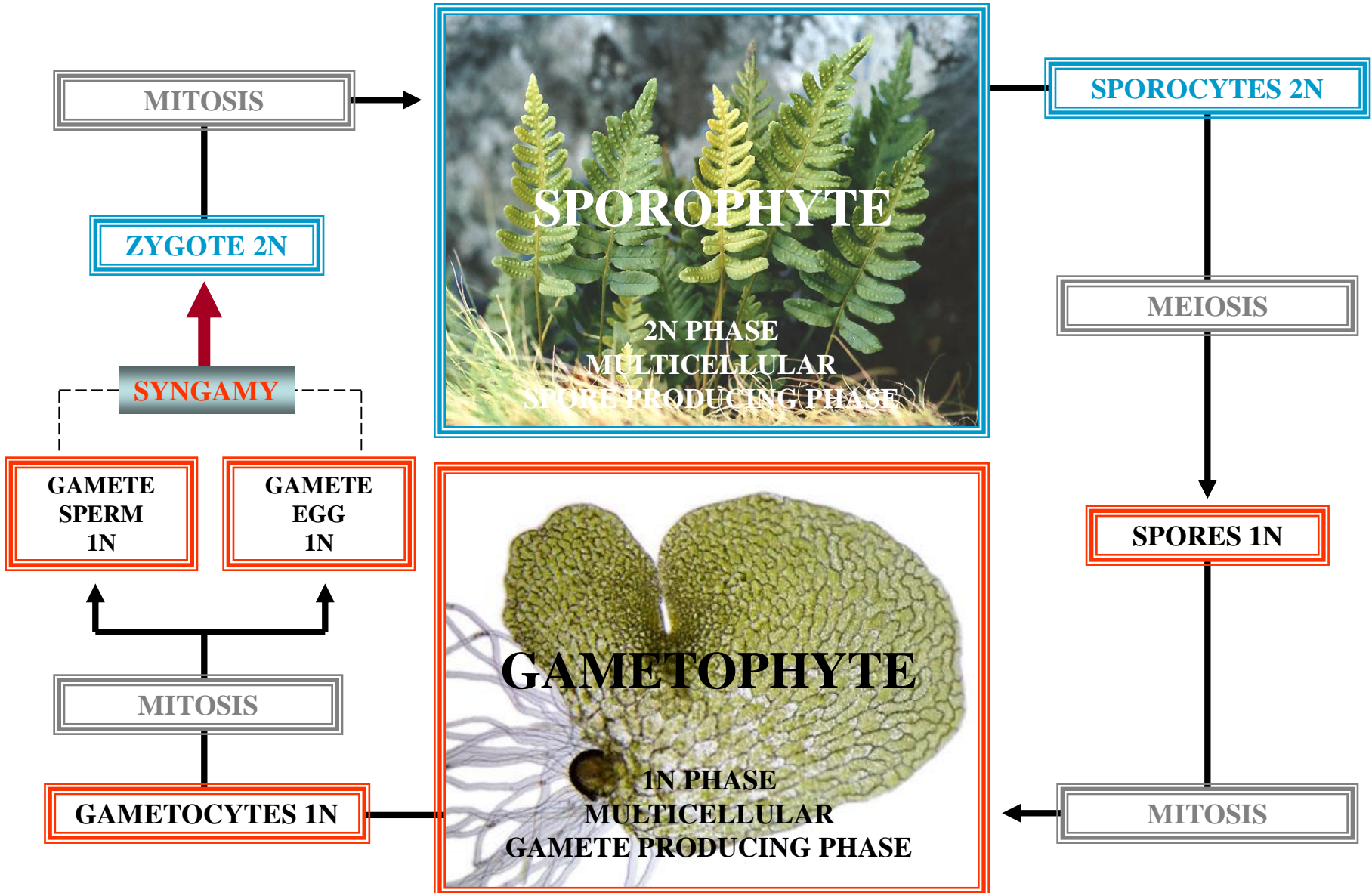
GAMETOPHYTE

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



**ENSURES
GENETIC DIVERSITY**

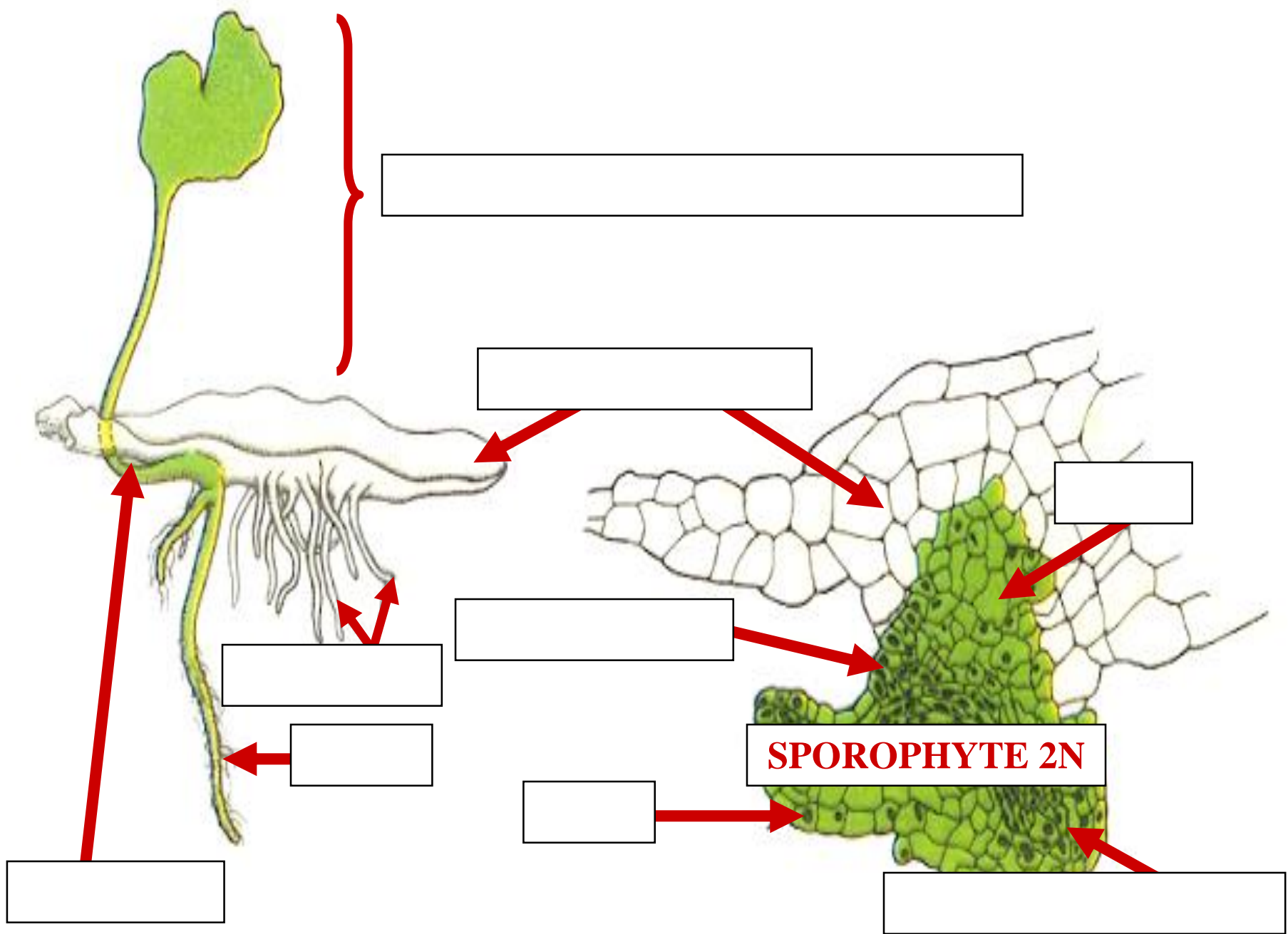
PTERIDALES LIFE CYCLE

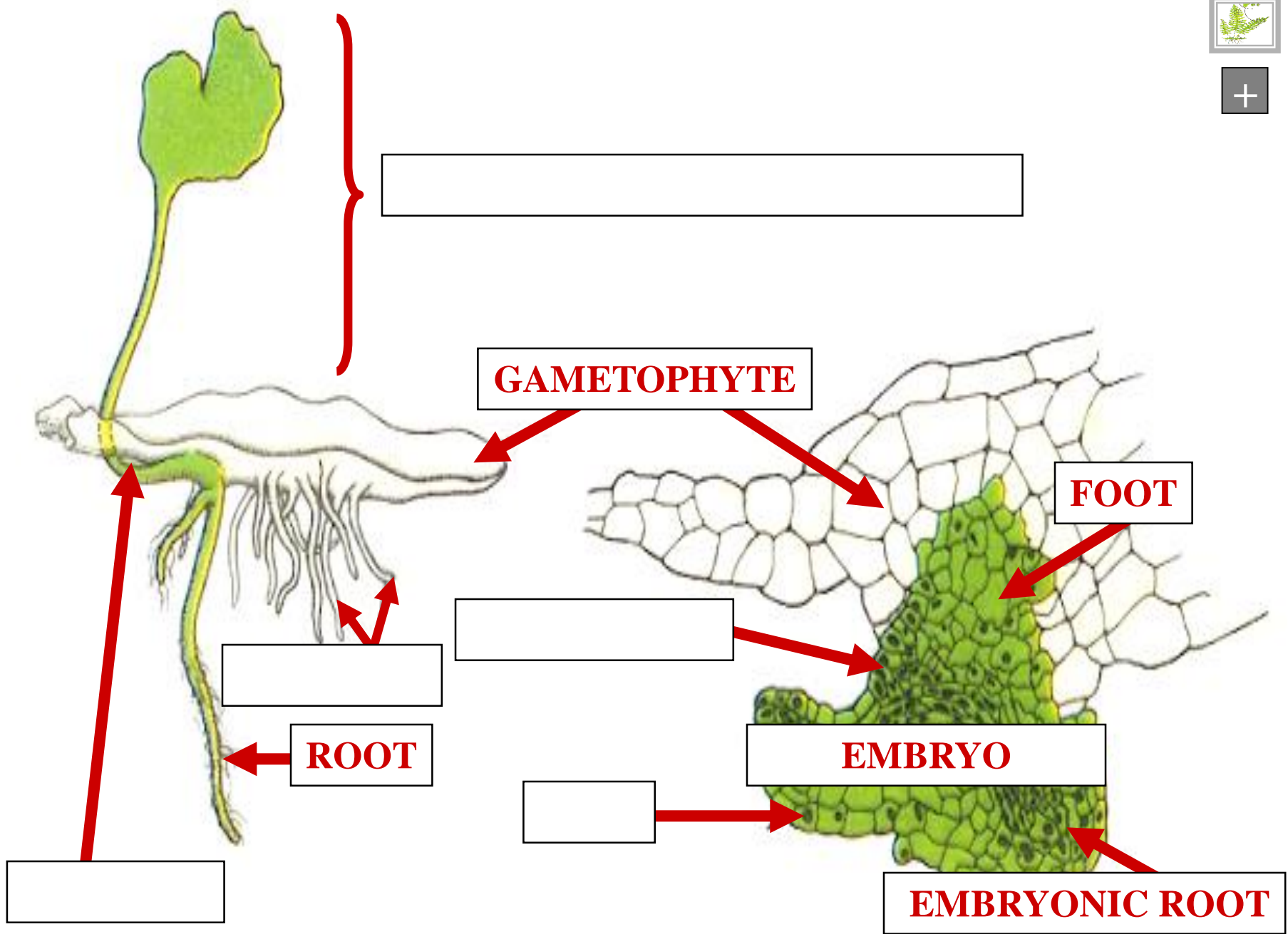




REPRODUCTION

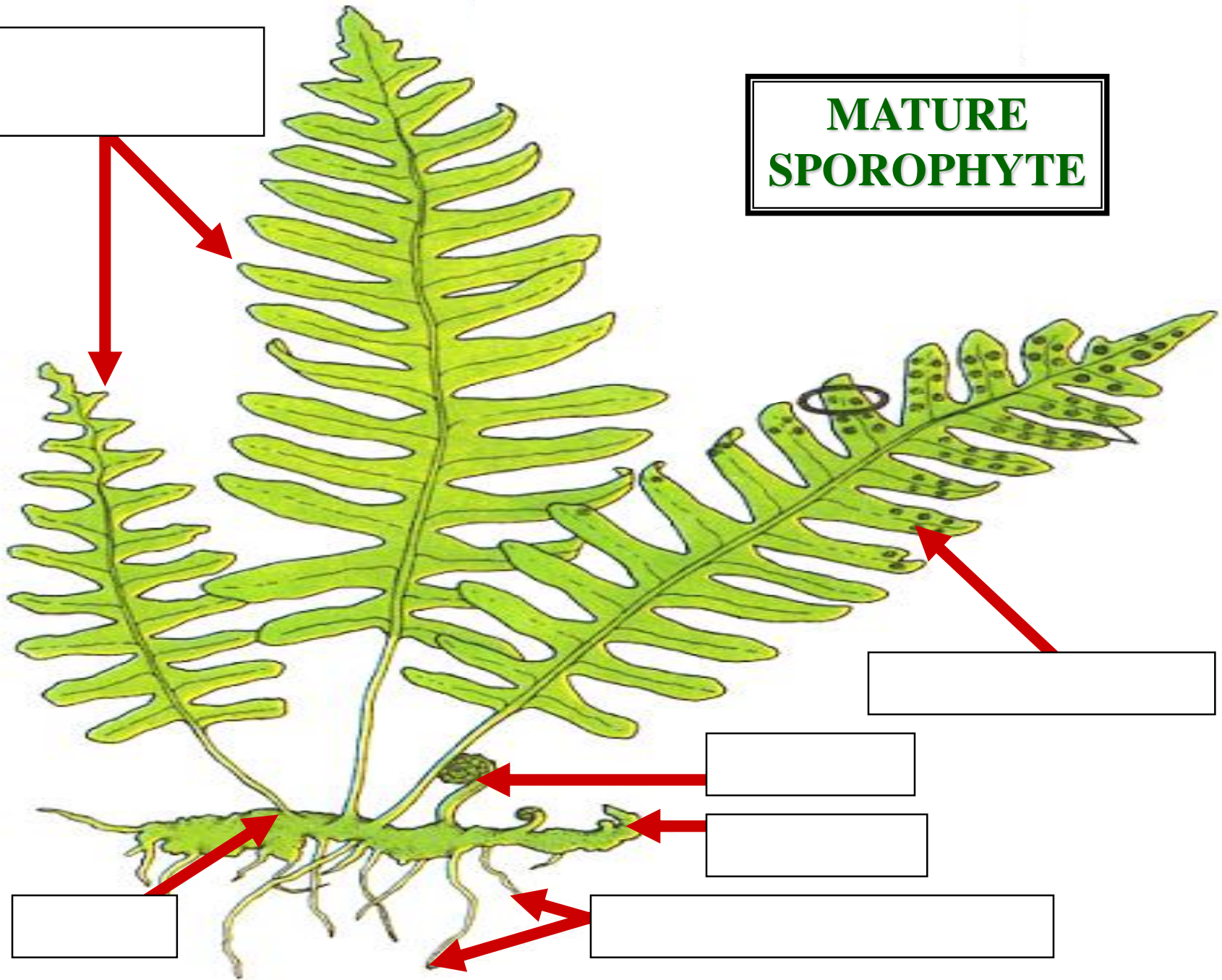
POLYPODIUM
LIFE CYCLE





**MATURE
SPOROPHYTE**

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**MATURE
SPOROPHYTE**

RHIZOME

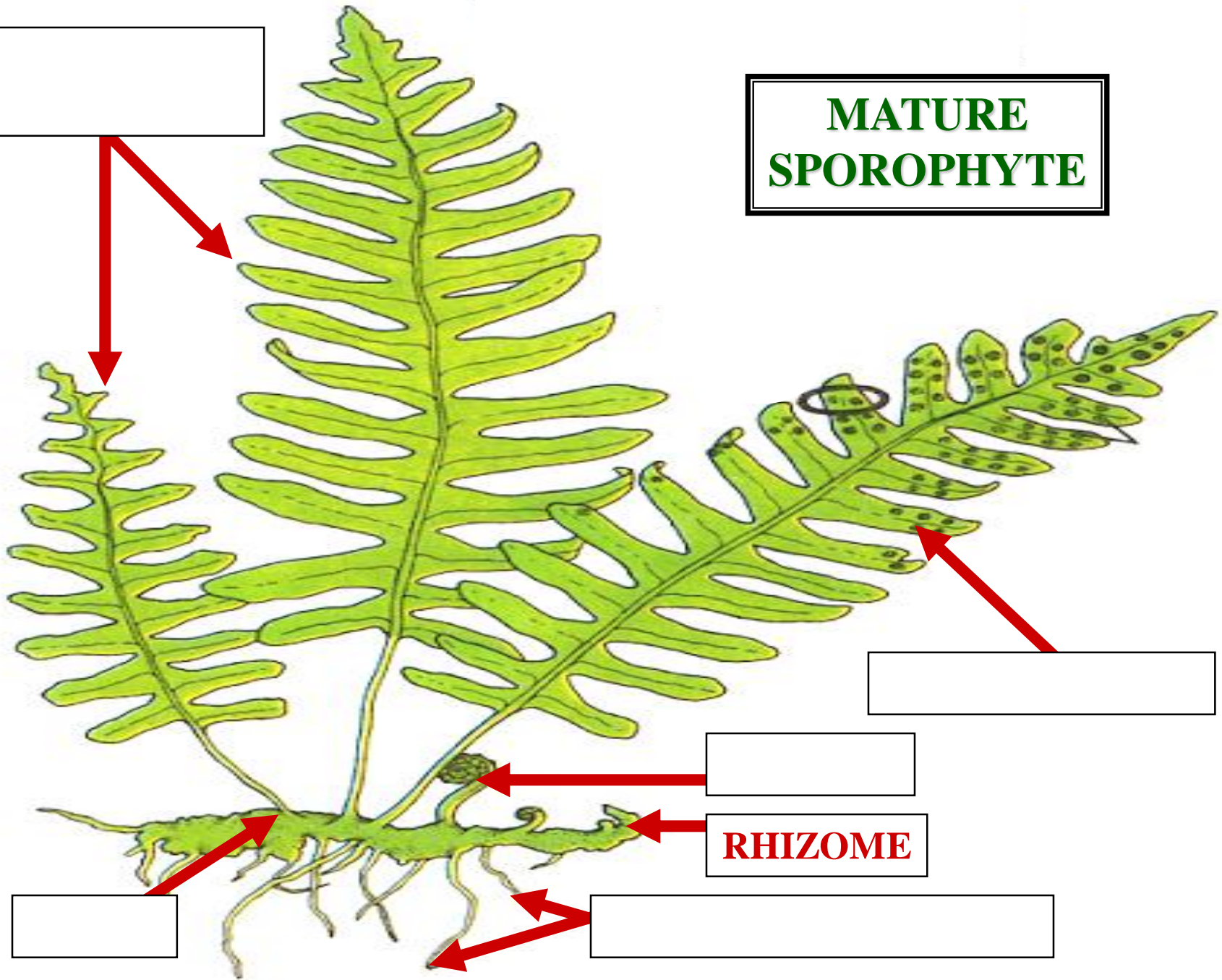
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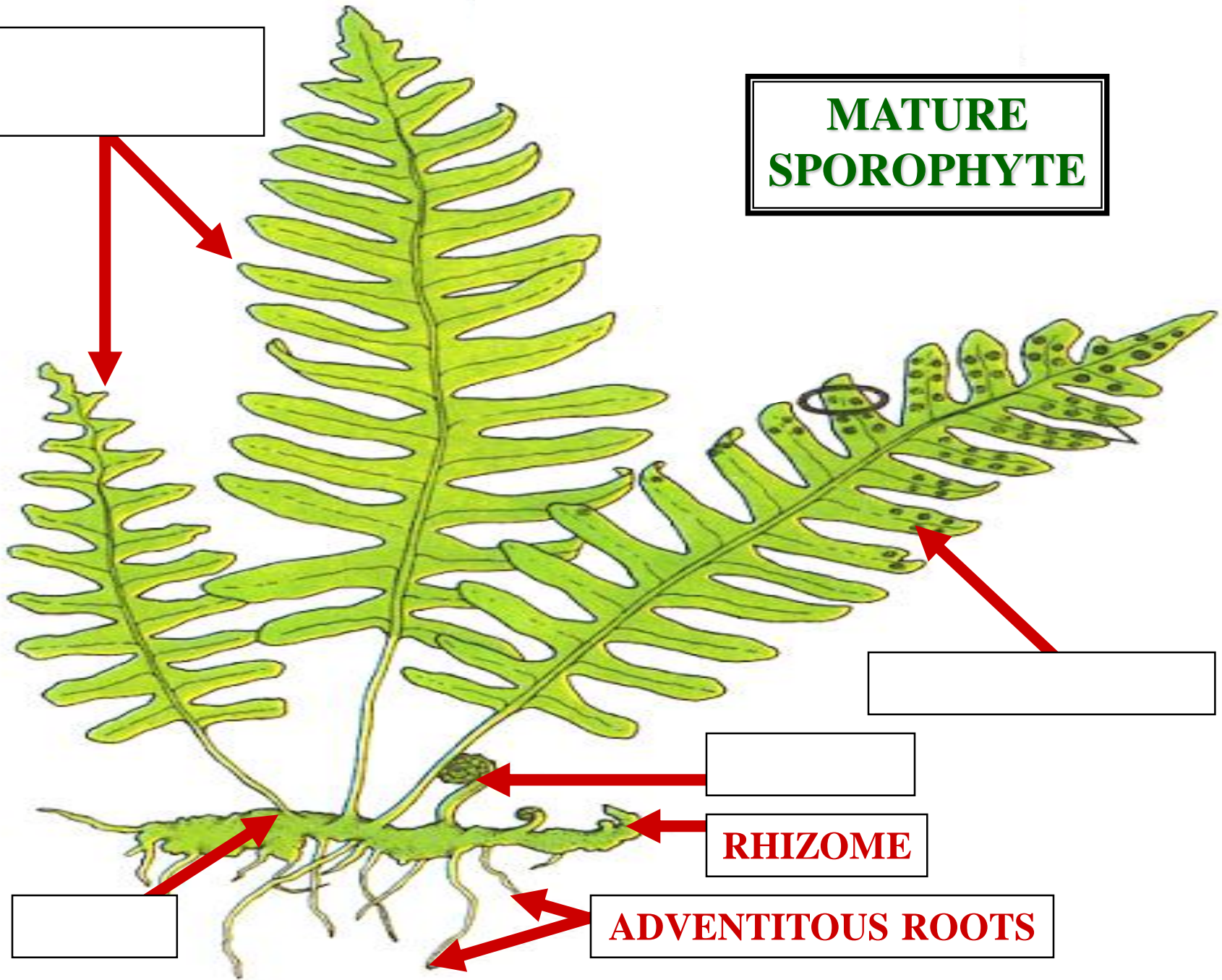
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**MATURE
SPOROPHYTE**

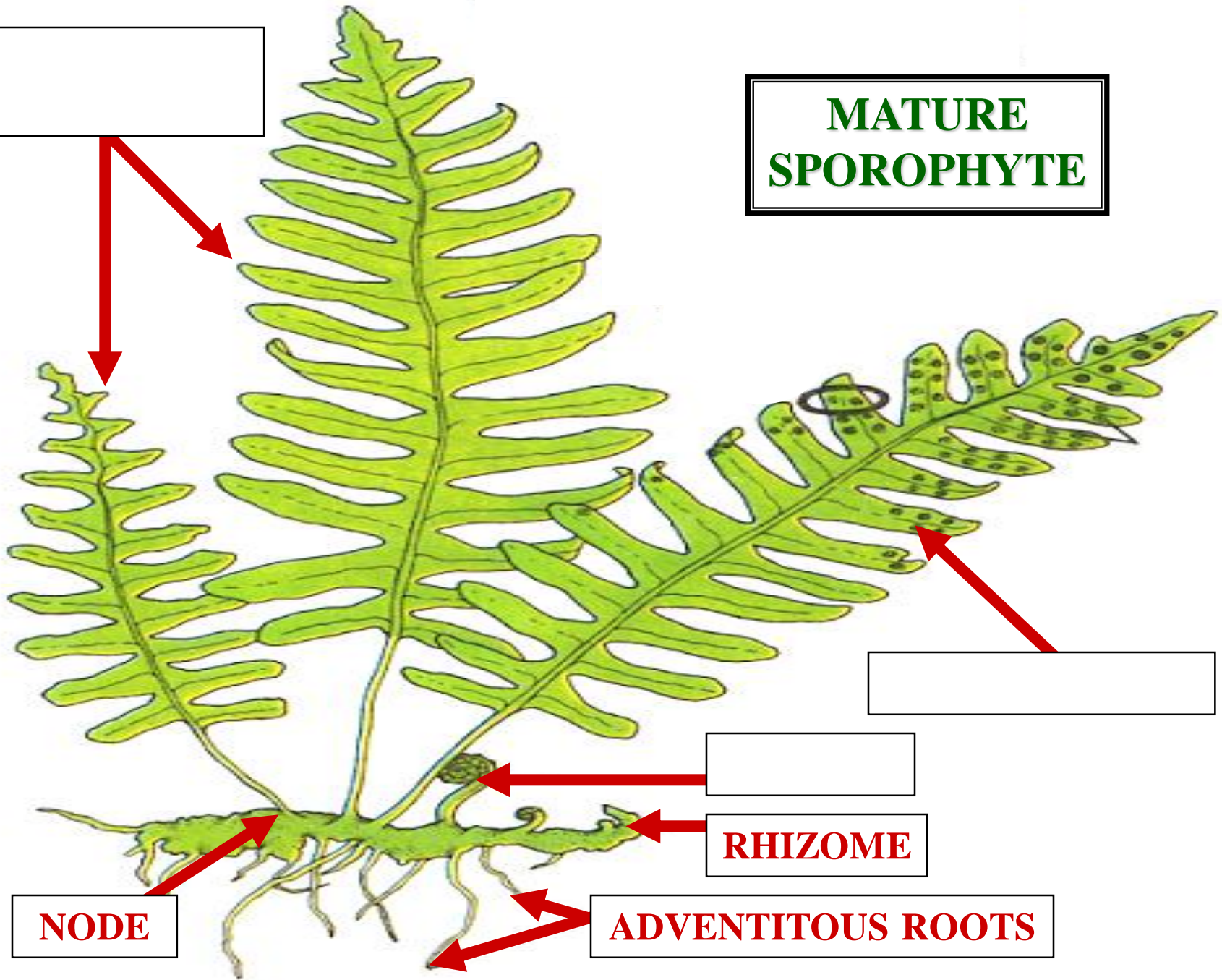


RHIZOME

ADVENTITIOUS ROOTS

**MATURE
SPOROPHYTE**

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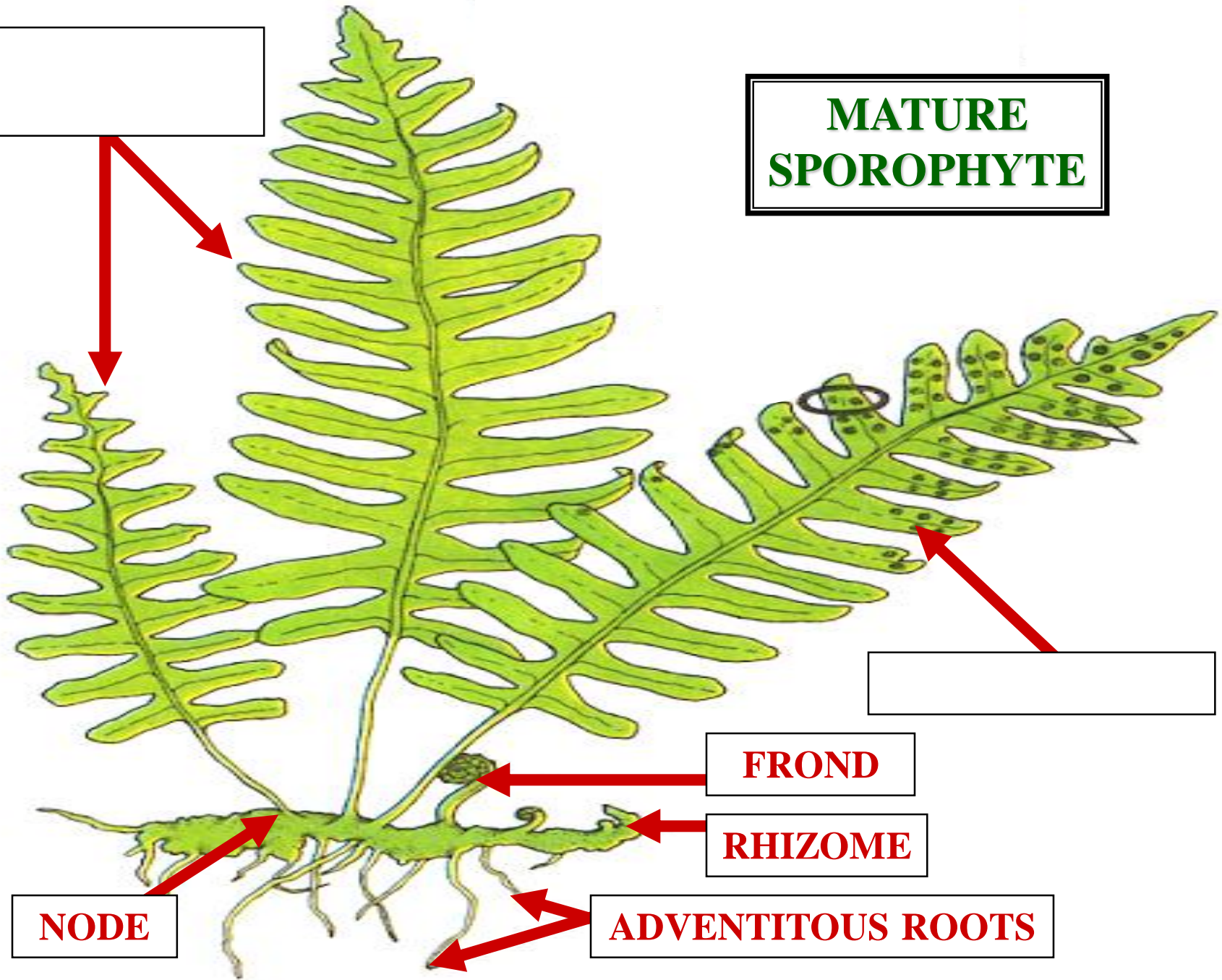
RHIZOME

NODE

ADVENTITIOUS ROOTS

**MATURE
SPOROPHYTE**

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FROND

RHIZOME

NODE

ADVENTITIOUS ROOTS

**MATURE
SPOROPHYTE**

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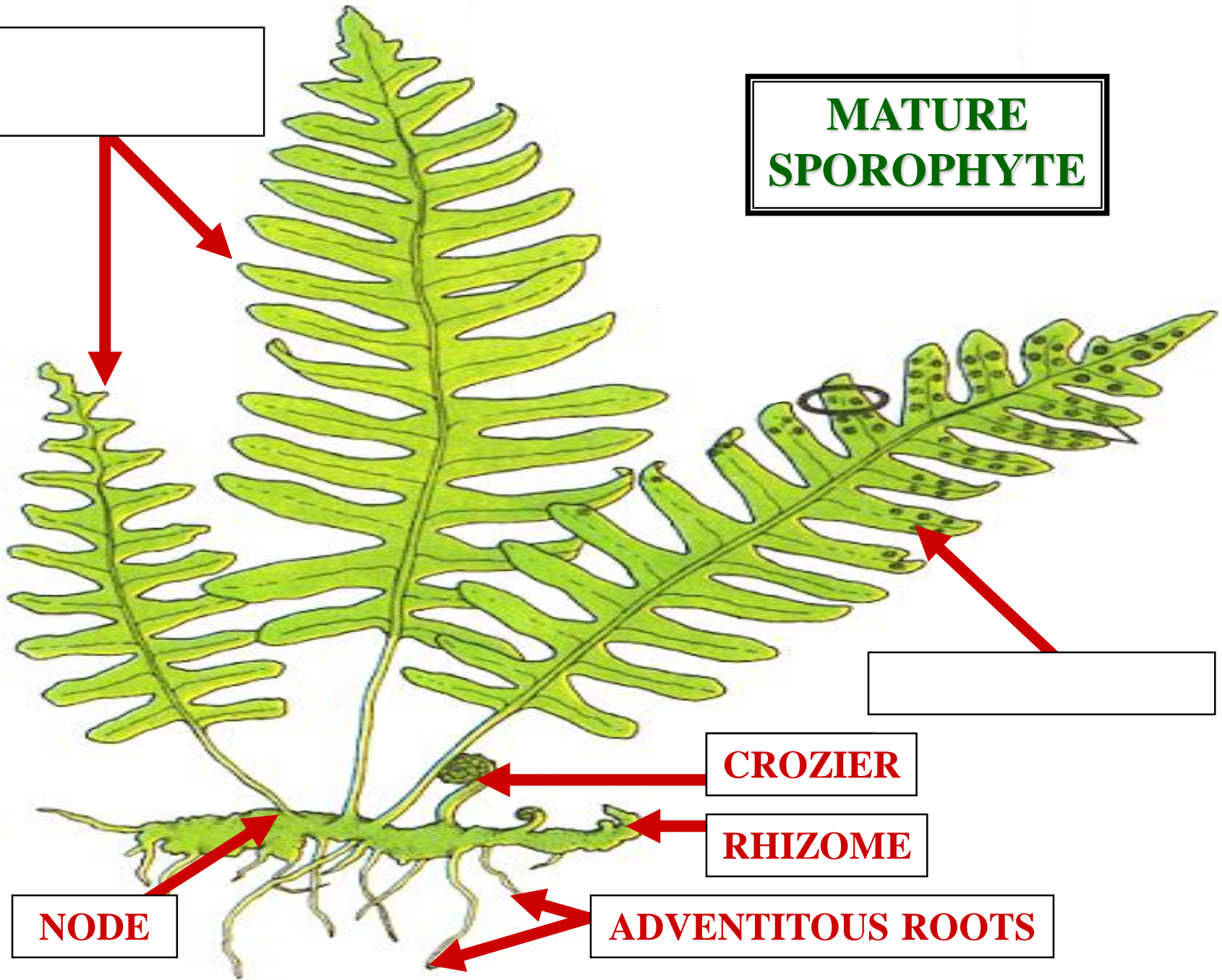
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CROZIER

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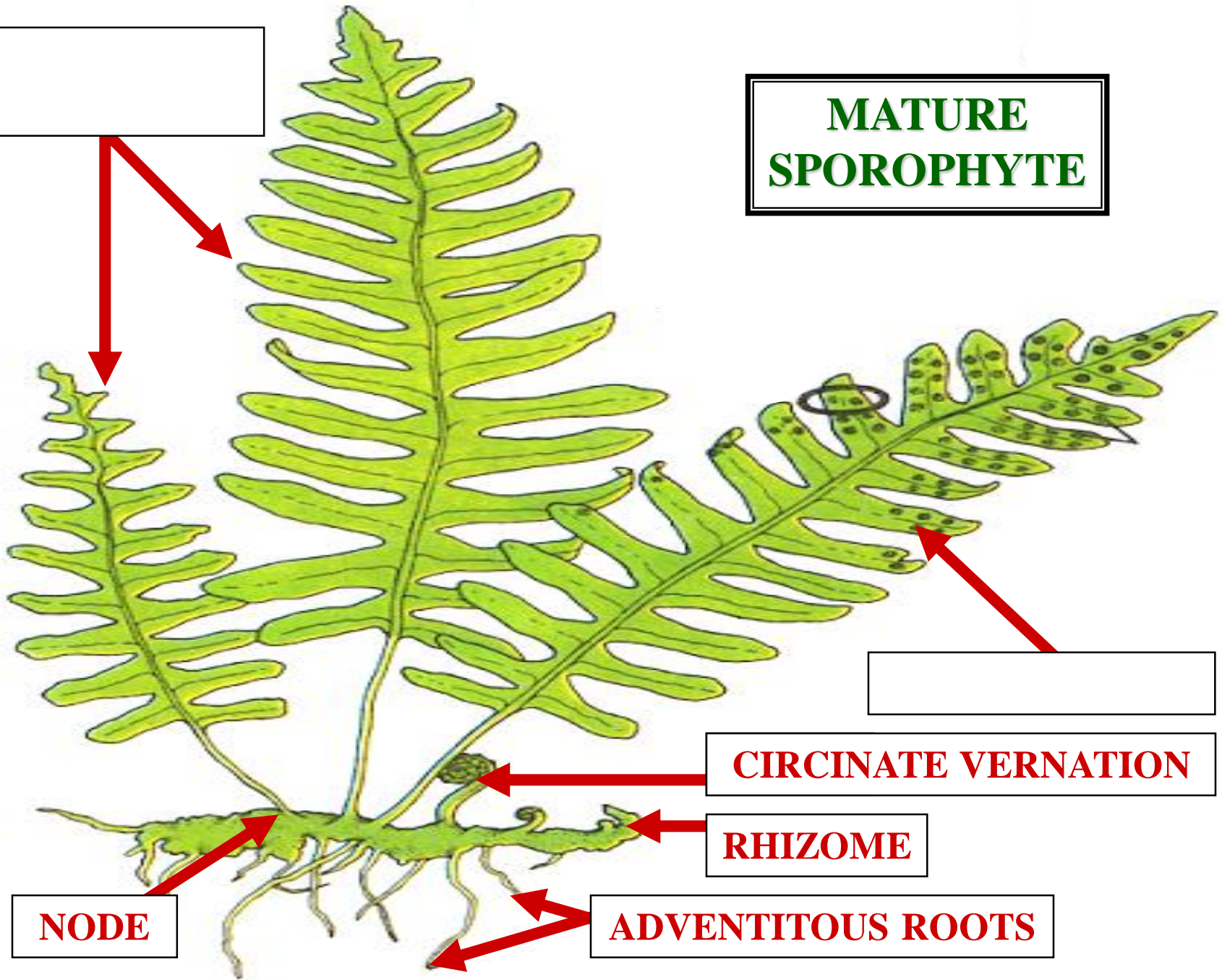
NODE

ADVENTITIOUS ROOTS



**MATURE
SPOROPHYTE**

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CIRCINATE VERNATION

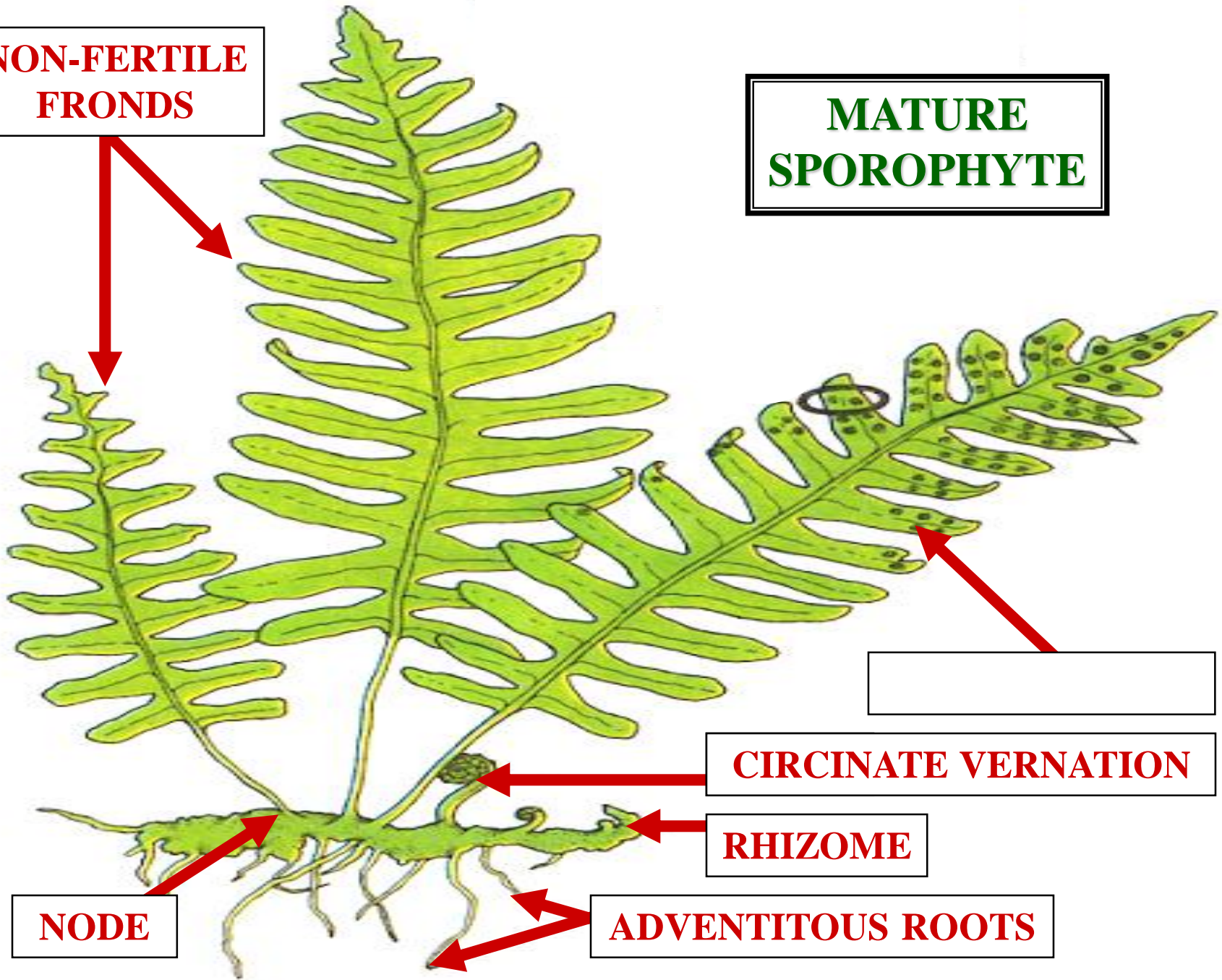
RHIZOME

NODE

ADVENTITIOUS ROOTS

**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**



CIRCINATE VERNATION

RHIZOME

NODE

ADVENTITIOUS ROOTS

**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**

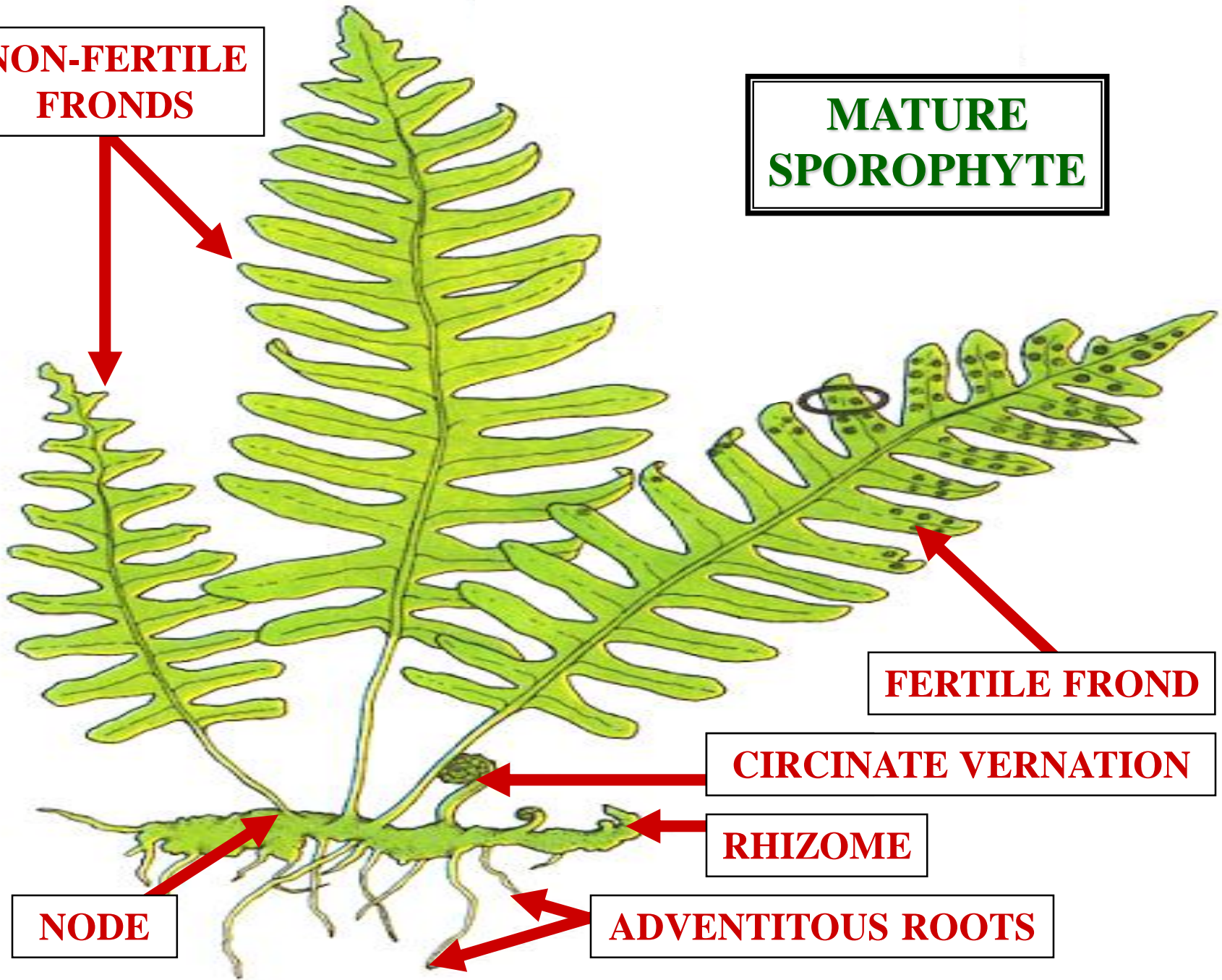
FERTILE FROND

CIRCINATE VERNATION

RHIZOME

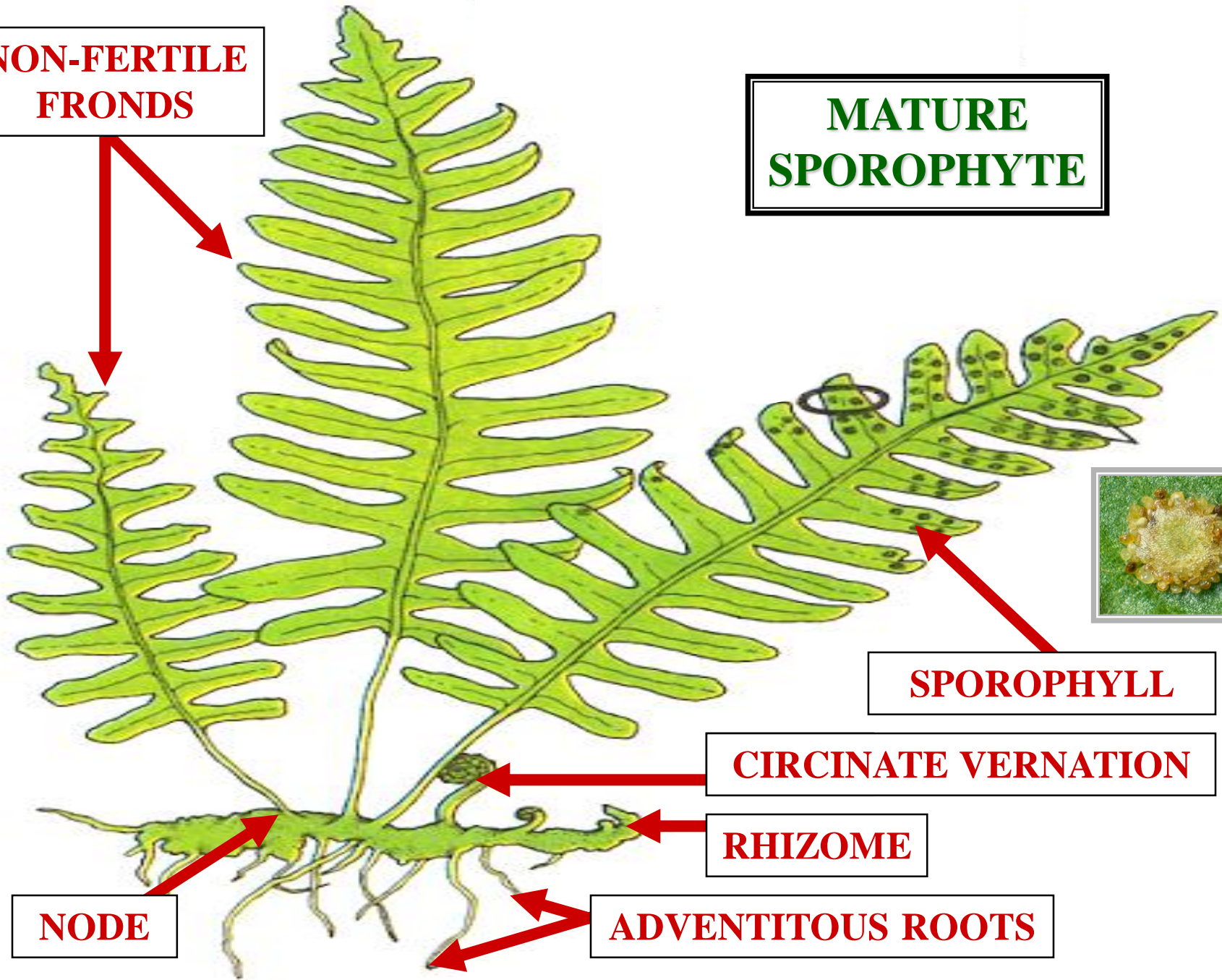
NODE

ADVENTITIOUS ROOTS



**NON-FERTILE
FRONDS**

**MATURE
SPOROPHYTE**



SPOROPHYLL

CIRCINATE VERNATION

RHIZOME

NODE

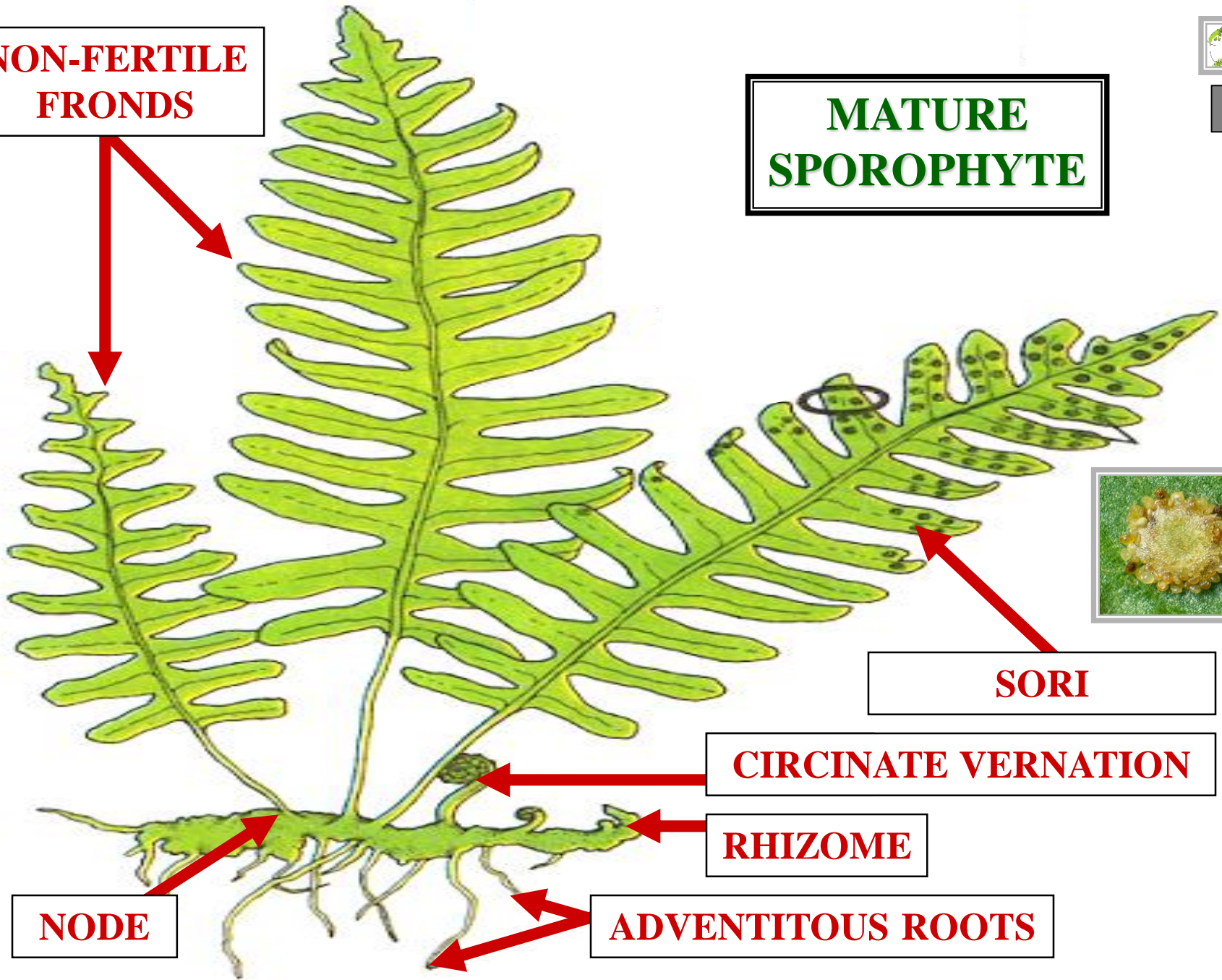
ADVENTITIOUS ROOTS





NON-FERTILE FRONDS

MATURE SPOROPHYTE



SORI

CIRCINATE VERNATION

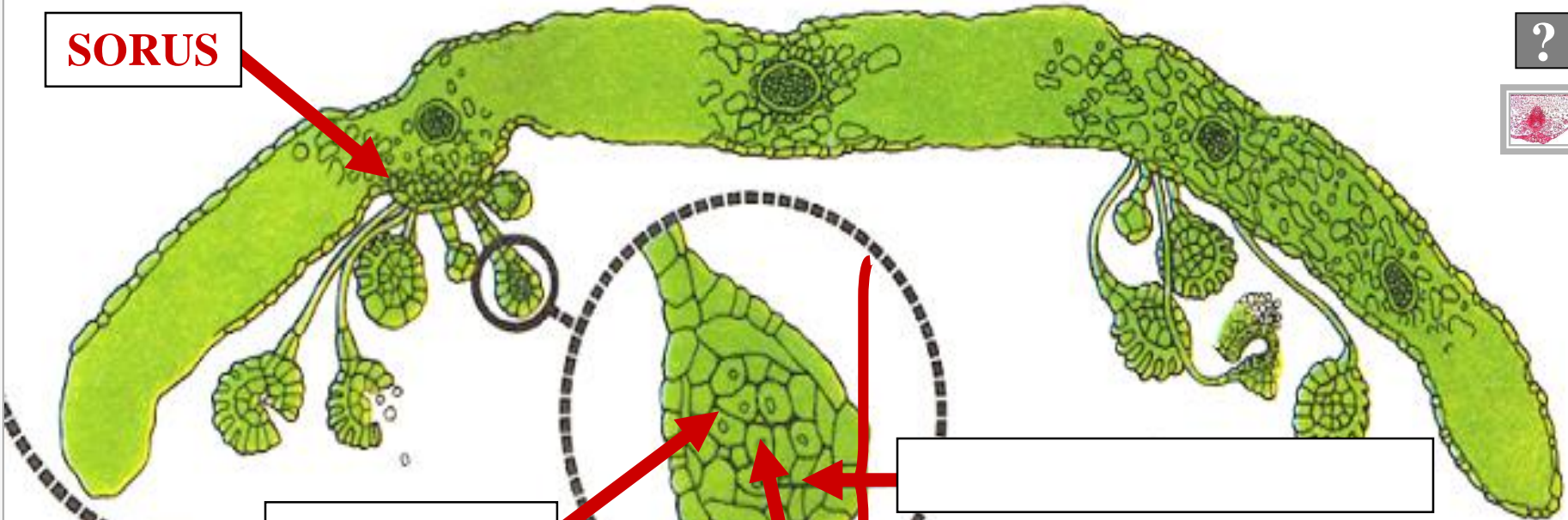
RHIZOME

ADVENTITIOUS ROOTS

NODE



SORUS



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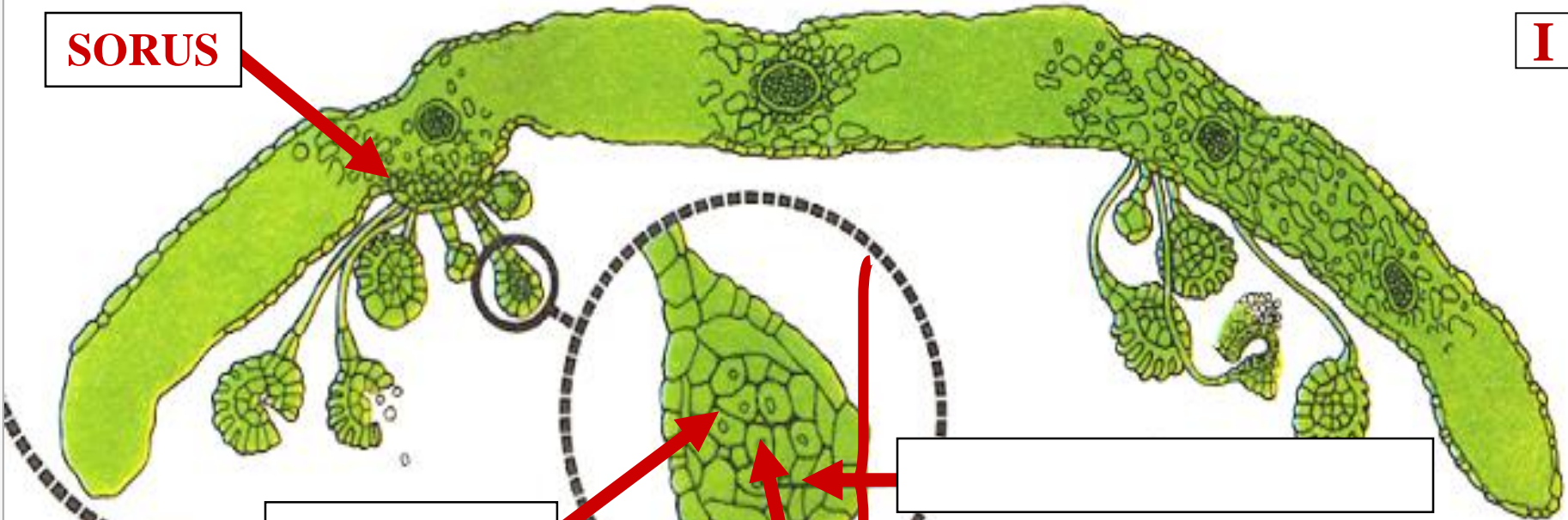
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SORI

MATURE SPOROPHYTE

SORUS



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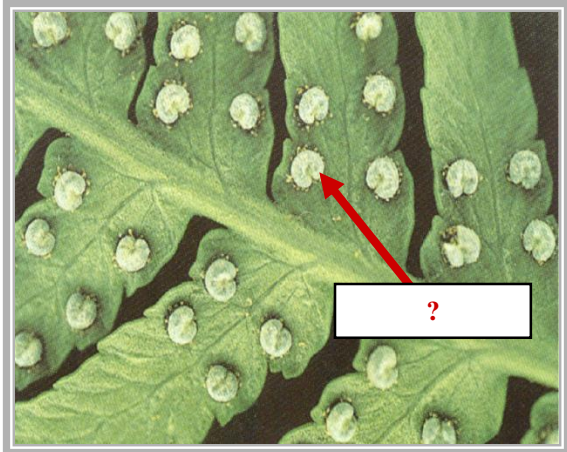
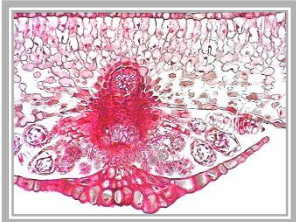
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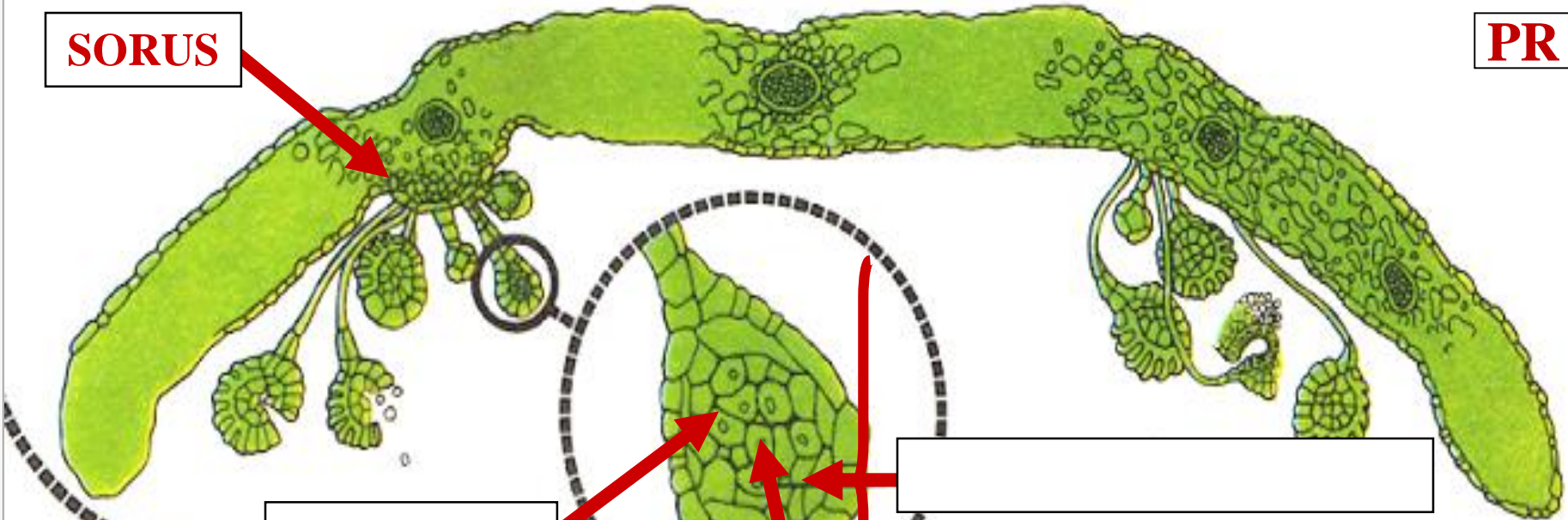
SORI



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SORUS

PR



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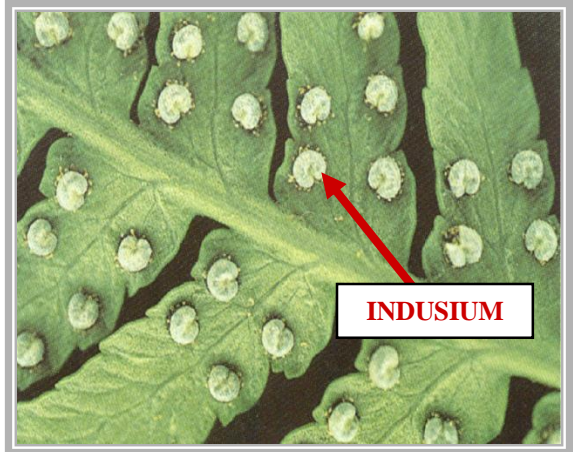
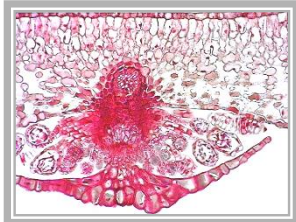
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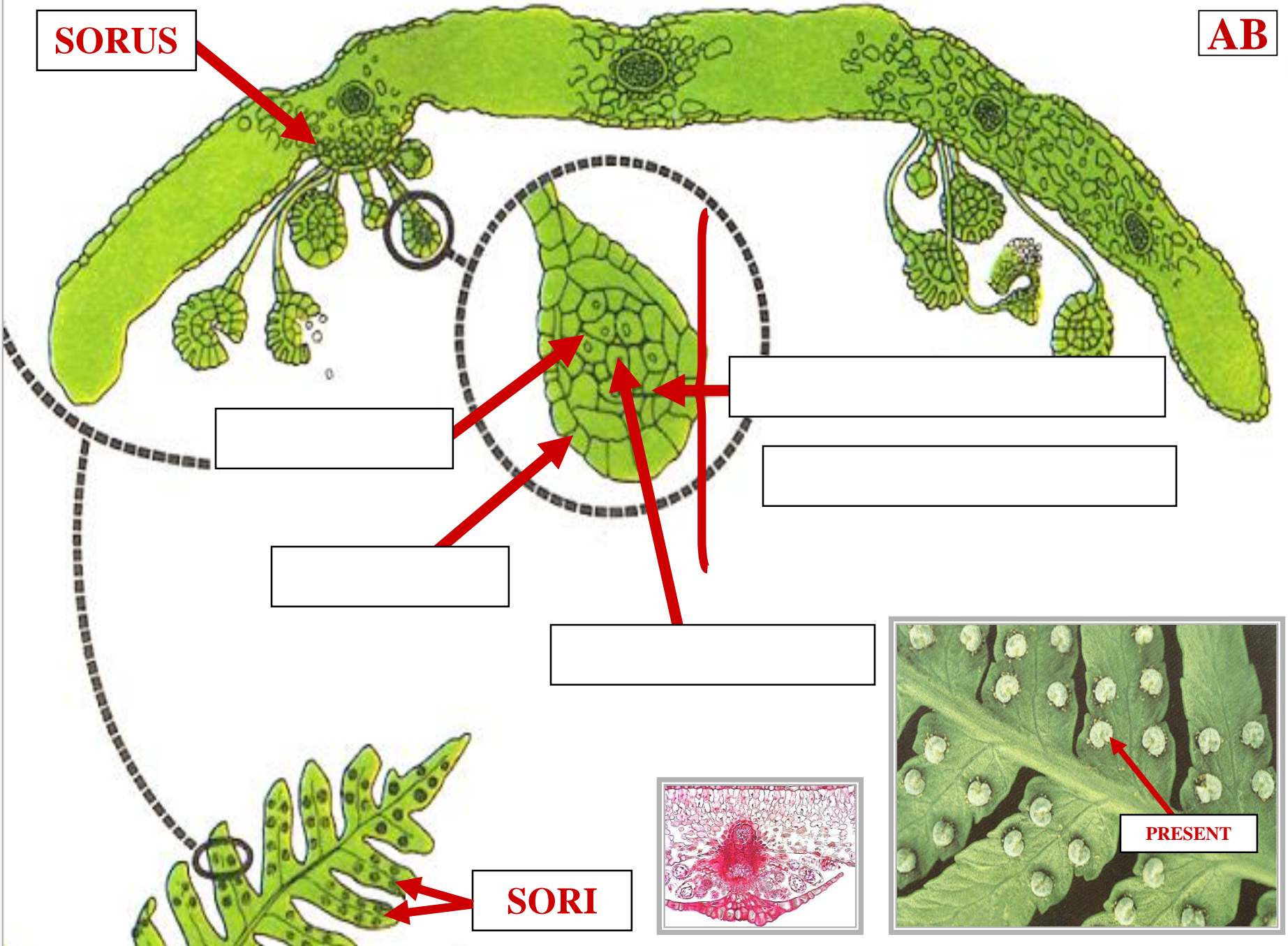
SORI



INDUSIUM

SORUS

AB



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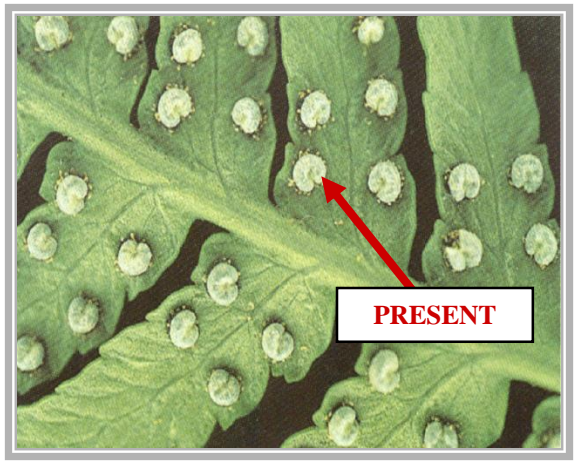
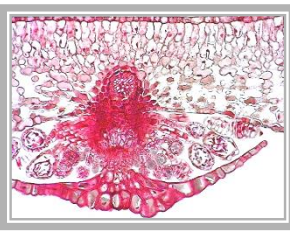
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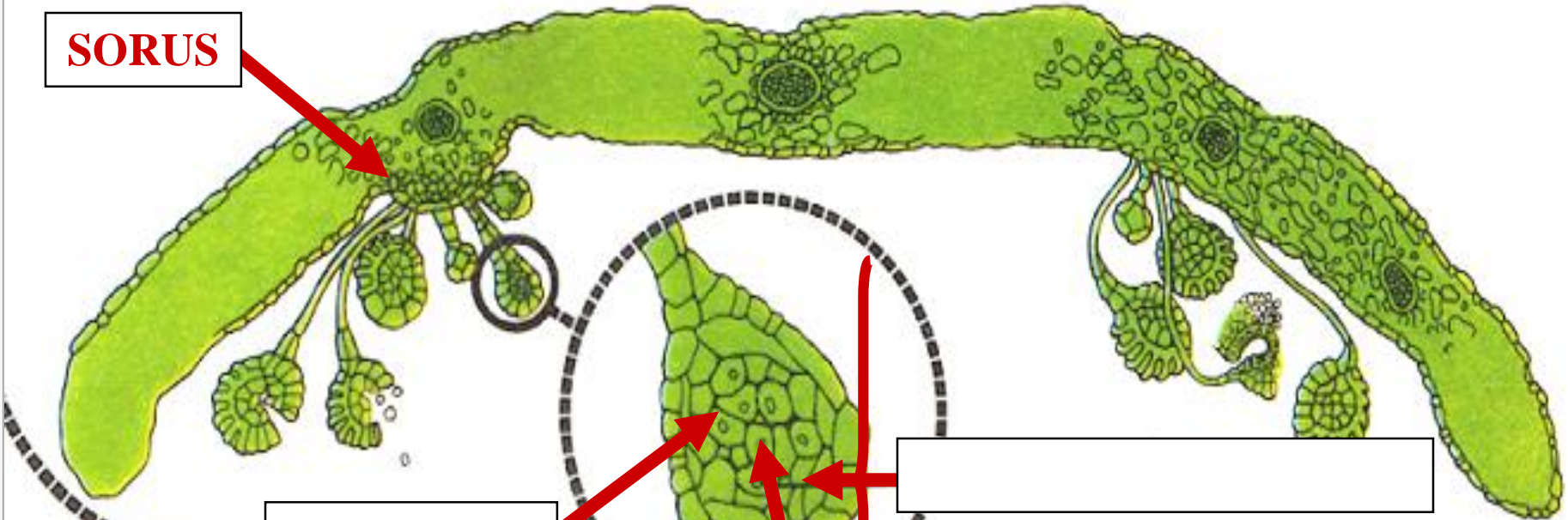
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PRESENT



SORUS



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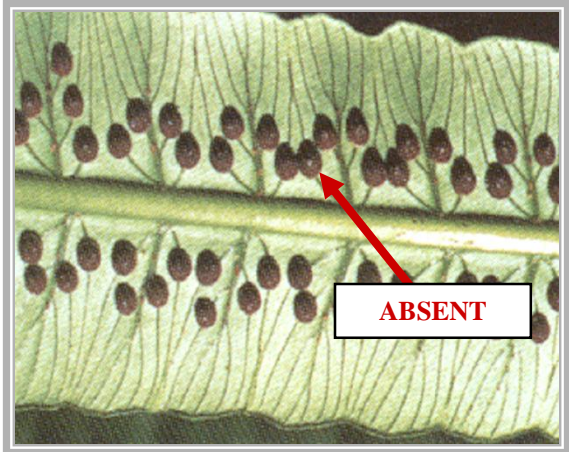
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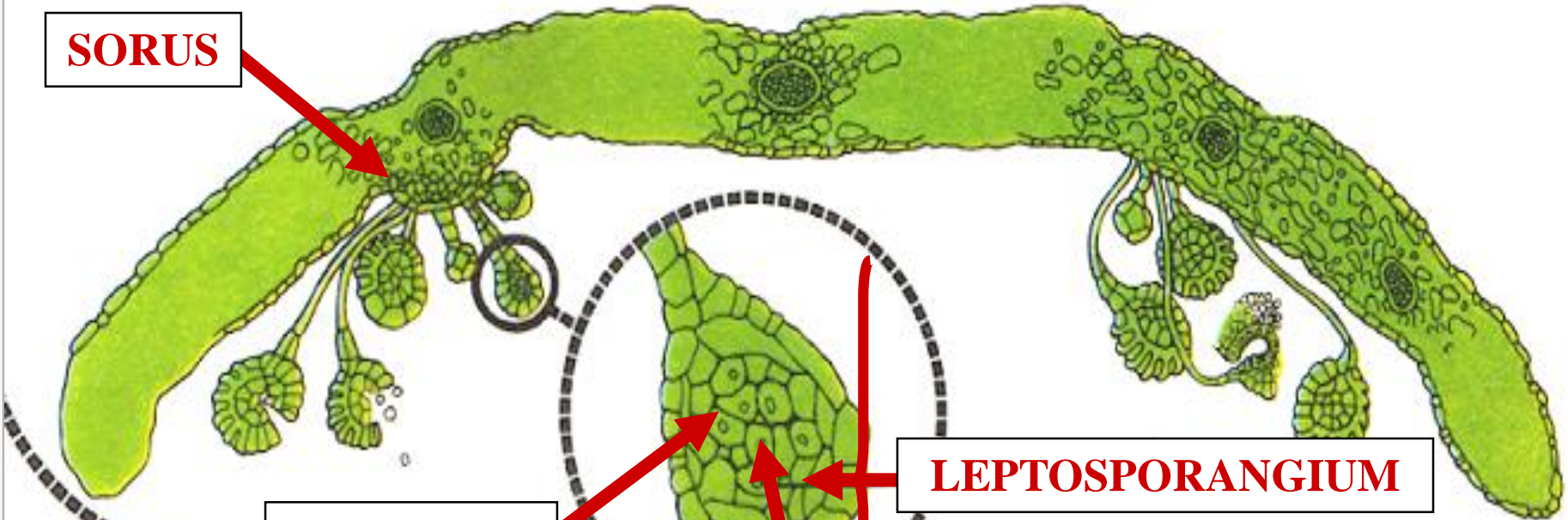


SORI



ABSENT

SORUS



LEPTOSPORANGIUM

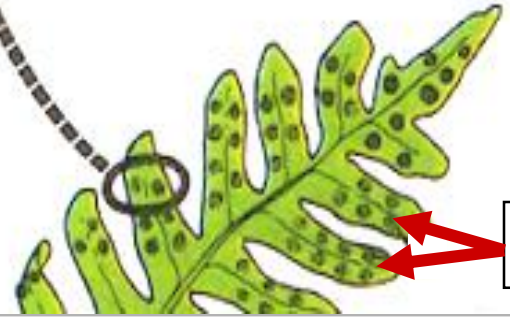
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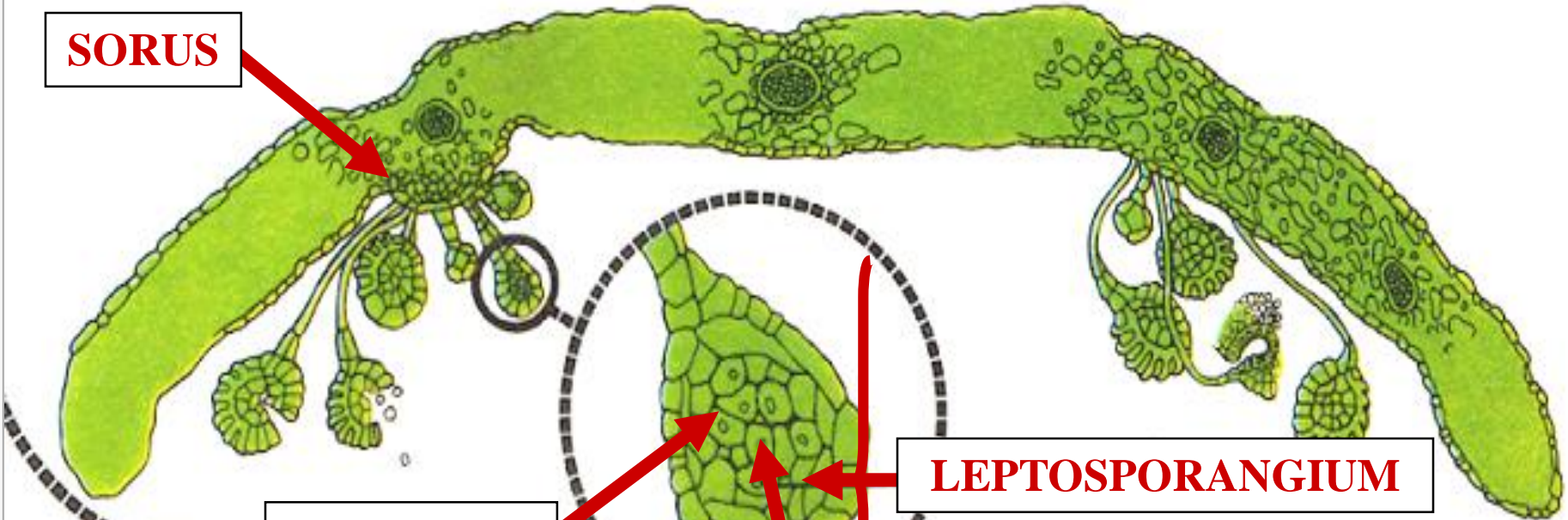
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**MATURE
SPOROPHYTE**



SORI

SORUS



LEPTOSPORANGIUM

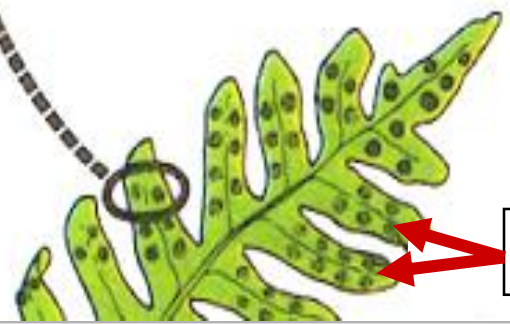
ABAXIAL SURFACE

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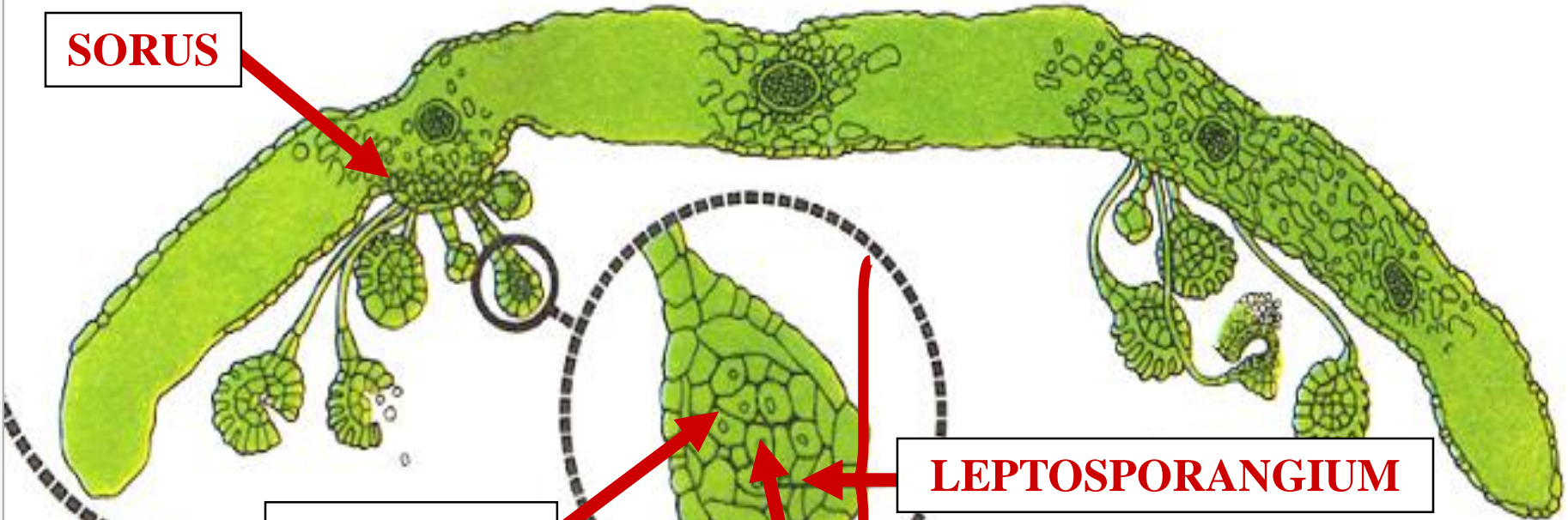
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MATURE SPOROPHYTE



SORI

SORUS



LEPTOSPORANGIUM

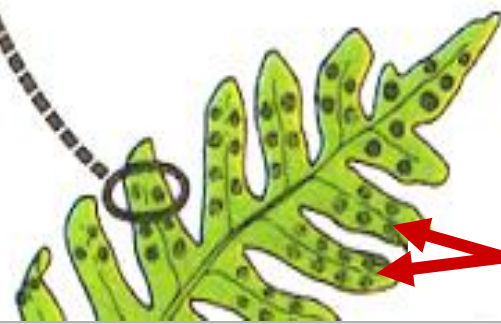
ABAXIAL SURFACE

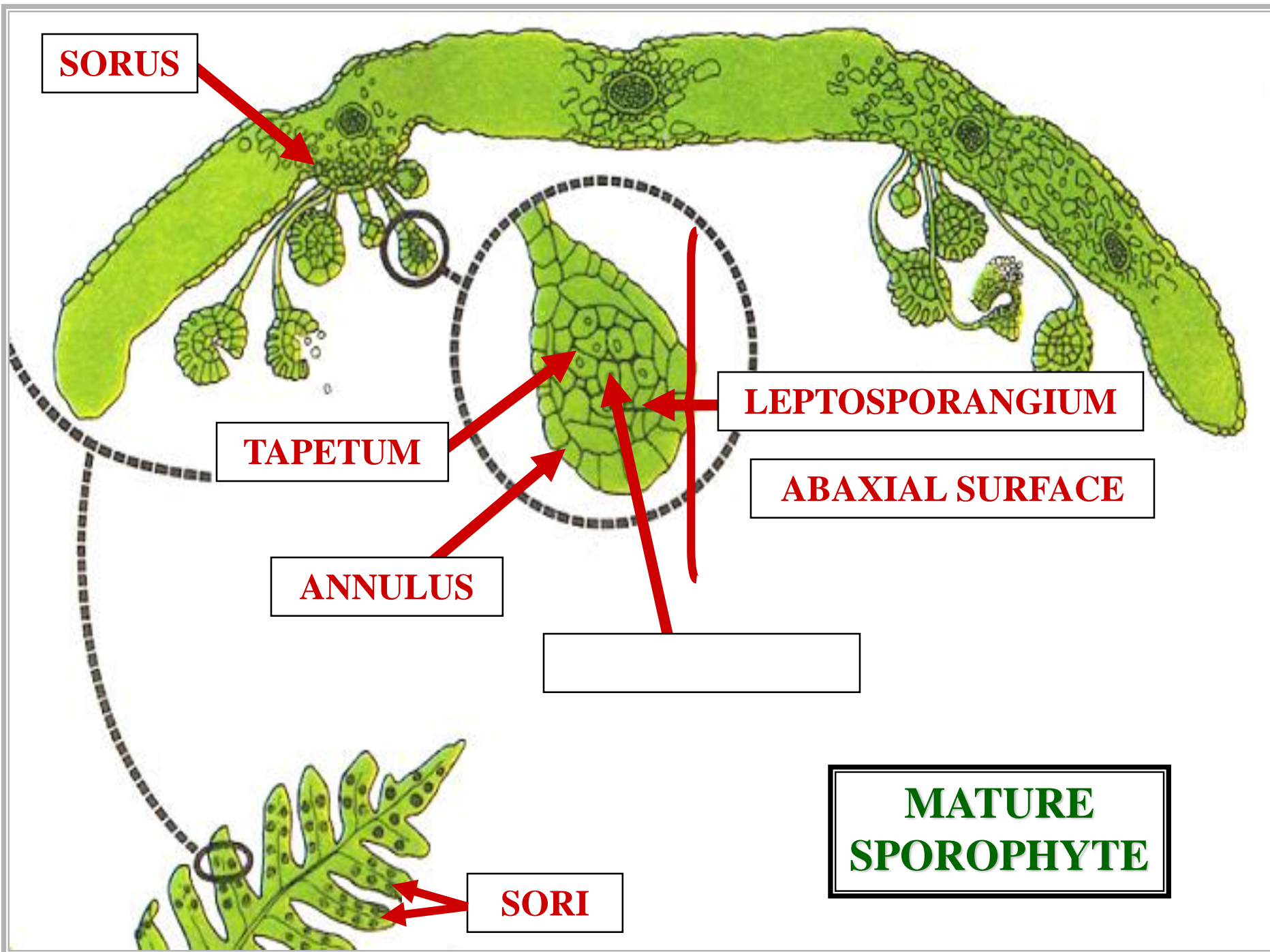
ANNULUS

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MATURE SPOROPHYTE

SORI





SORUS

TAPETUM

ANNULUS

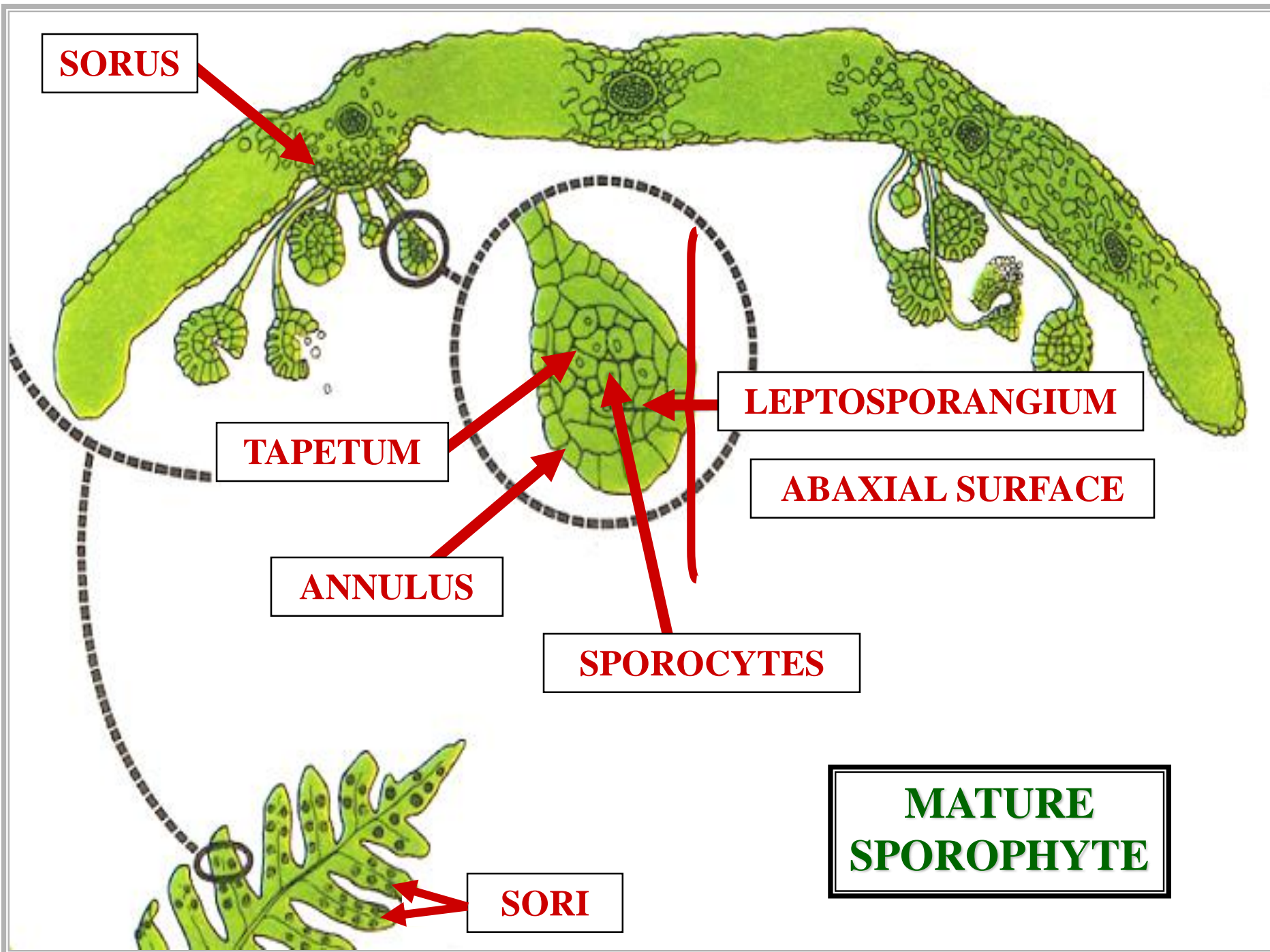
LEPTOSPORANGIUM

ABAXIAL SURFACE

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MATURE SPOROPHYTE

SORI



SORUS

TAPETUM

ANNULUS

LEPTOSPORANGIUM

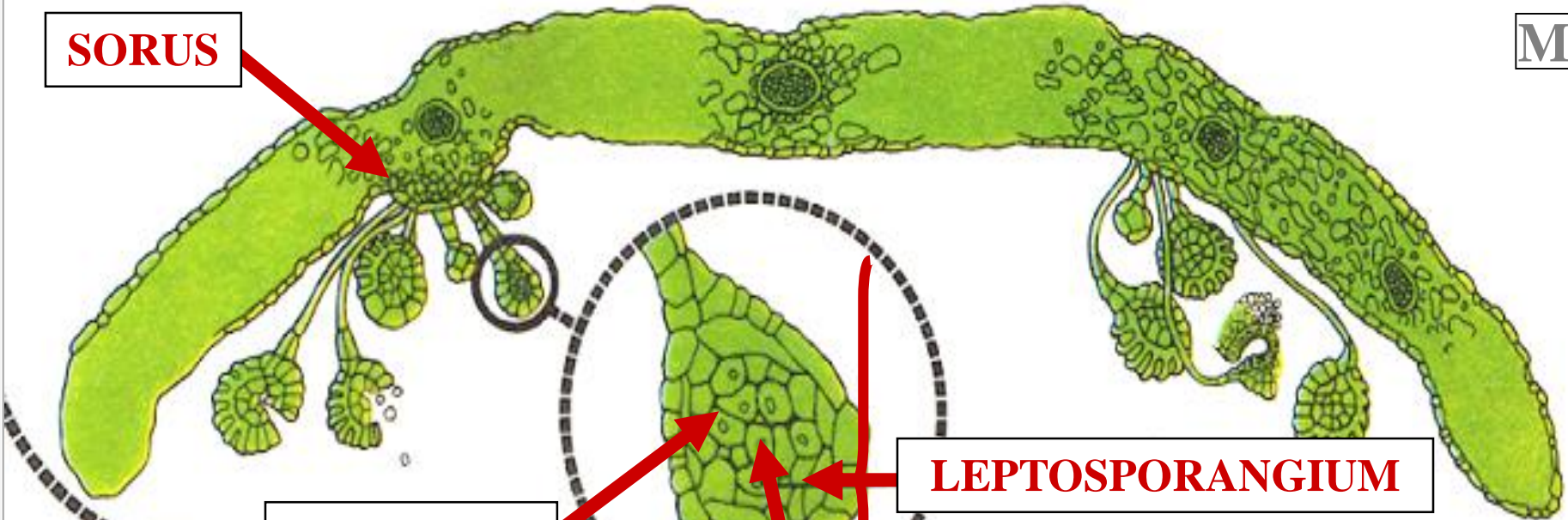
ABAXIAL SURFACE

SPOROCYTES

**MATURE
SPOROPHYTE**

SORI

SORUS



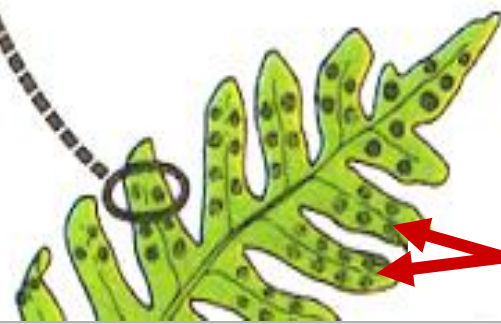
TAPETUM

LEPTOSPORANGIUM

ABAXIAL SURFACE

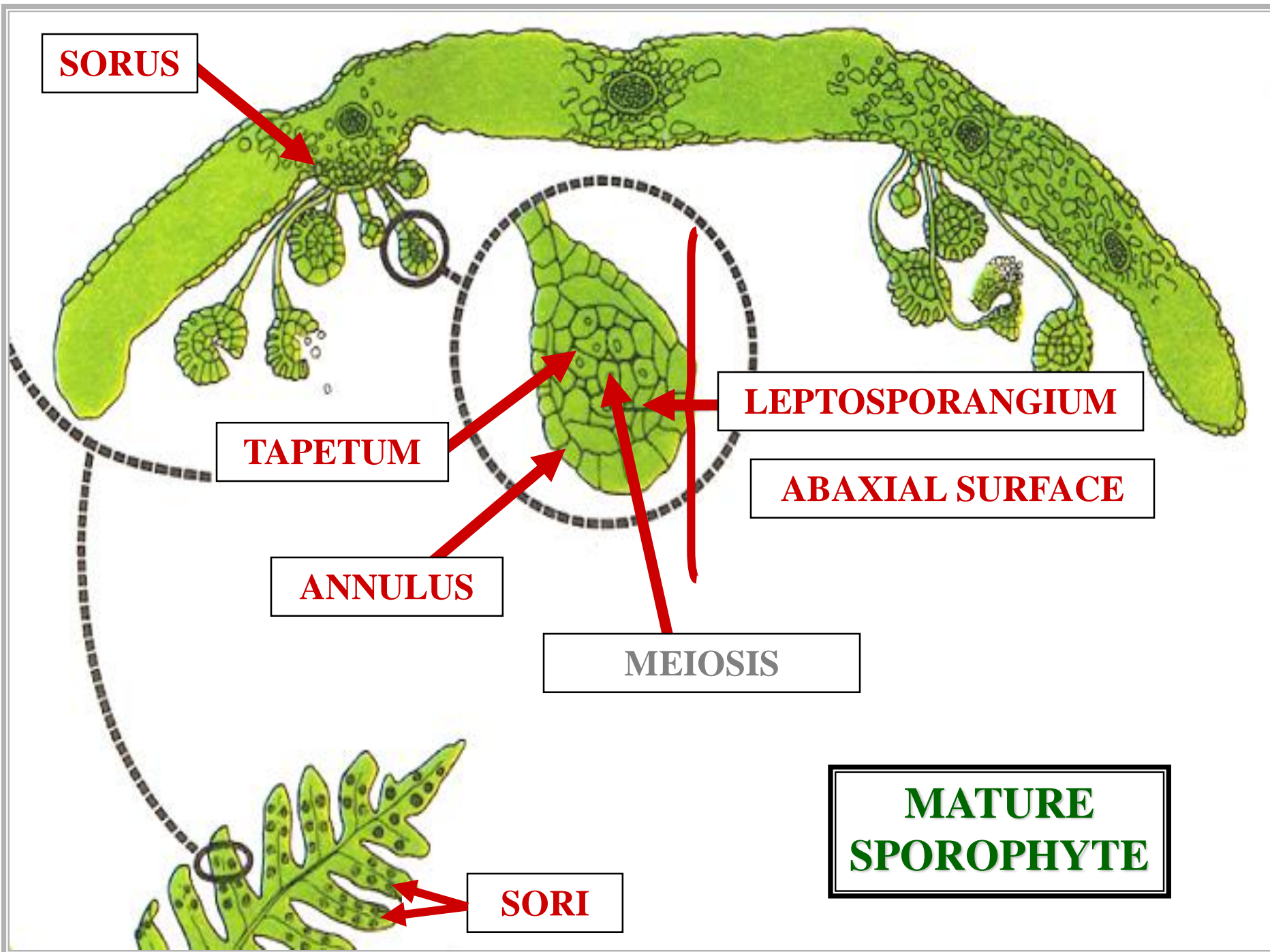
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2N



SORI

**MATURE
SPOROPHYTE**



SORUS

TAPETUM

ANNULUS

LEPTOSPORANGIUM

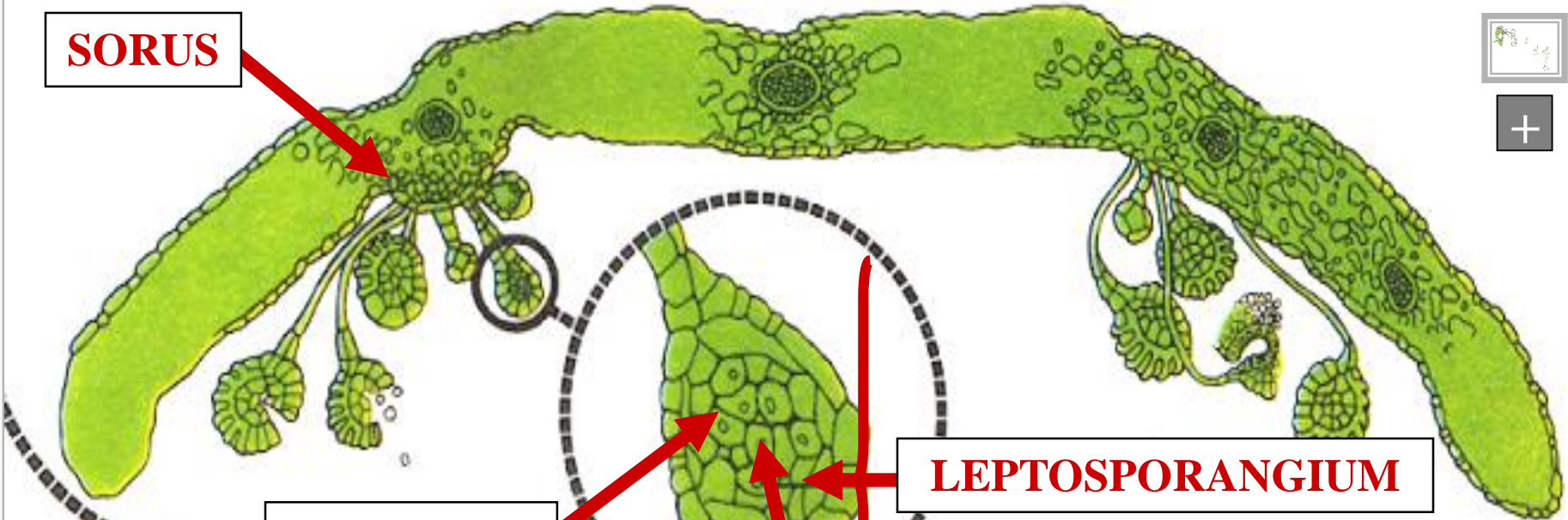
ABAXIAL SURFACE

MEIOSIS

MATURE SPOROPHYTE

SORI

SORUS



TAPETUM

LEPTOSPORANGIUM

ABAXIAL SURFACE

ANNULUS

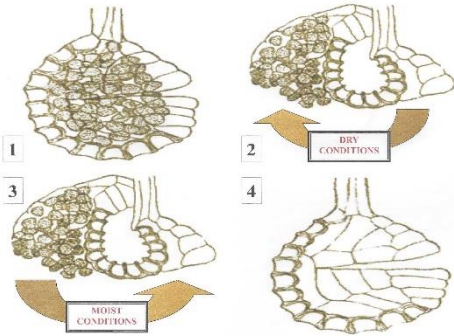
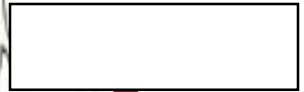
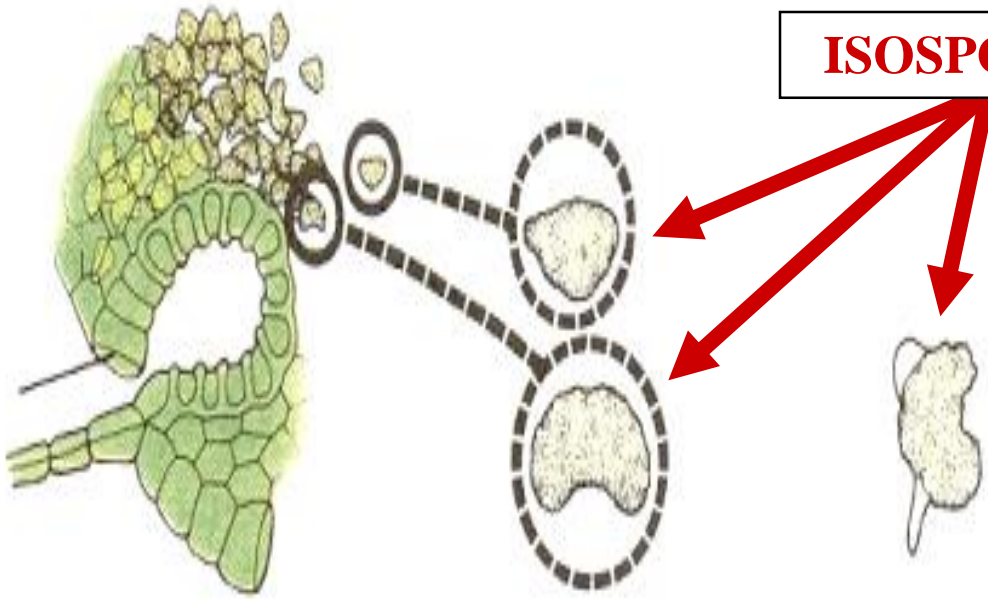
ISOSPORES

**MATURE
SPOROPHYTE**

SORI



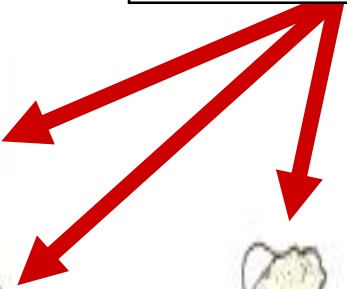
ISOSPORES



**MATURE
GAMETOPHYTE**



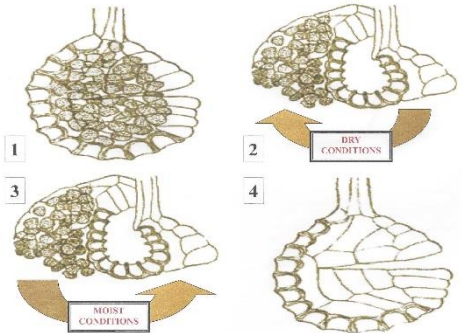
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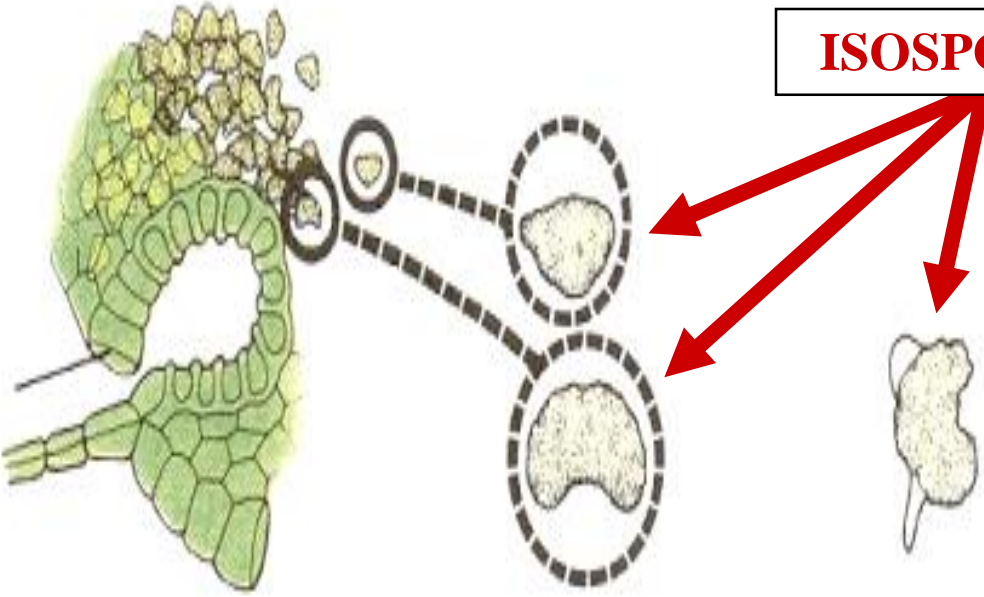


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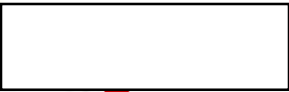


**MATURE
GAMETOPHYTE**

ISOSPORES

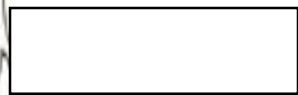
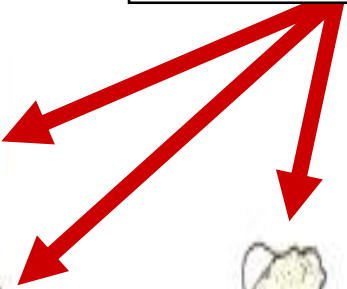
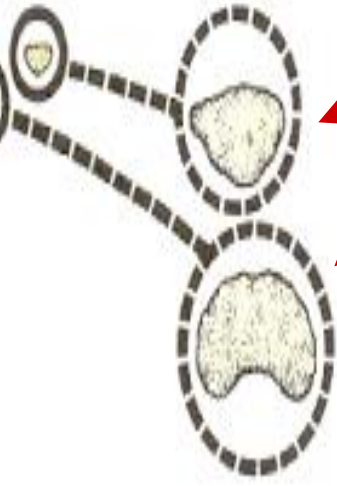


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DISPERSAL**



**MATURE
GAMETOPHYTE**

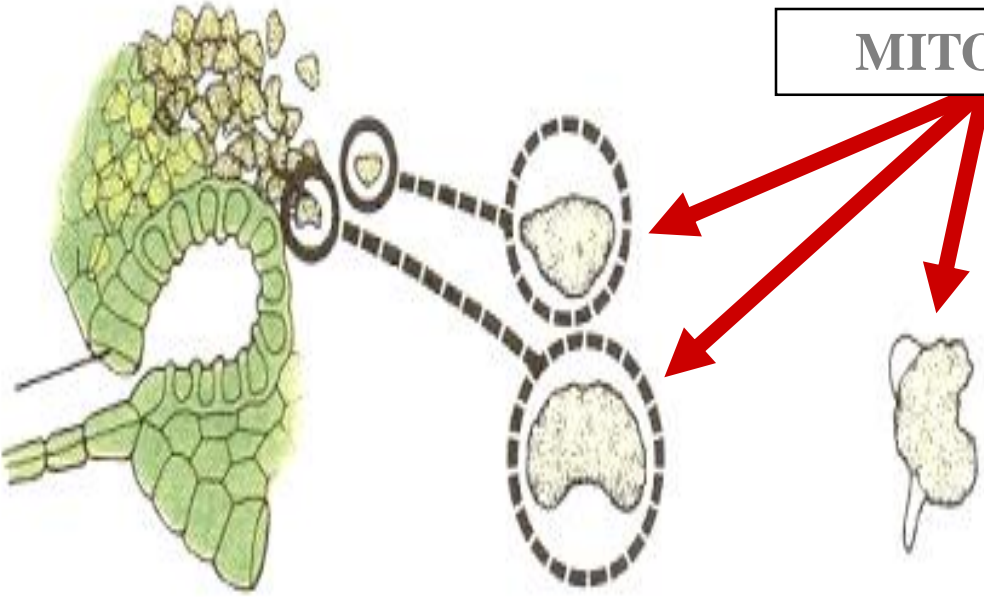
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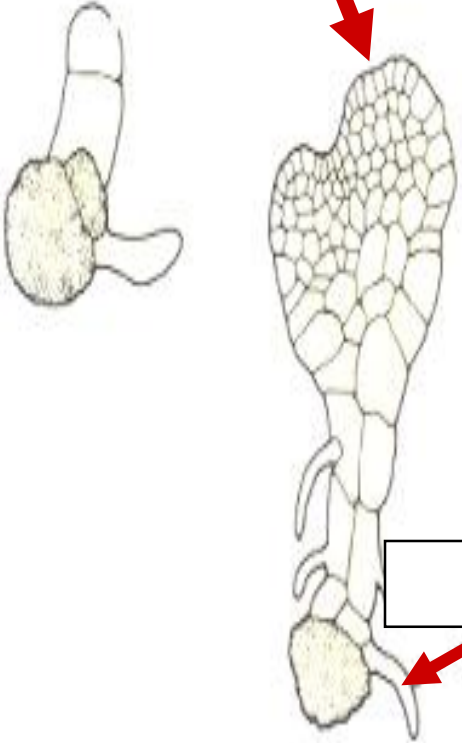
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GAMETOPHYTE**

MITOSIS



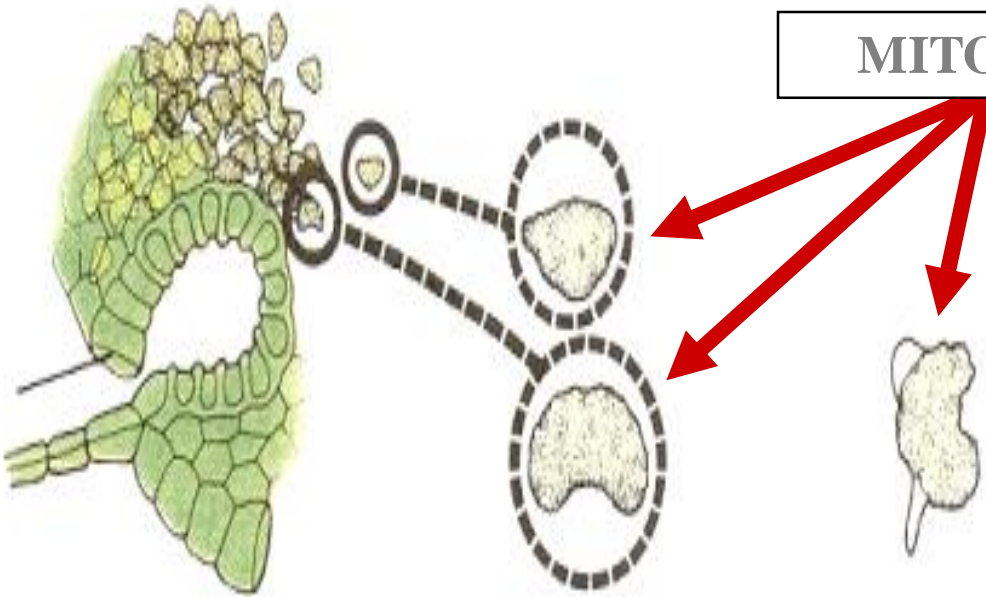
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**YOUNG
GAMETOPHYTE**



**MATURE
GAMETOPHYTE**

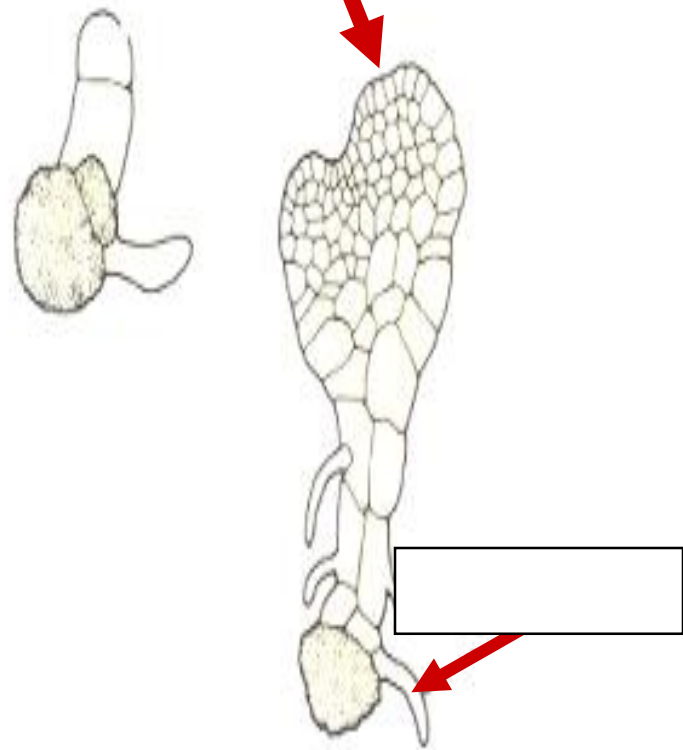
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**ISOSPORES
CATAPULT
DISPERSAL**

**MATURE
GAMETOPHYTE**

MITOSIS



**MATURE
GAMETOPHYTE**



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GAMETOPHYTE

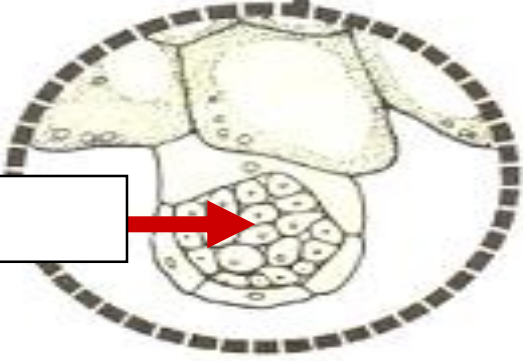
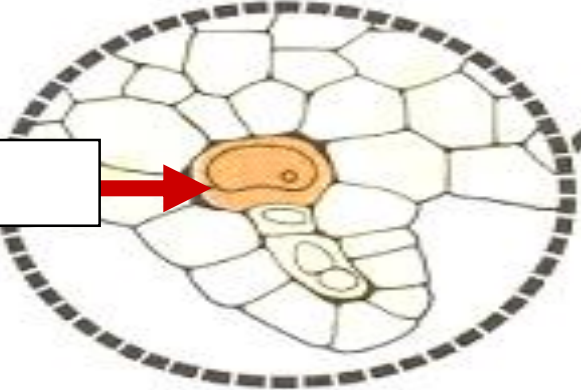
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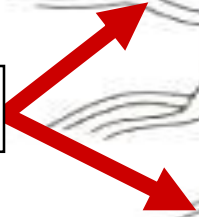
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**MATURE
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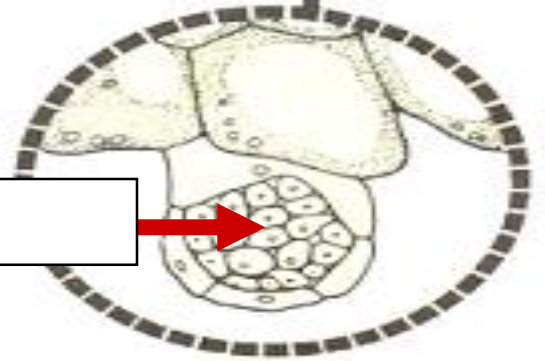
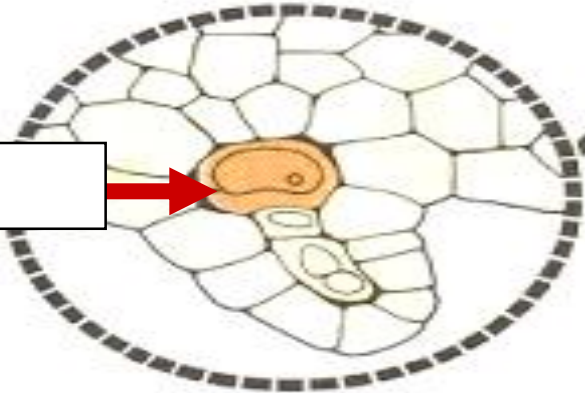
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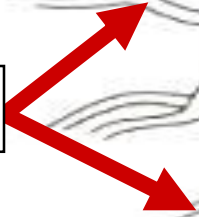


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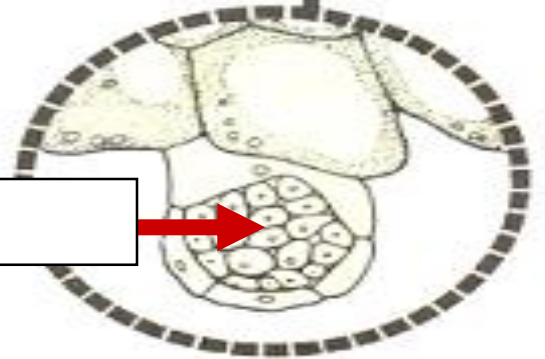
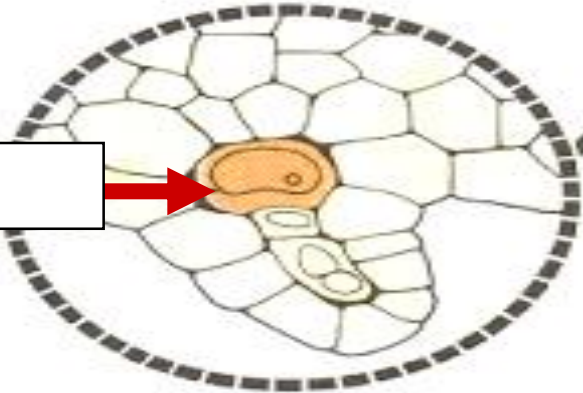
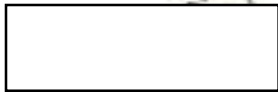
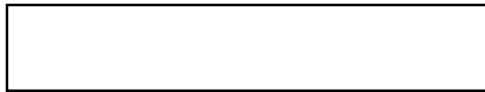
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**MATURE
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EXOSPORIC



**MATURE
GAMETOPHYTE**



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EPITERRANEAN

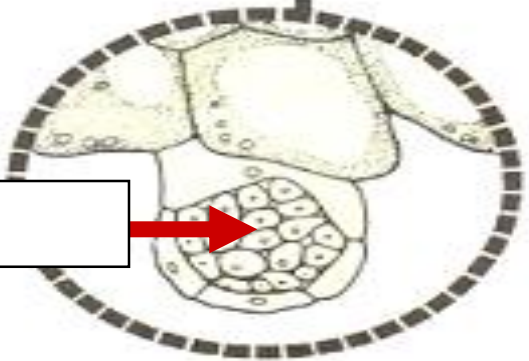
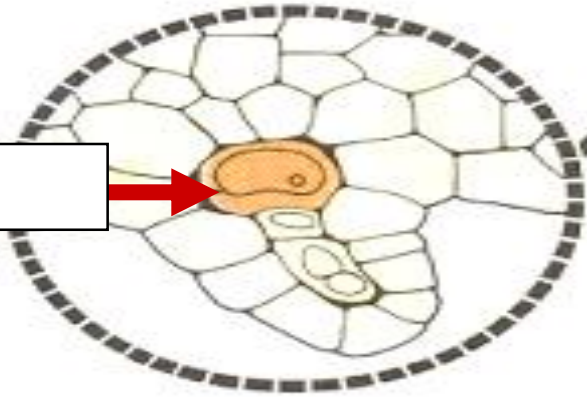
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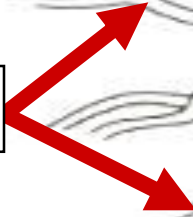
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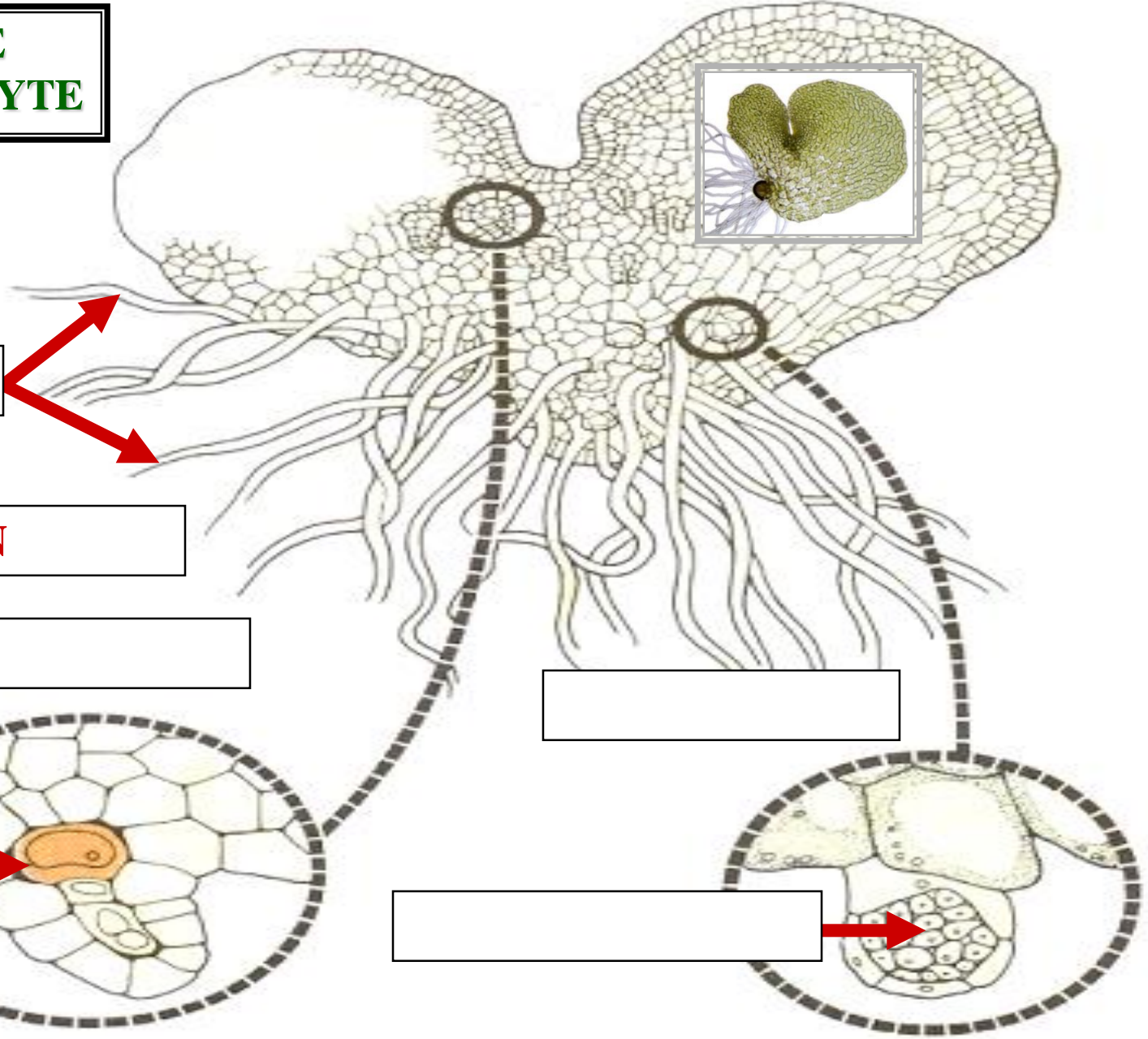
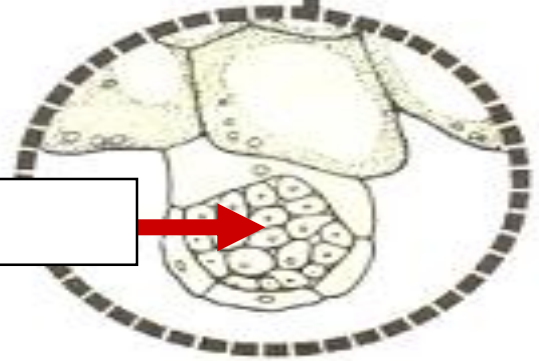
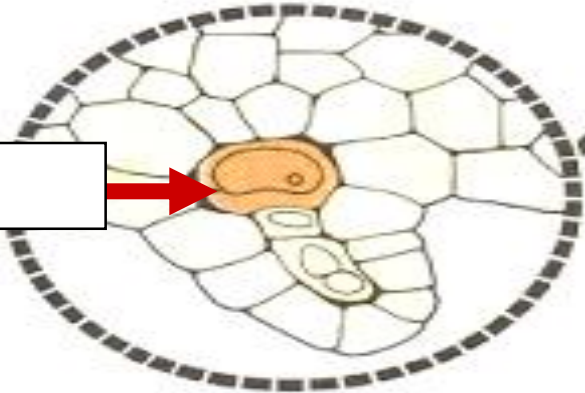
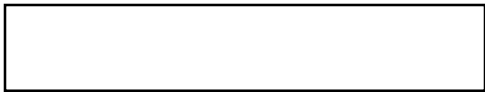
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**MATURE
GAMETOPHYTE**



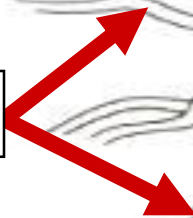
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**MATURE
GAMETOPHYTE**



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HEART-SHAPE

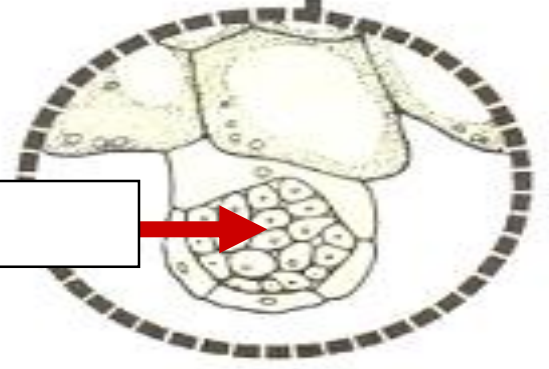
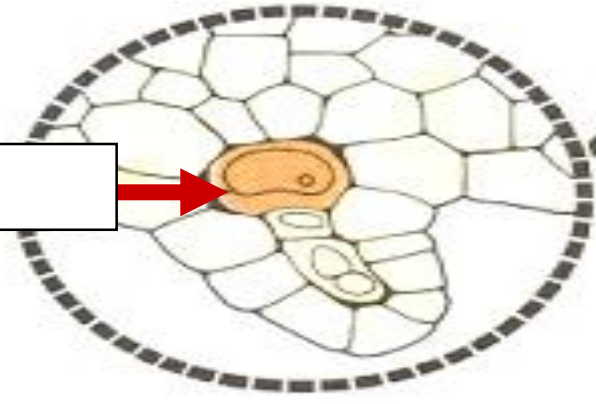
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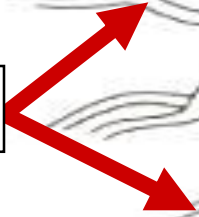
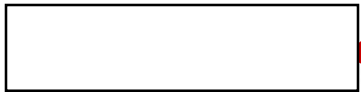


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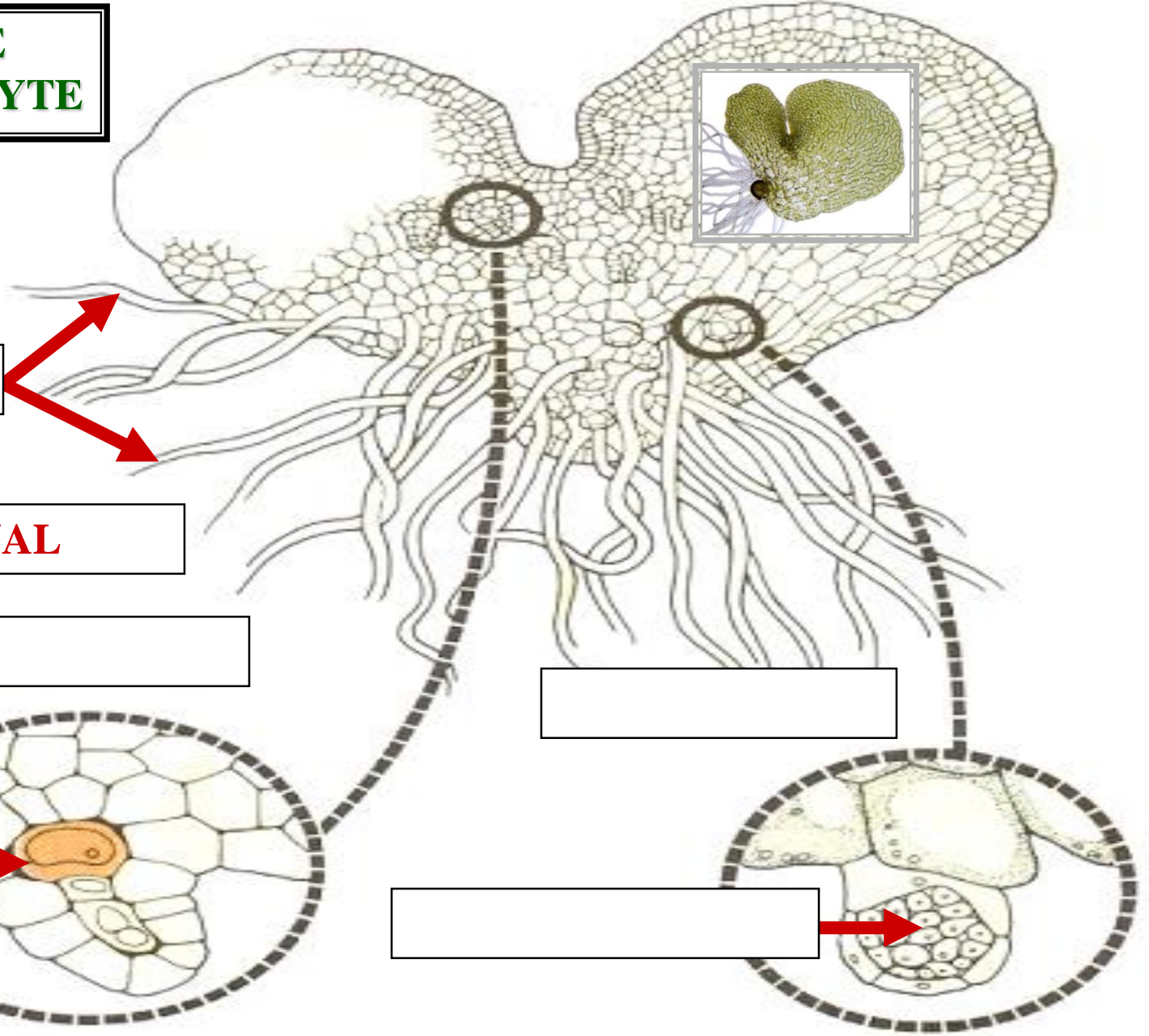
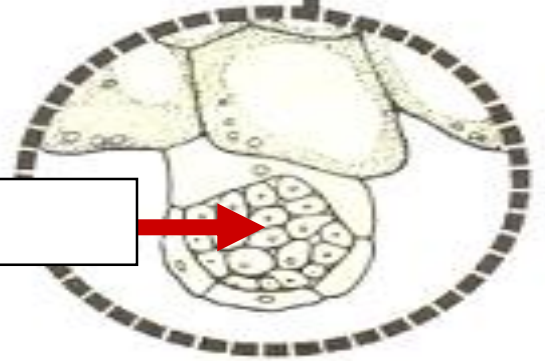
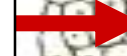
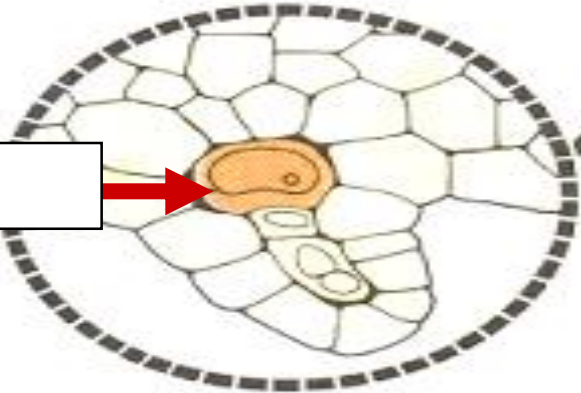
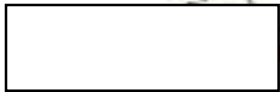
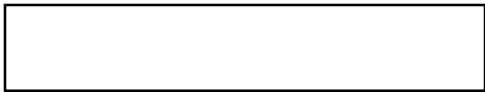
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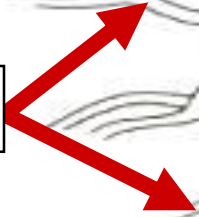
**MATURE
GAMETOPHYTE**



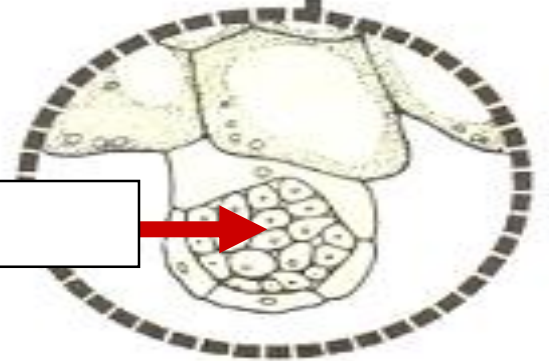
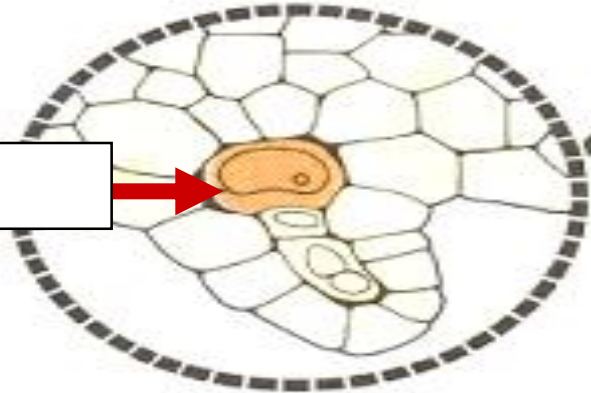
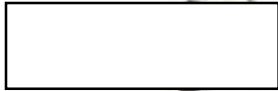
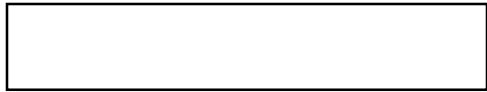
BISEXUAL



**MATURE
GAMETOPHYTE**



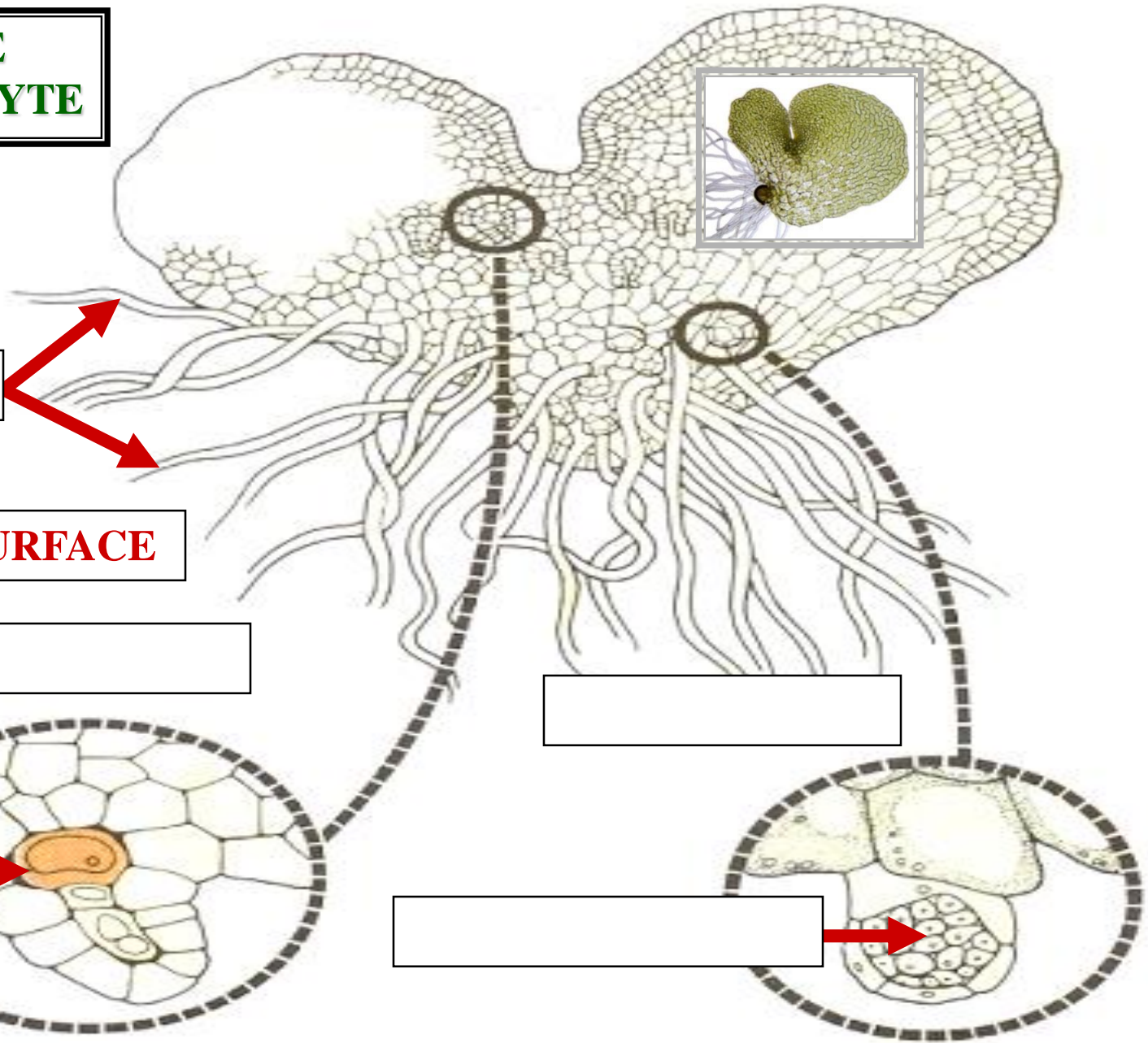
ABAXIAL SURFACE



**MATURE
GAMETOPHYTE**

RHIZOIDS

ABAXIAL SURFACE

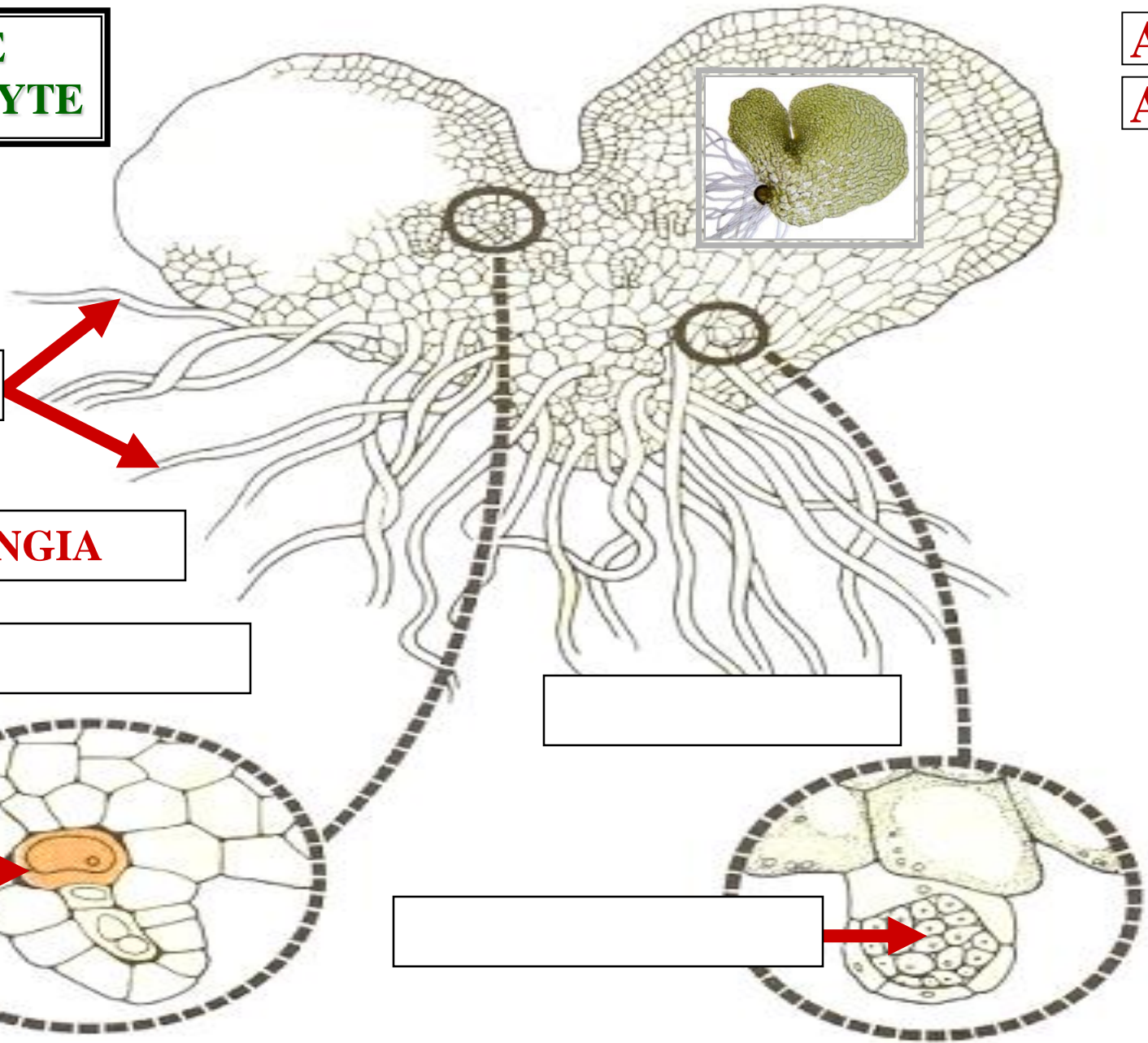
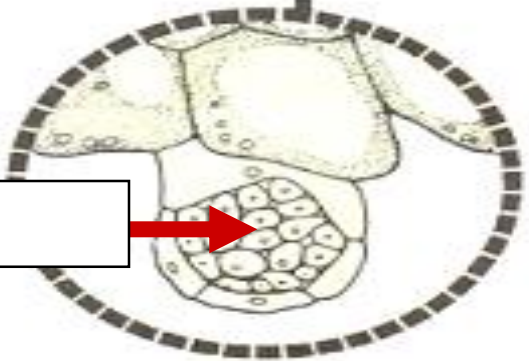
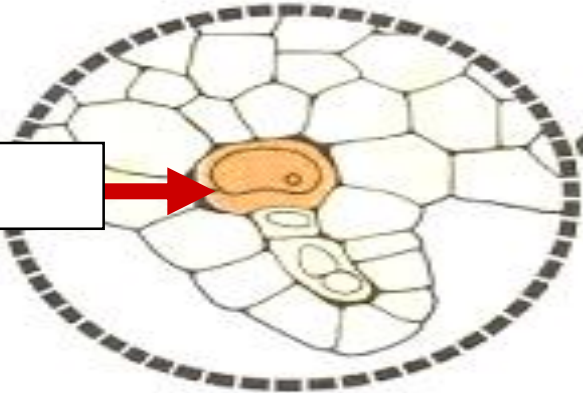
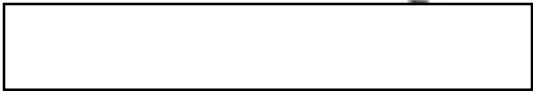
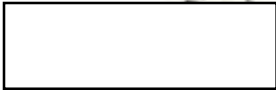


**MATURE
GAMETOPHYTE**

A
A

RHIZOIDS

GAMETANGIA



**MATURE
GAMETOPHYTE**



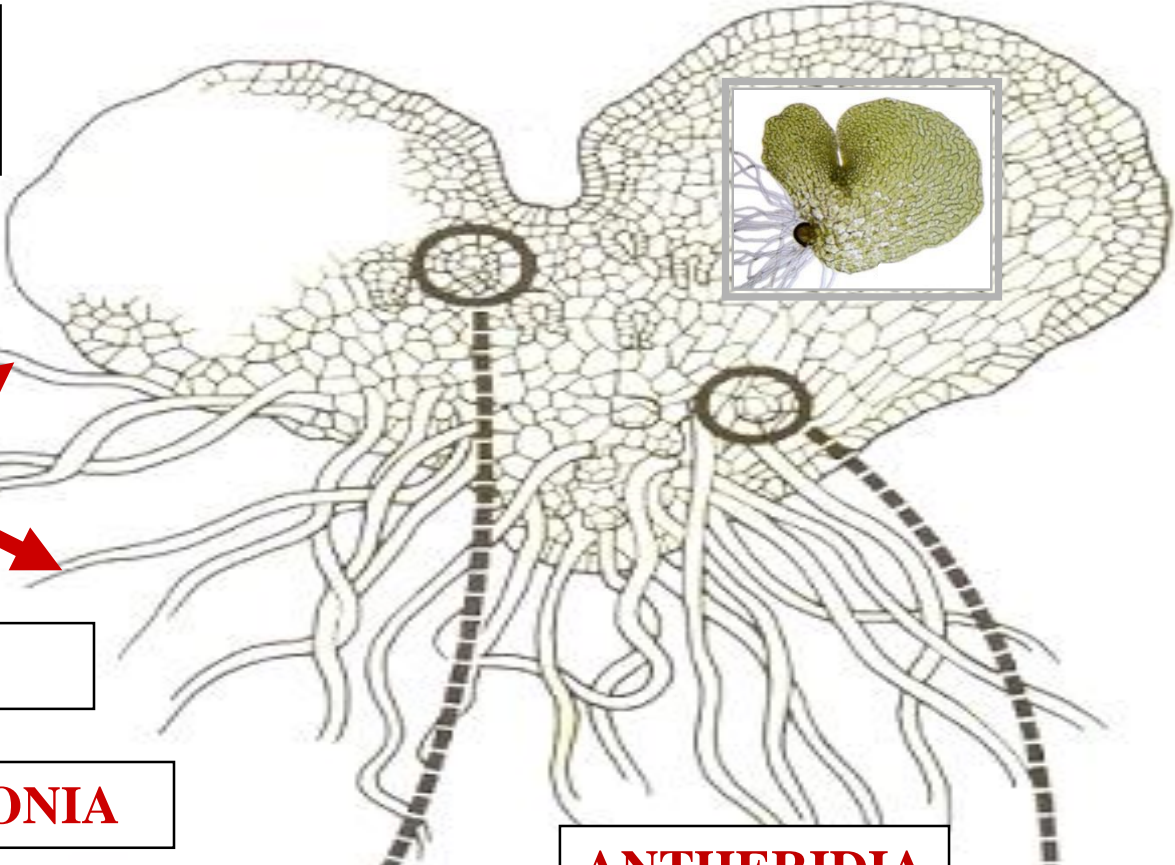
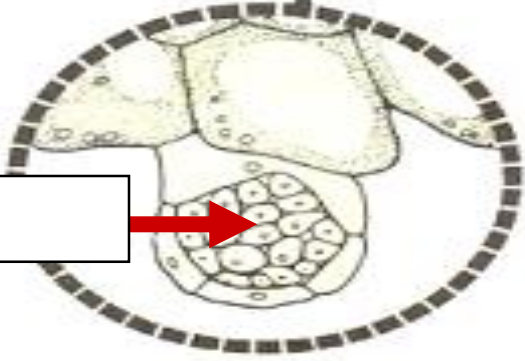
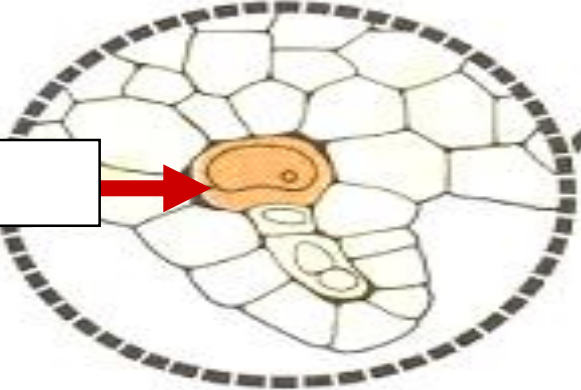
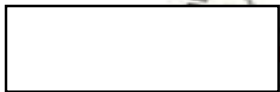
RHIZOIDS



GAMETANGIA

ARCHEGONIA

ANTHERIDIA

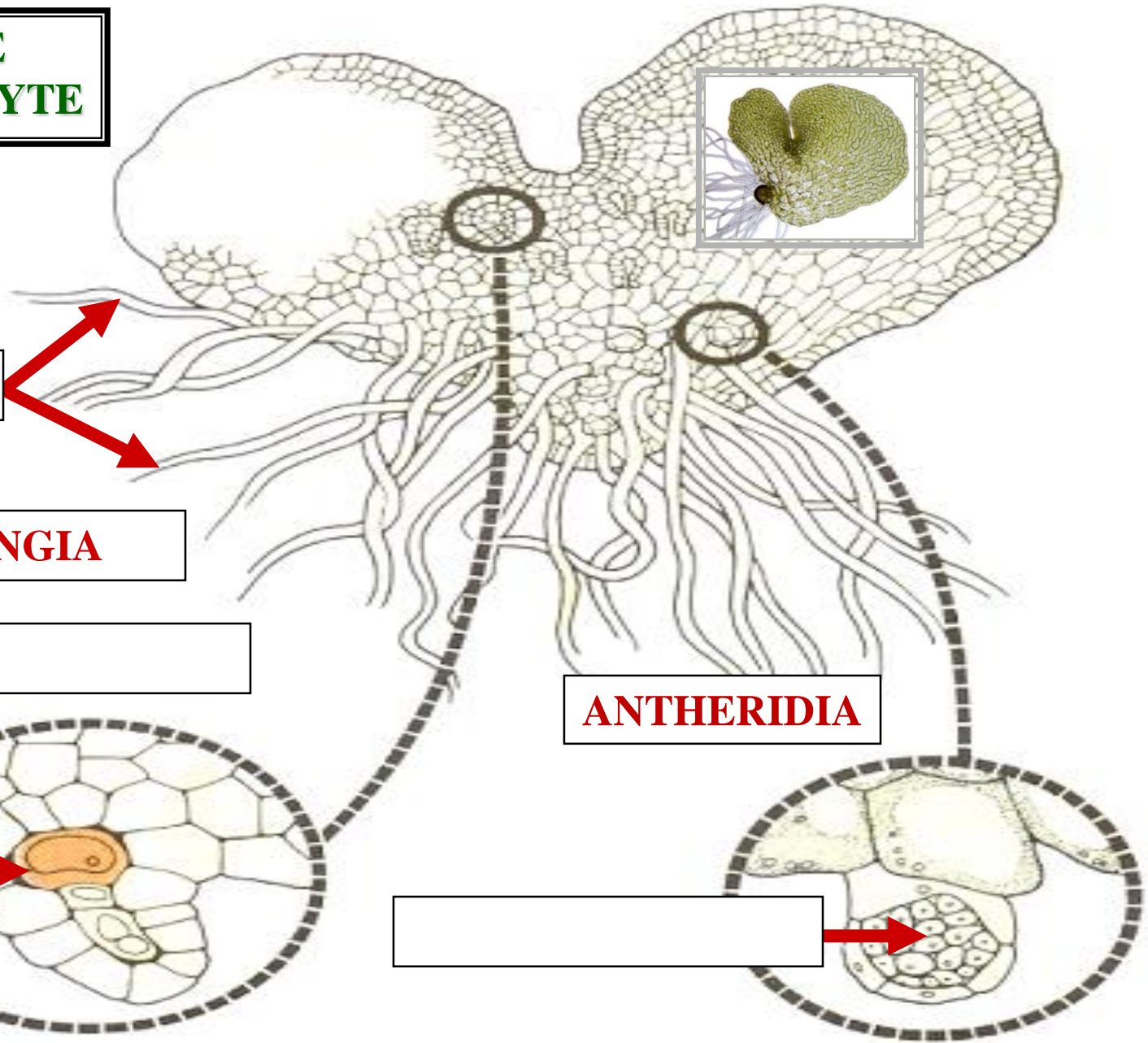
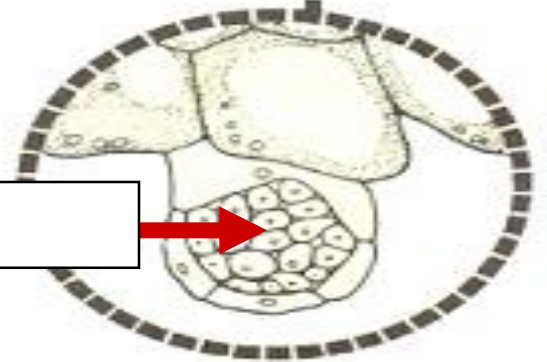
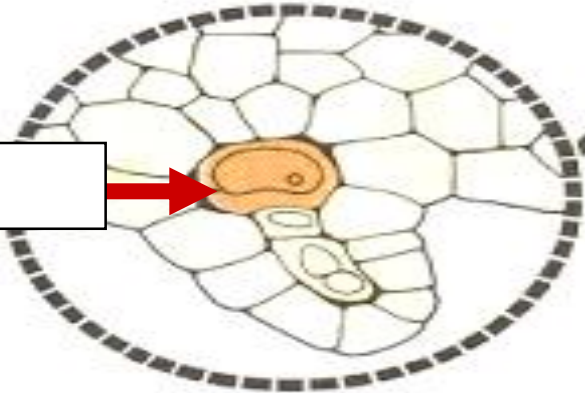
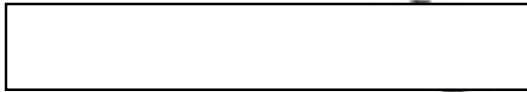
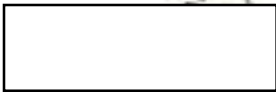
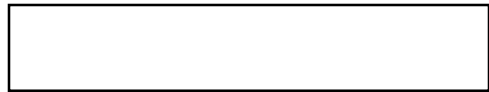


**MATURE
GAMETOPHYTE**

RHIZOIDS

GAMETANGIA

ANTHERIDIA

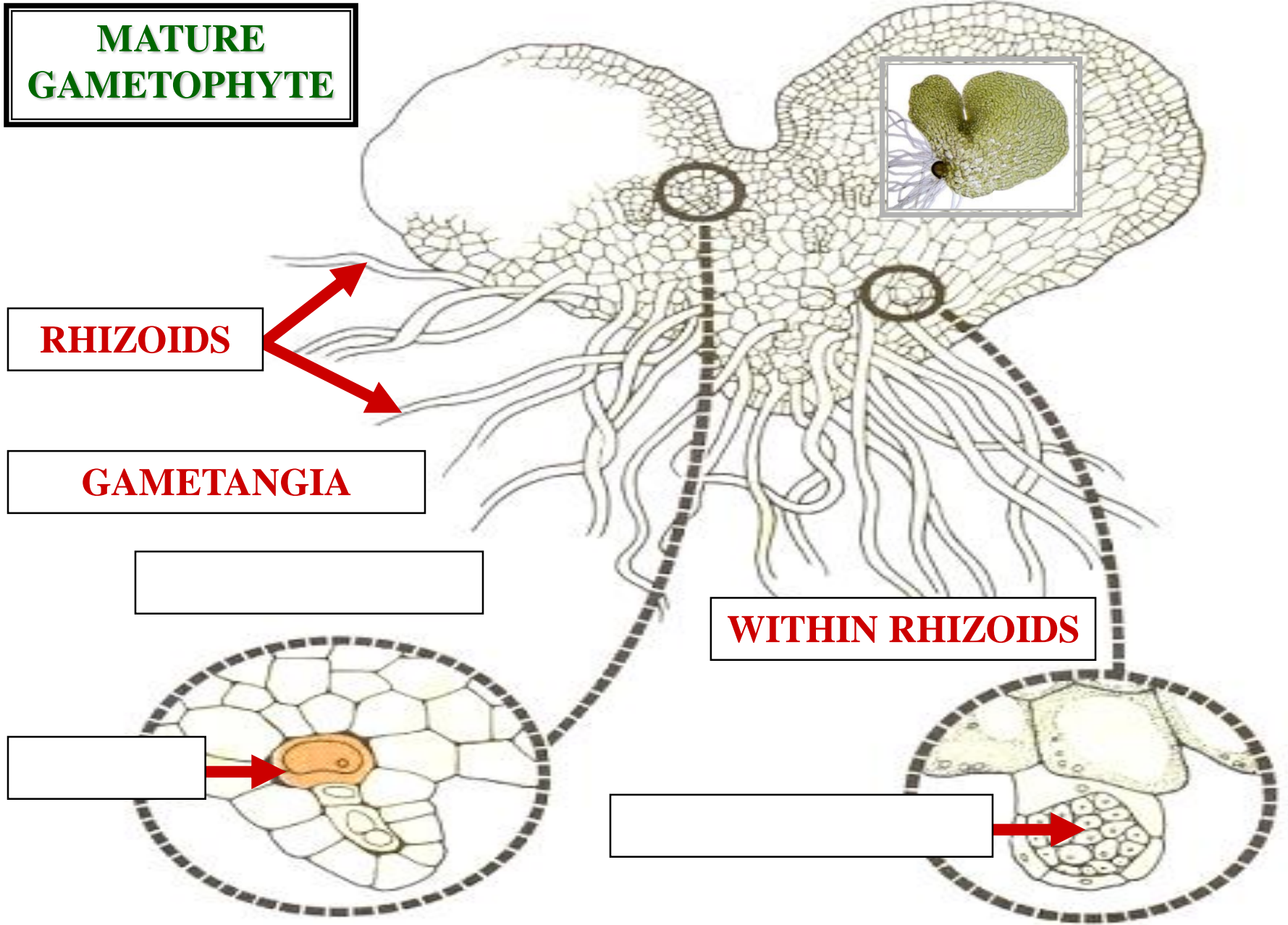


**MATURE
GAMETOPHYTE**

RHIZOIDS

GAMETANGIA

WITHIN RHIZOIDS



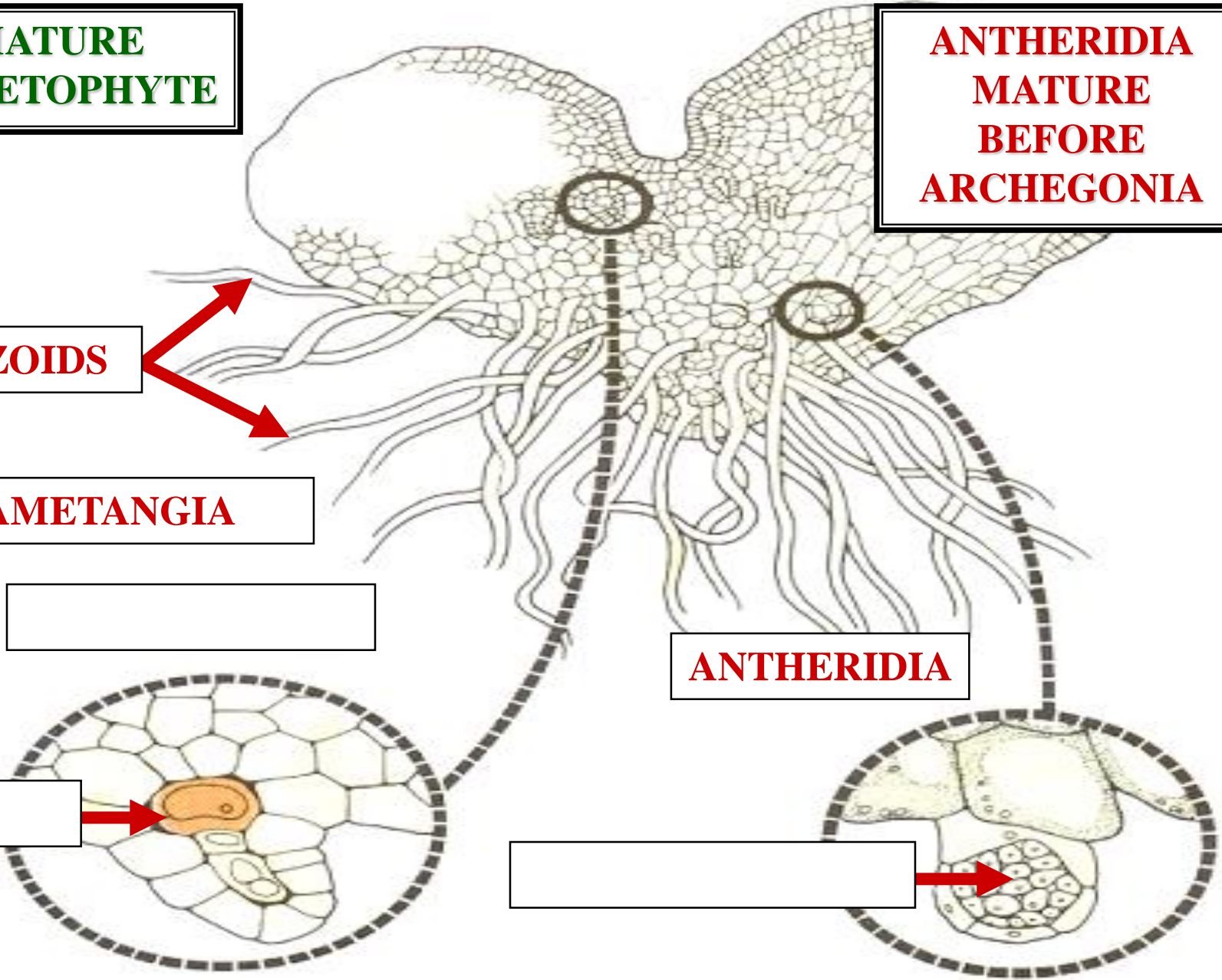
**MATURE
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**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

RHIZOIDS

GAMETANGIA

ANTHERIDIA



**MATURE
GAMETOPHYTE**

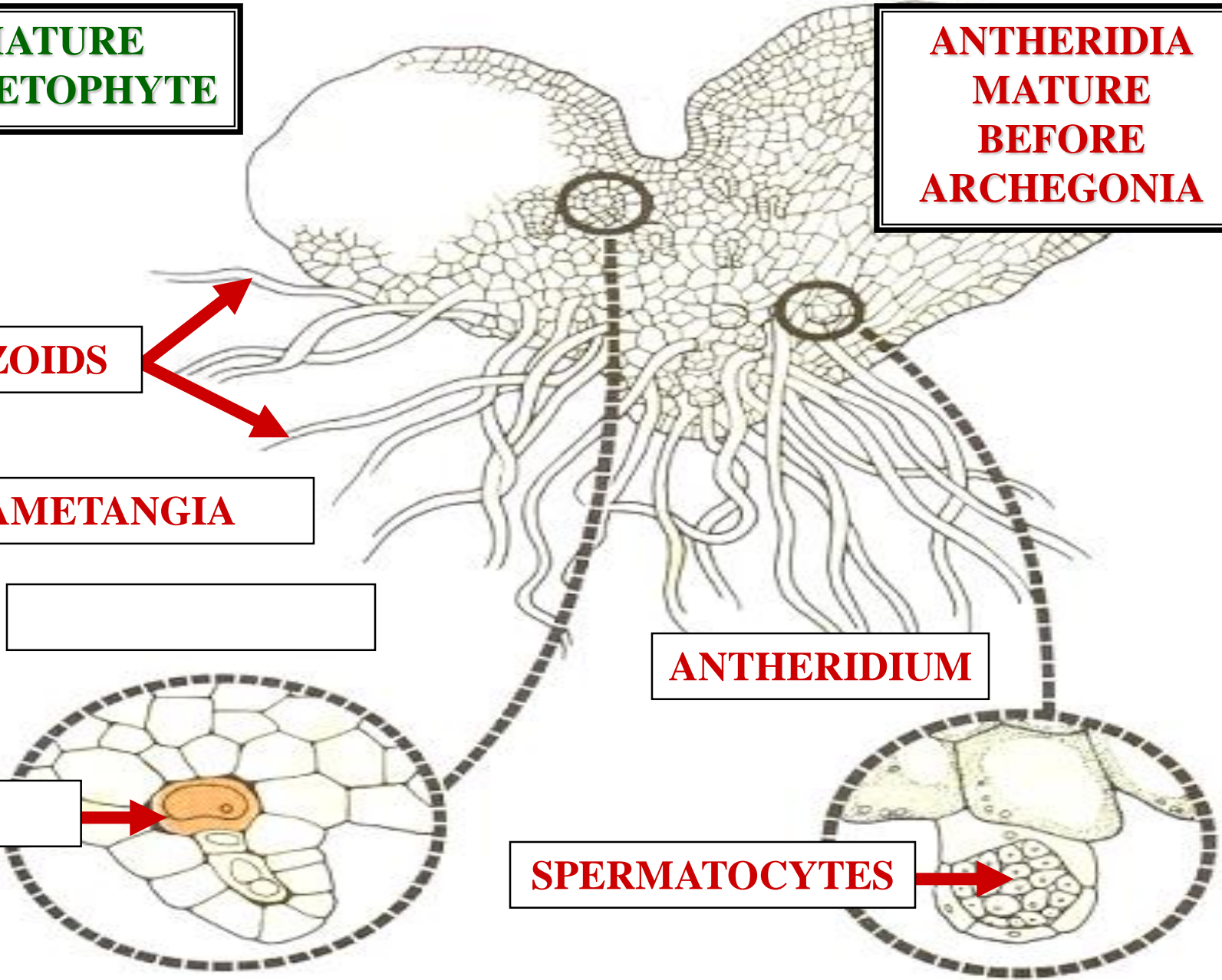
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MATURE
BEFORE
ARCHEGONIA**

RHIZOIDS

GAMETANGIA

ANTHERIDIUM

SPERMATOCYTES



**MATURE
GAMETOPHYTE**

**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

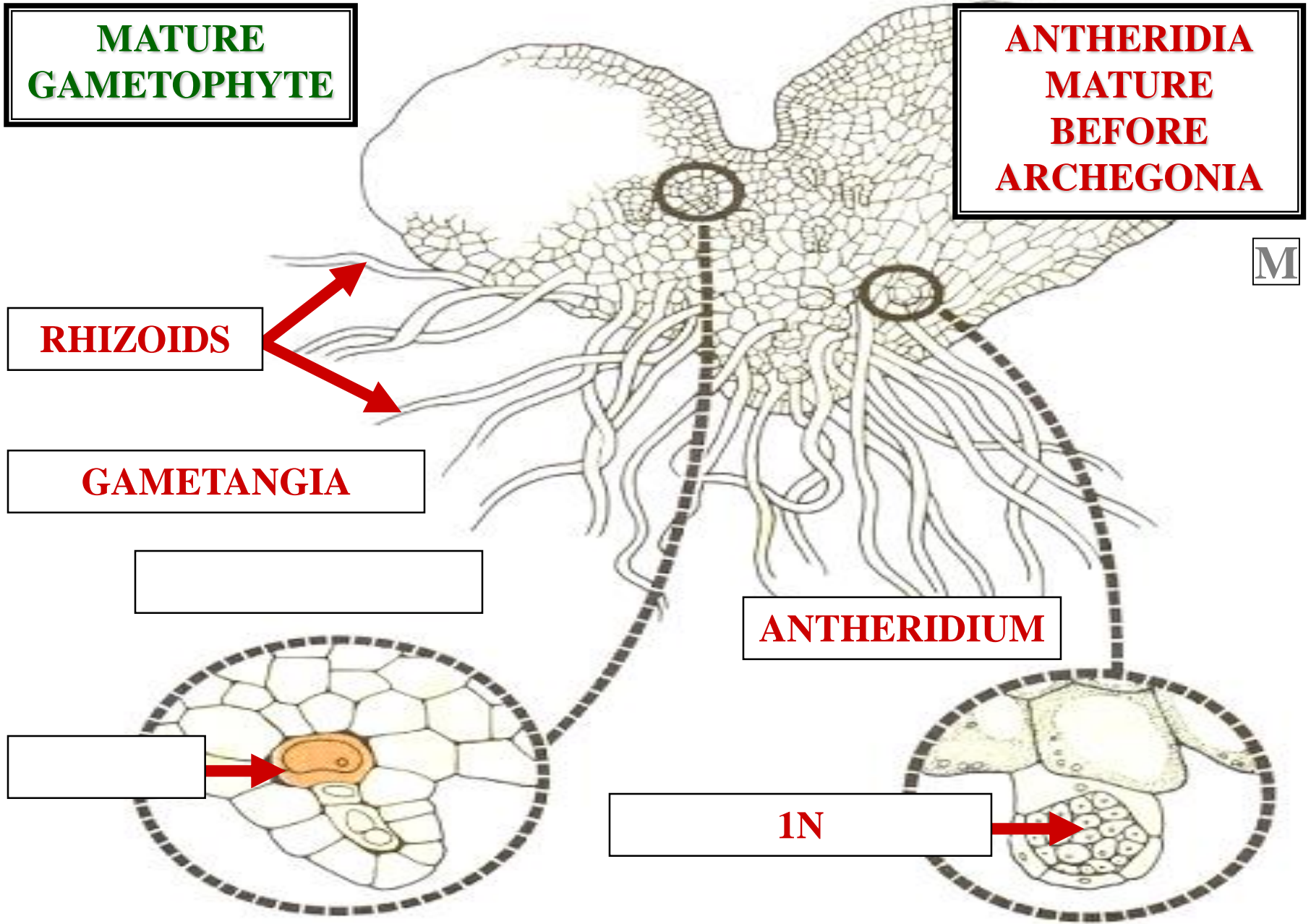
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GAMETANGIA

ANTHERIDIUM

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**MATURE
GAMETOPHYTE**

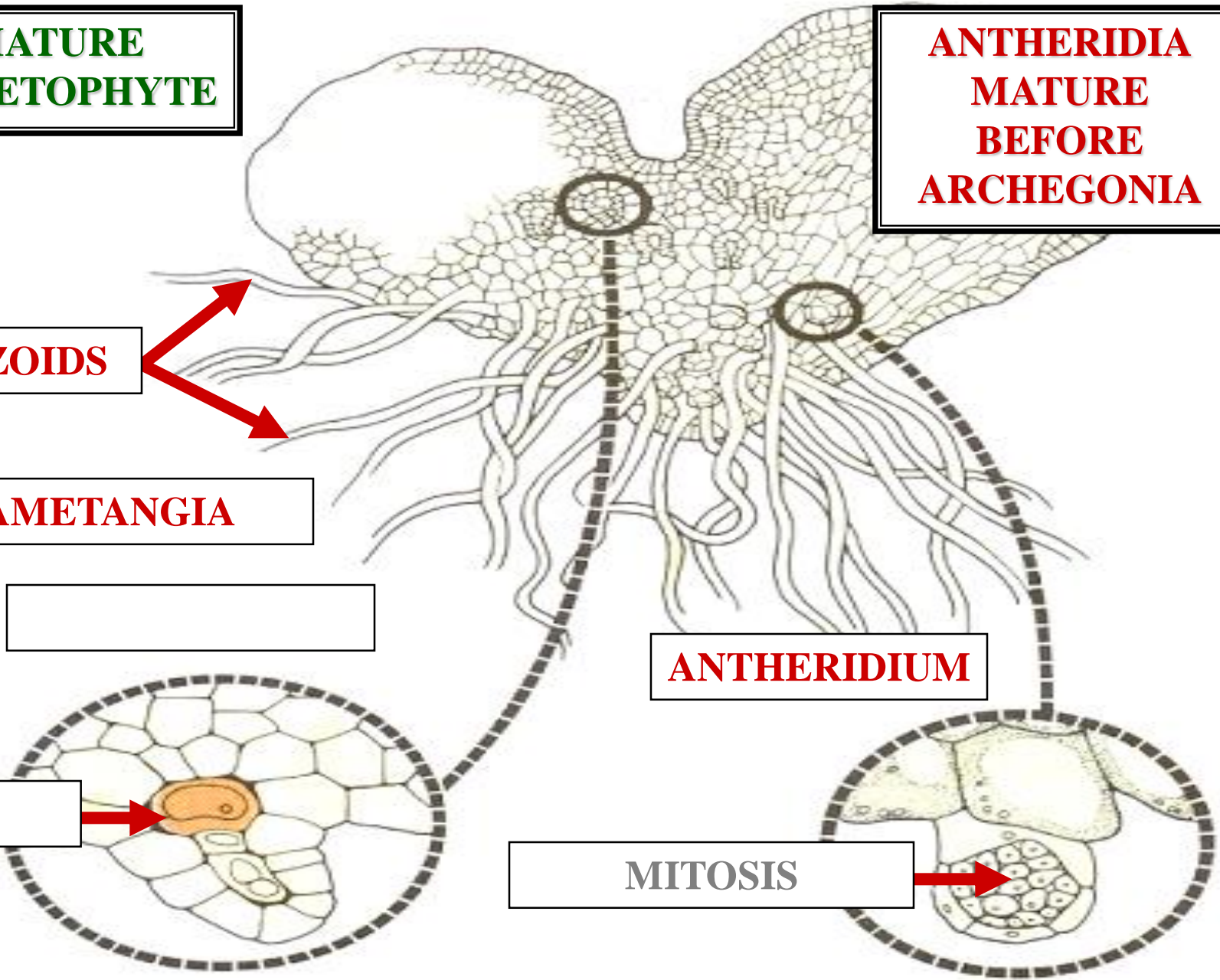
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BEFORE
ARCHEGONIA**

RHIZOIDS

GAMETANGIA

ANTHERIDIUM

MITOSIS



**MATURE
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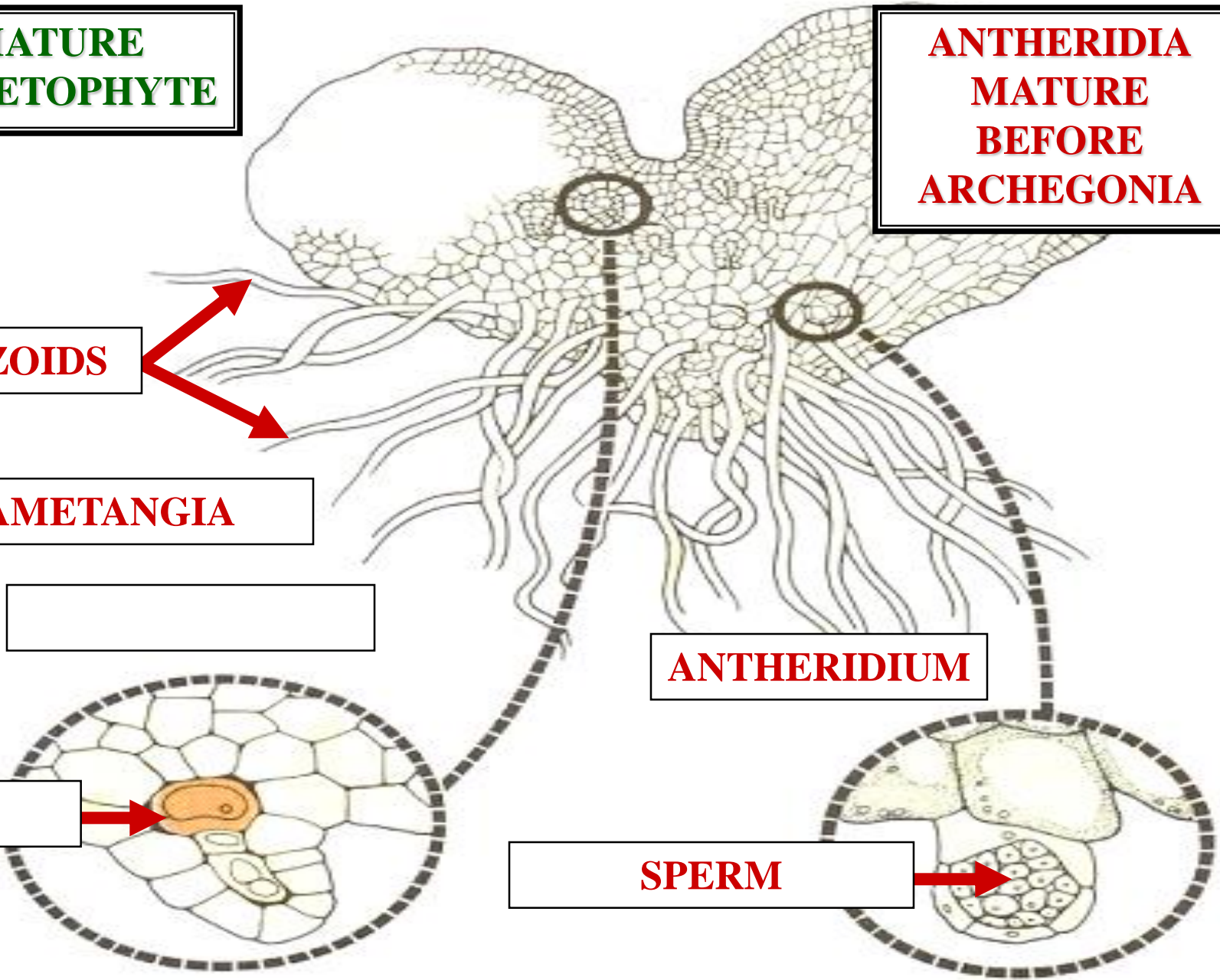
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BEFORE
ARCHEGONIA**

RHIZOIDS

GAMETANGIA

ANTHERIDIUM

SPERM



**MATURE
GAMETOPHYTE**

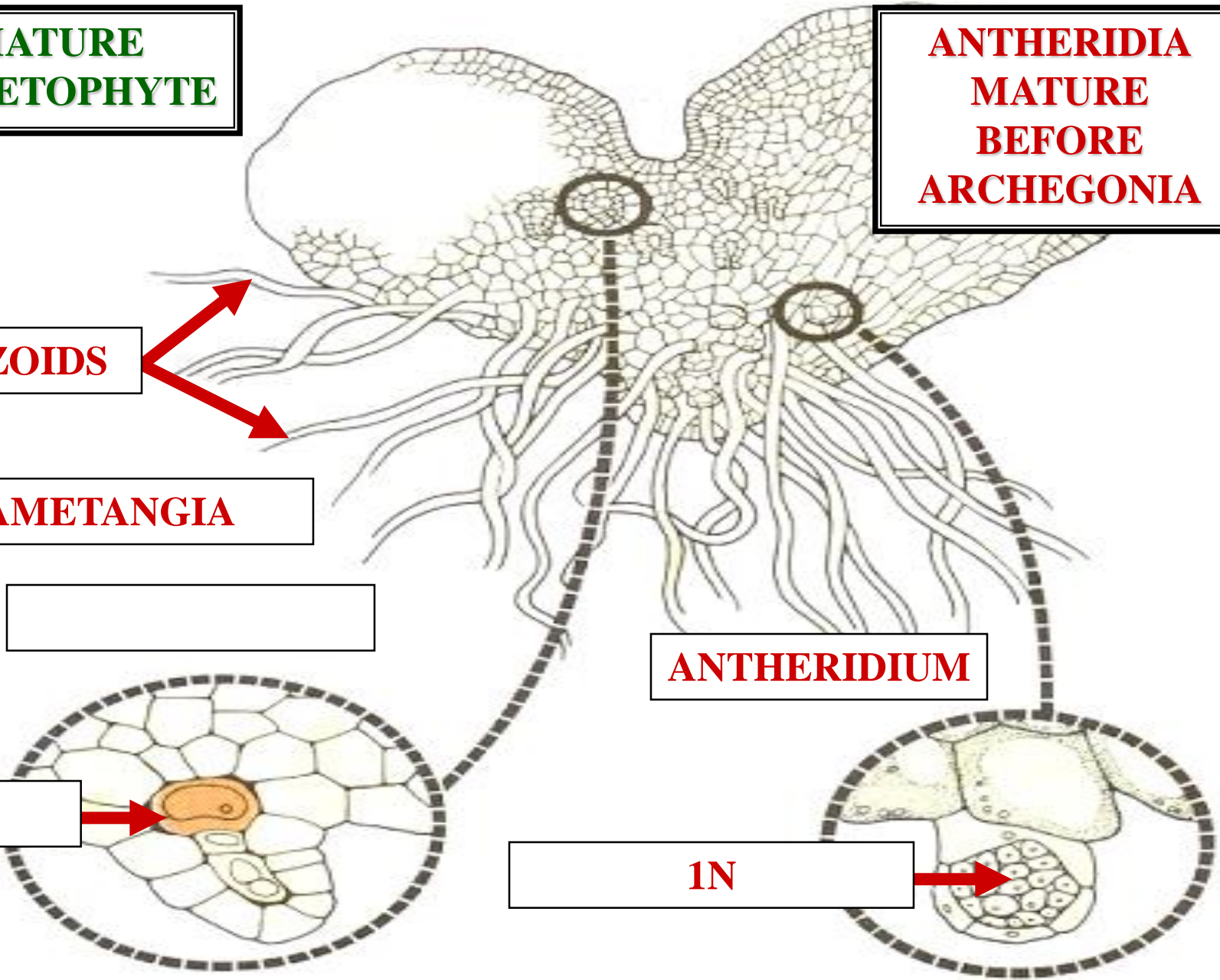
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MATURE
BEFORE
ARCHEGONIA**

RHIZOIDS

GAMETANGIA

ANTHERIDIUM

1N



**MATURE
GAMETOPHYTE**

**ANTHERIDIA
MATURE
BEFORE
ARCHEGONIA**

RHIZOIDS

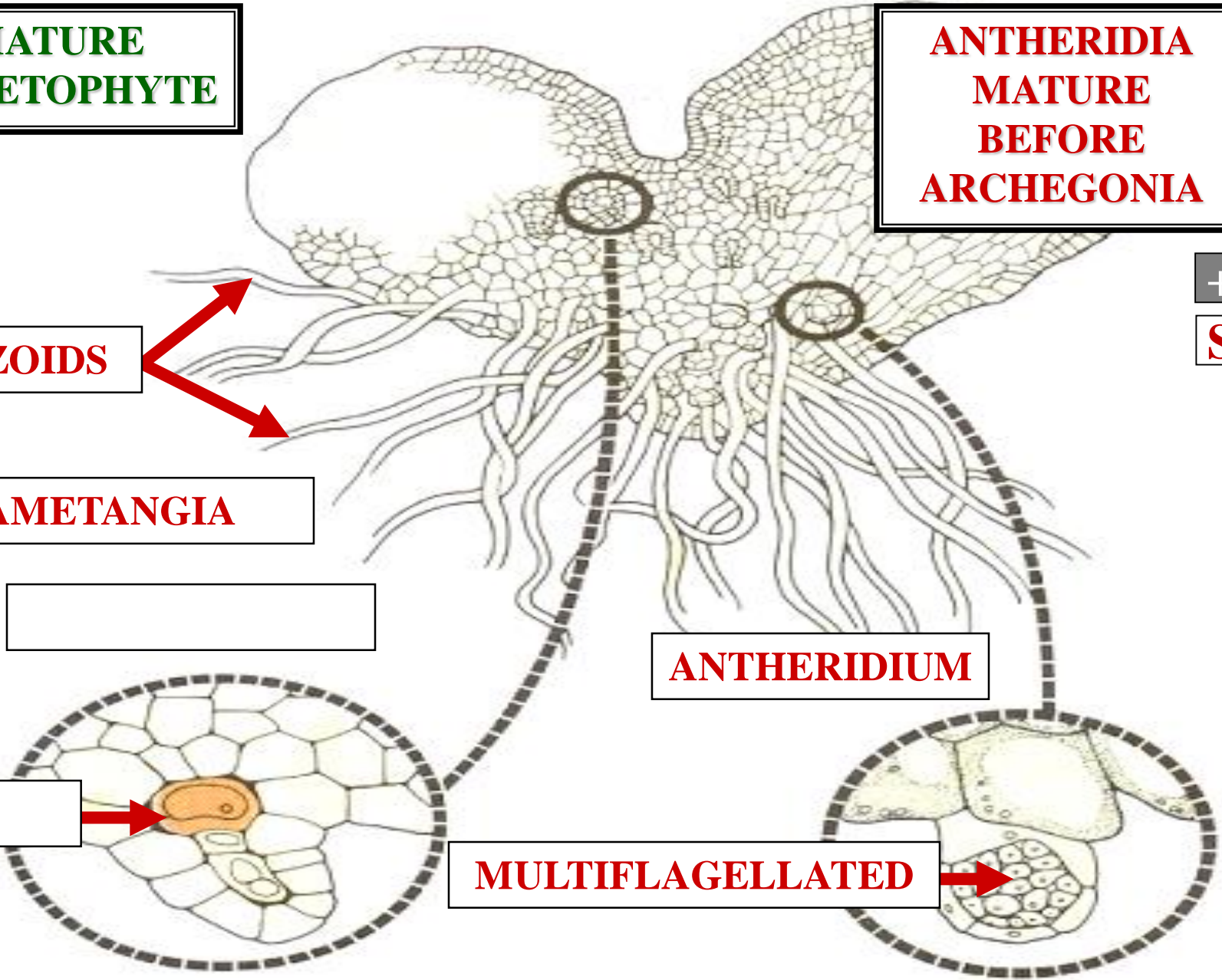
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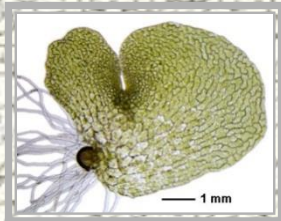
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MULTIFLAGELLATED





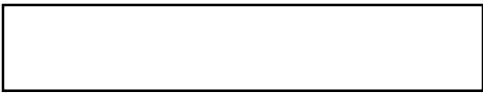
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GAMETOPHYTE**



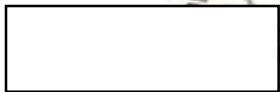
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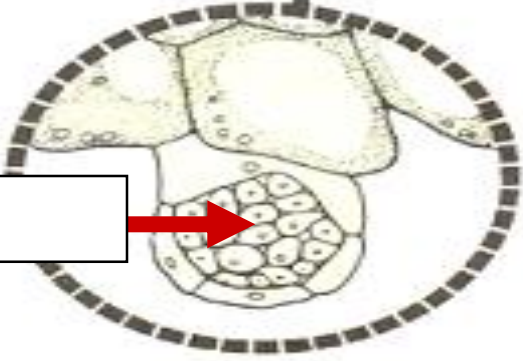
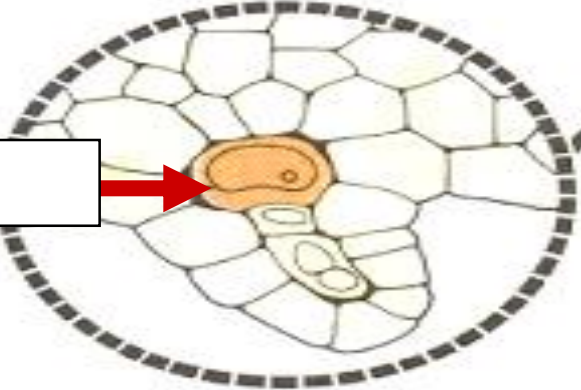
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ANTHERIDIUM



SPERM



**MATURE
GAMETOPHYTE**

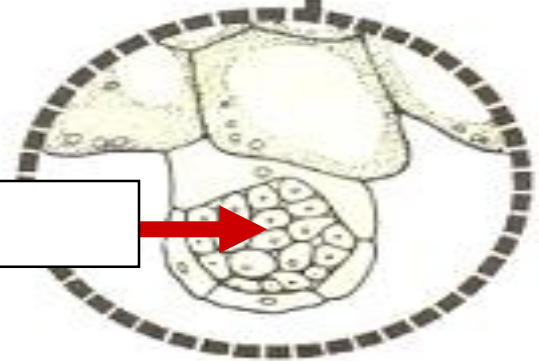
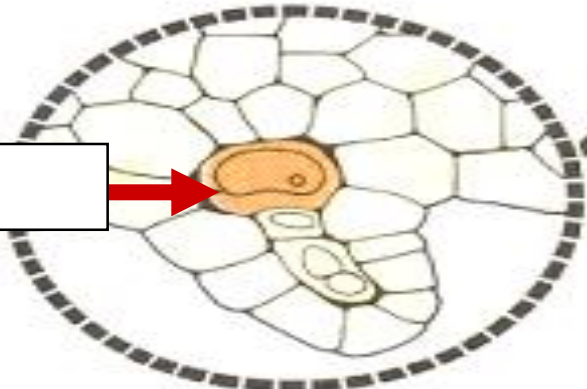
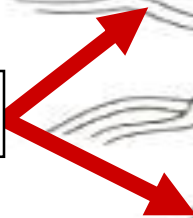
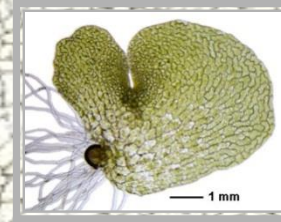
RHIZOIDS

GAMETANGIA

ARCHEGONIA

ANTHERIDIUM

SPERM



**MATURE
GAMETOPHYTE**

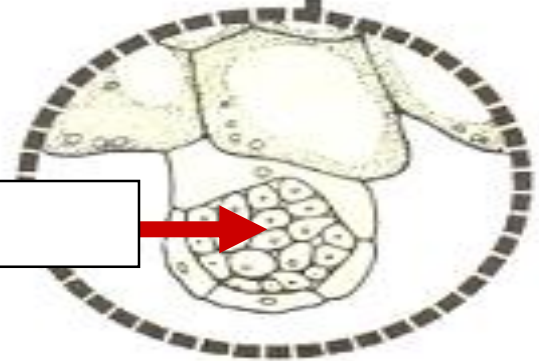
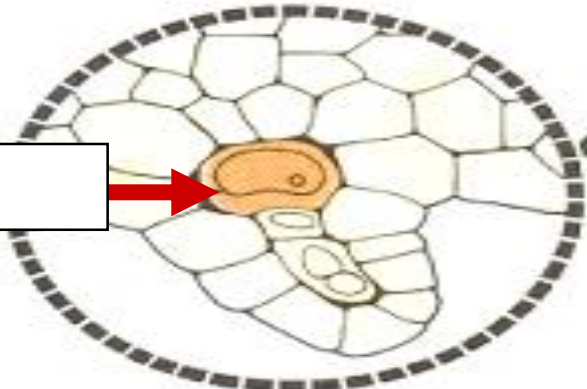
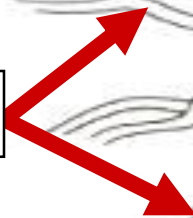
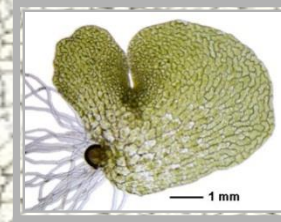
RHIZOIDS

GAMETANGIA

NEAR NOTCH

ANTHERIDIUM

SPERM



**MATURE
GAMETOPHYTE**

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

RHIZOIDS

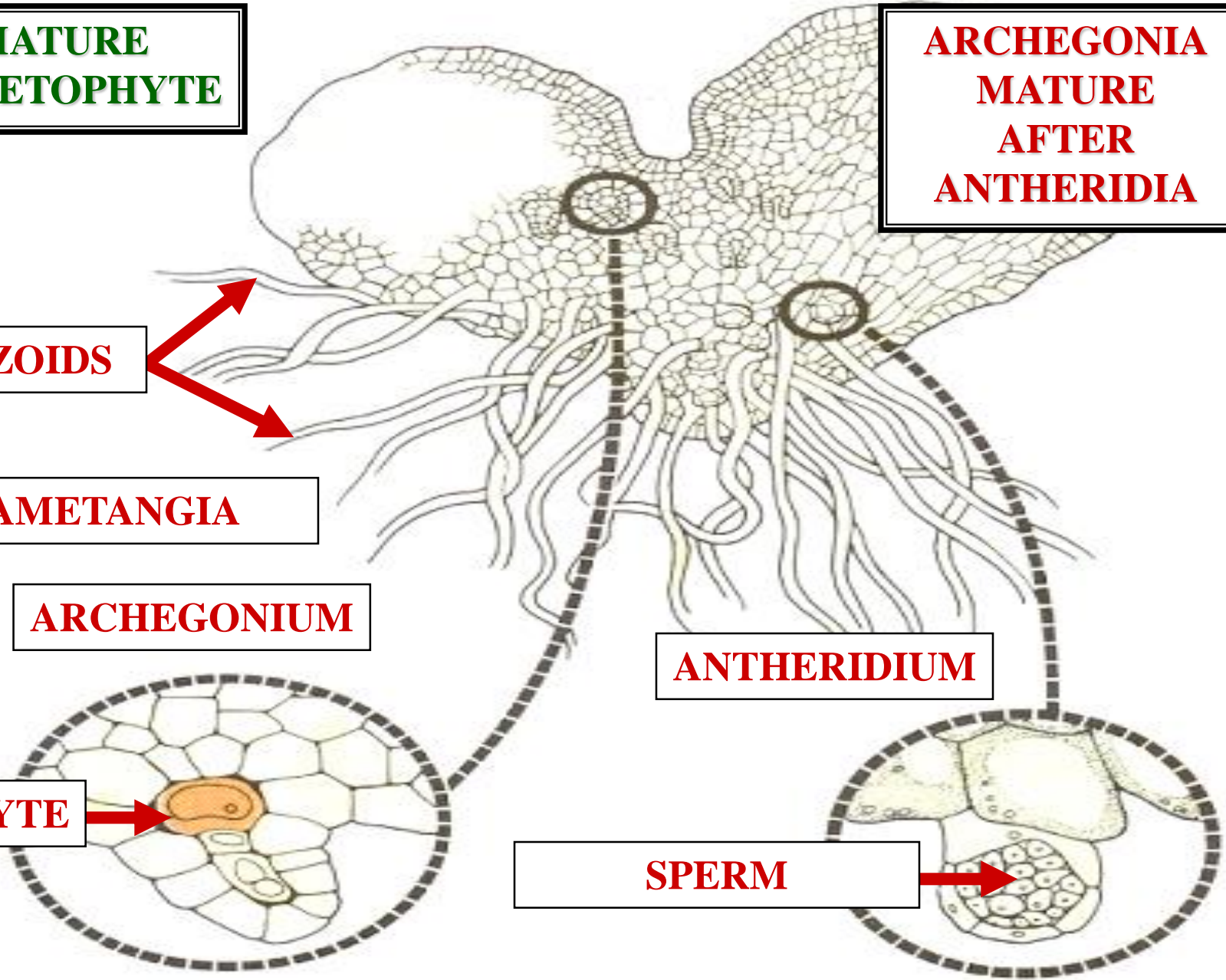
GAMETANGIA

ARCHEGONIUM

ANTHERIDIUM

OOCYTE

SPERM



**MATURE
GAMETOPHYTE**

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

RHIZOIDS

GAMETANGIA

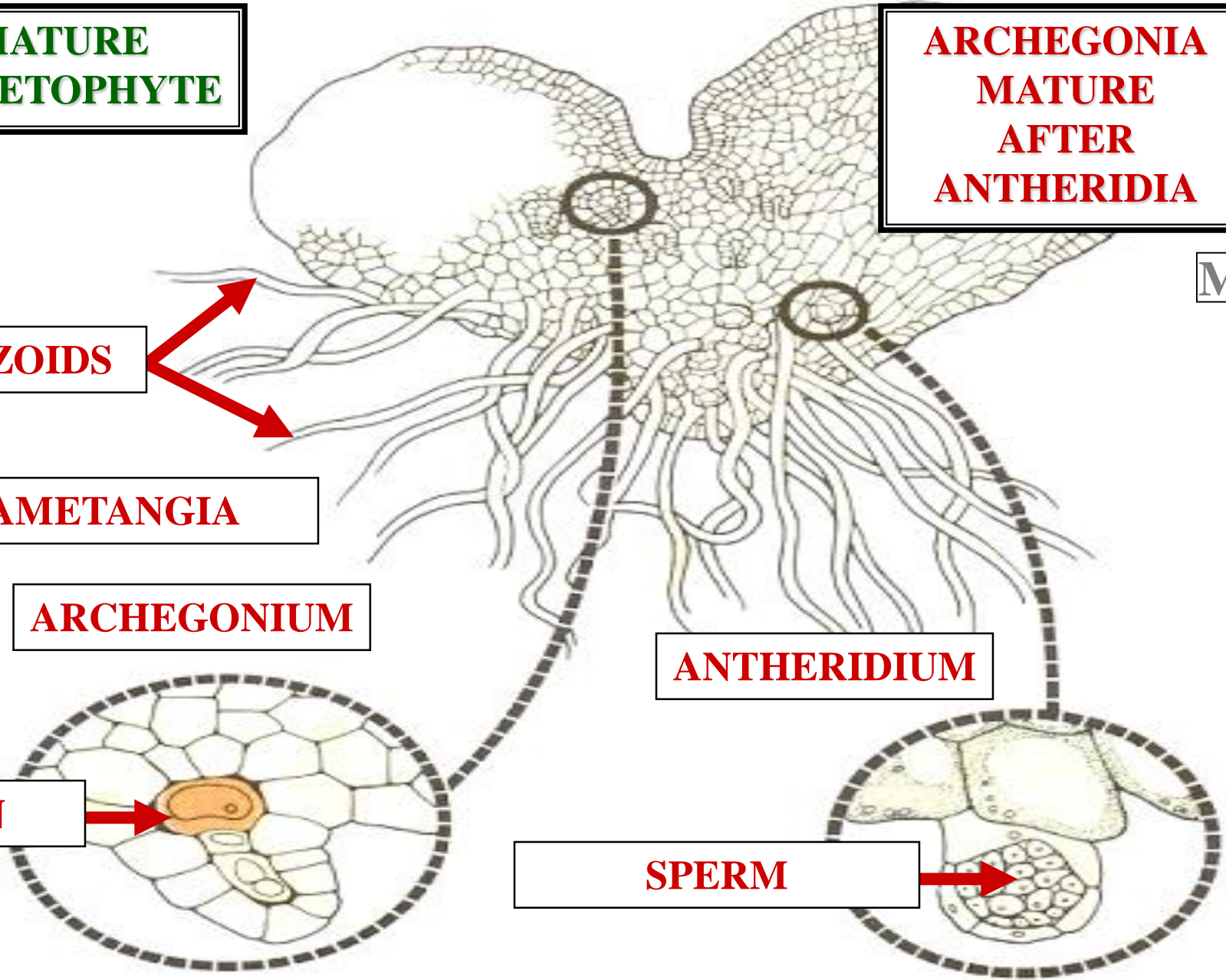
ARCHEGONIUM

ANTHERIDIUM

1N

SPERM

M



**MATURE
GAMETOPHYTE**

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

RHIZOIDS

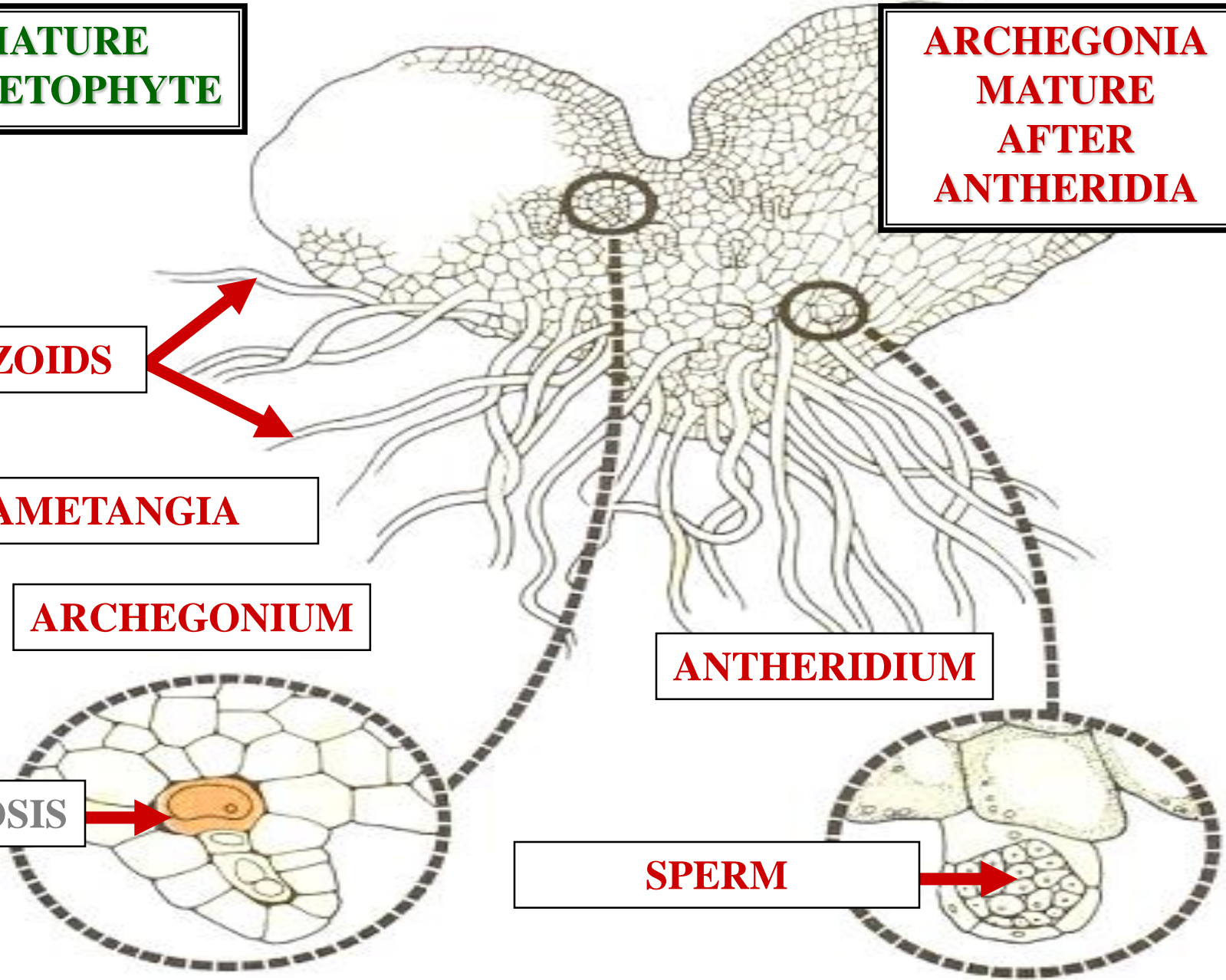
GAMETANGIA

ARCHEGONIUM

ANTHERIDIUM

MITOSIS

SPERM



**MATURE
GAMETOPHYTE**

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

RHIZOIDS

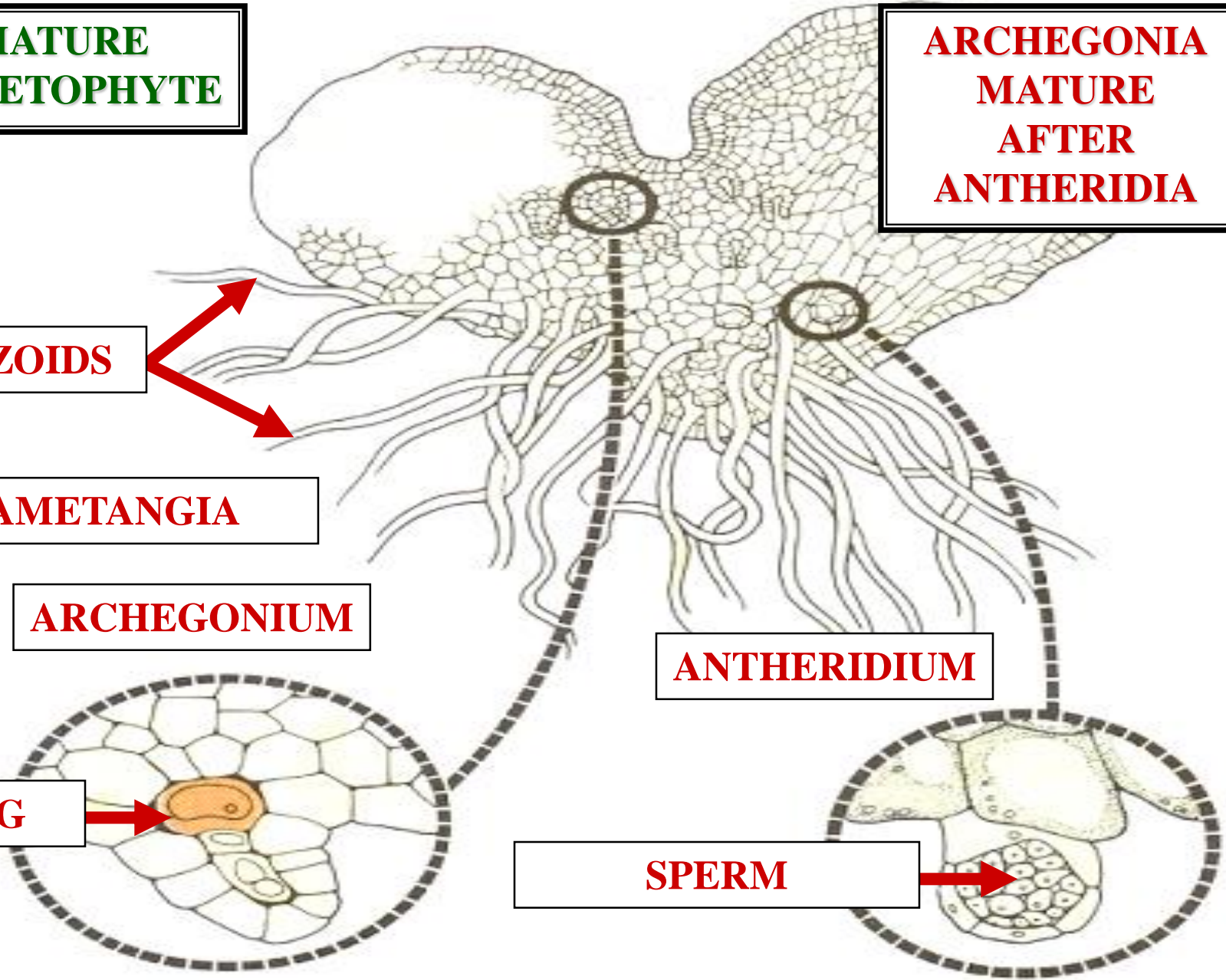
GAMETANGIA

ARCHEGONIUM

EGG

ANTHERIDIUM

SPERM



**MATURE
GAMETOPHYTE**

**ARCHEGONIA
MATURE
AFTER
ANTHERIDIA**

RHIZOIDS

GAMETANGIA

ARCHEGONIUM

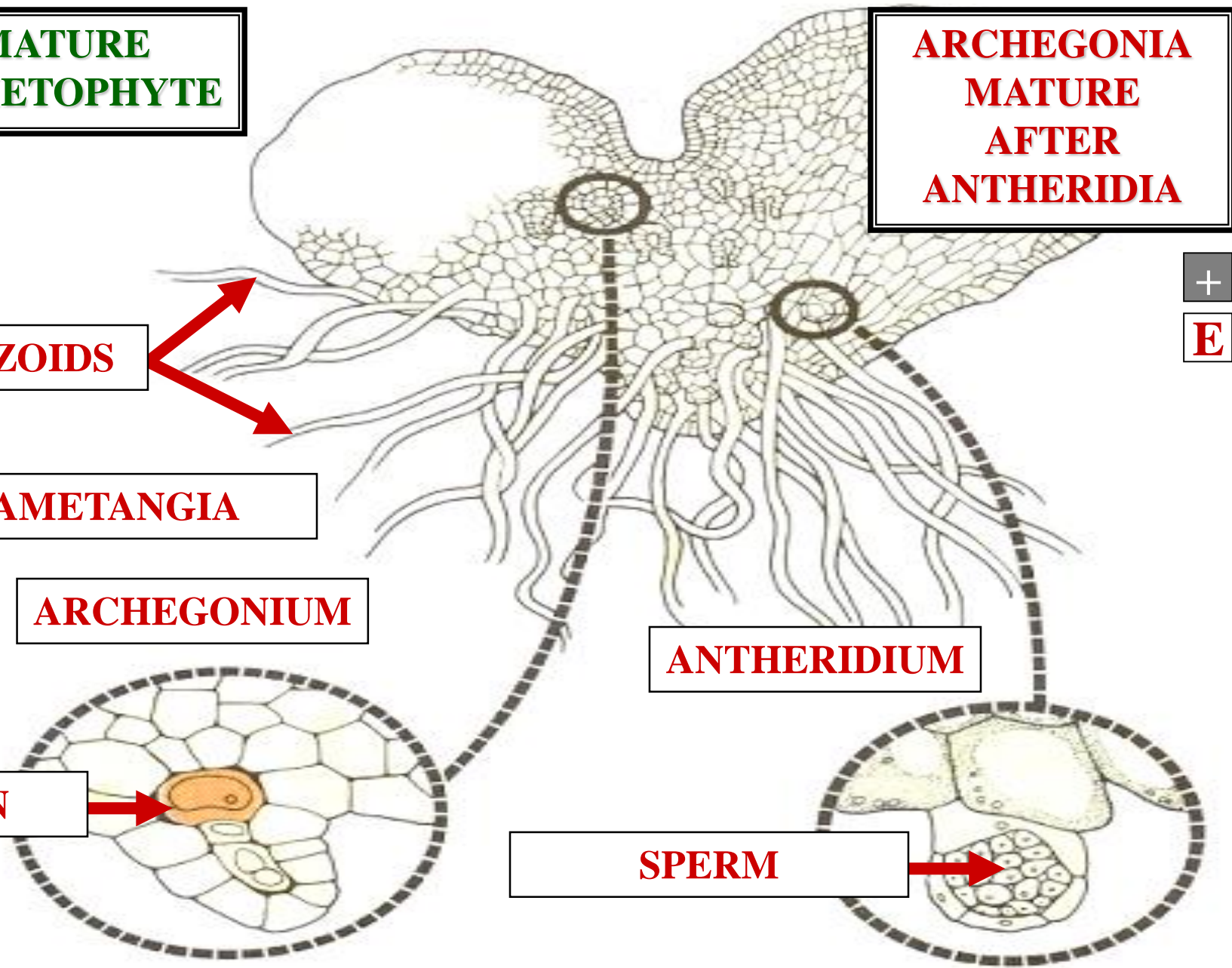
ANTHERIDIUM

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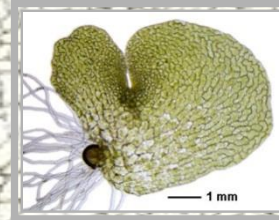
SPERM

+

E



**MATURE
GAMETOPHYTE**



RHIZOIDS

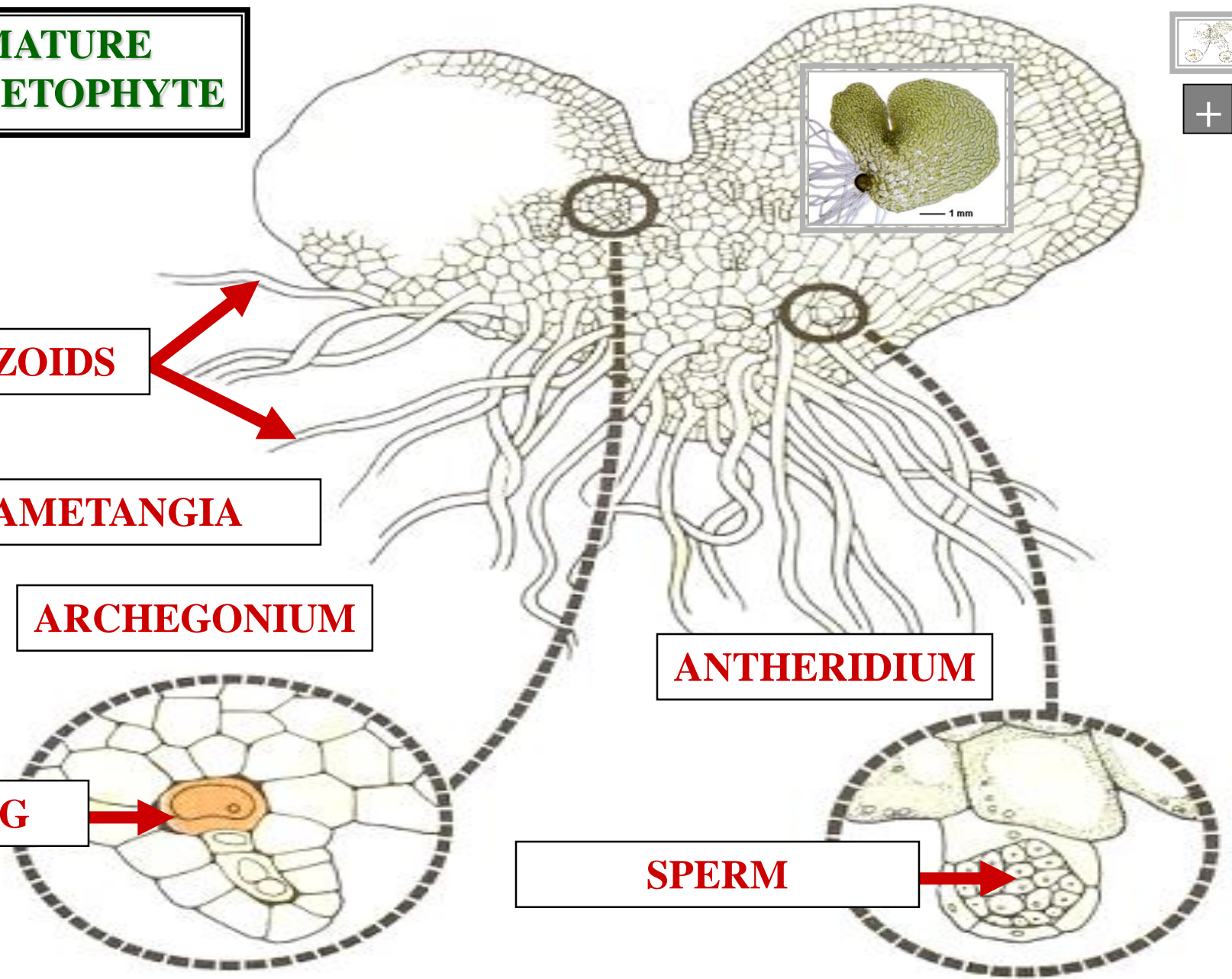
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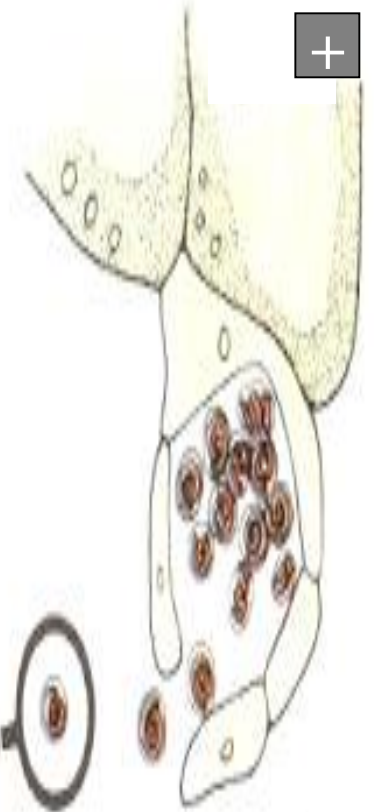
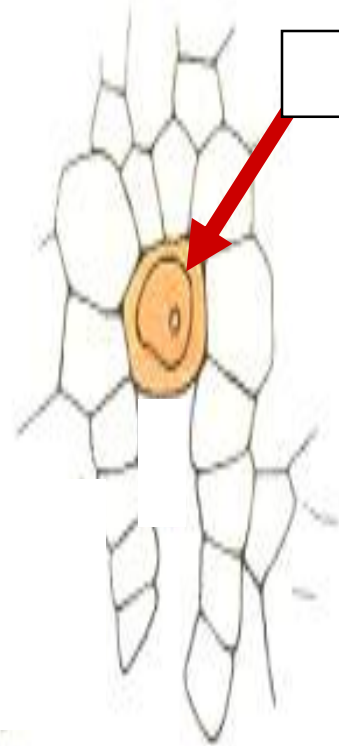
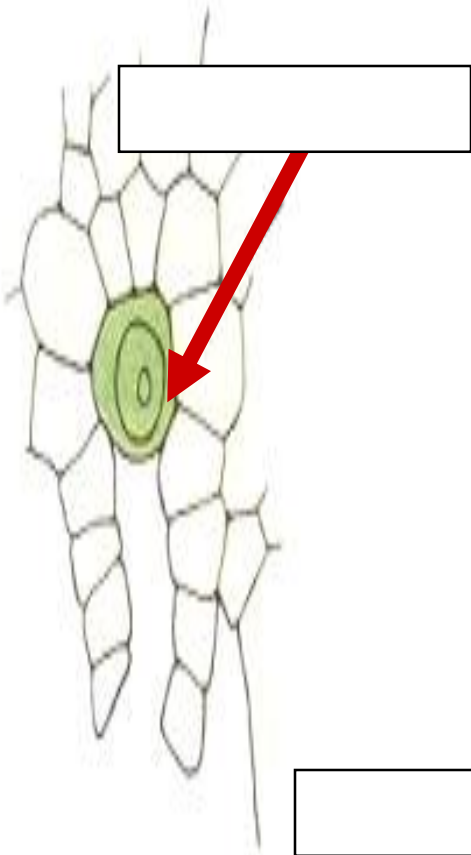
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ARCHEGONIUM

EGG

ANTHERIDIUM



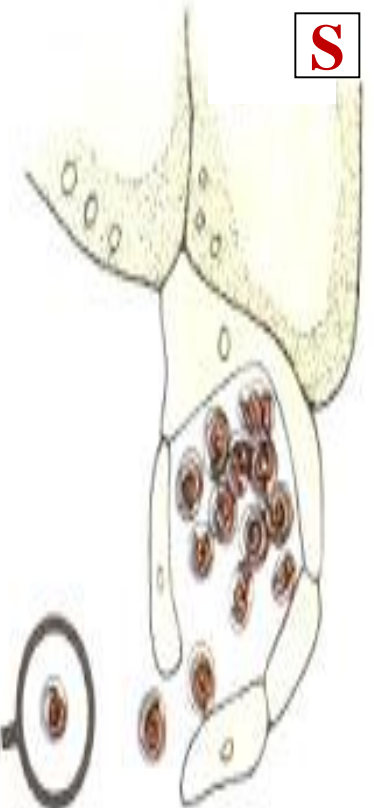
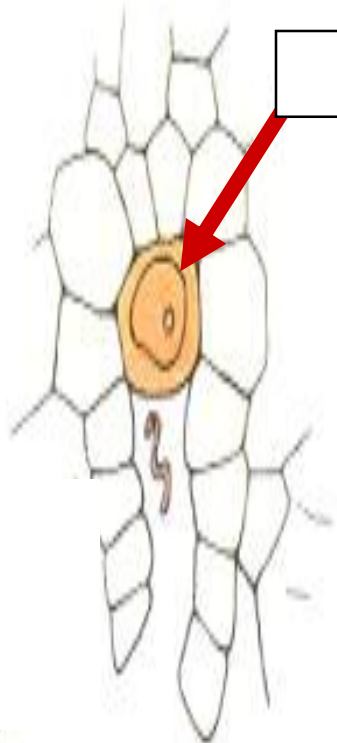
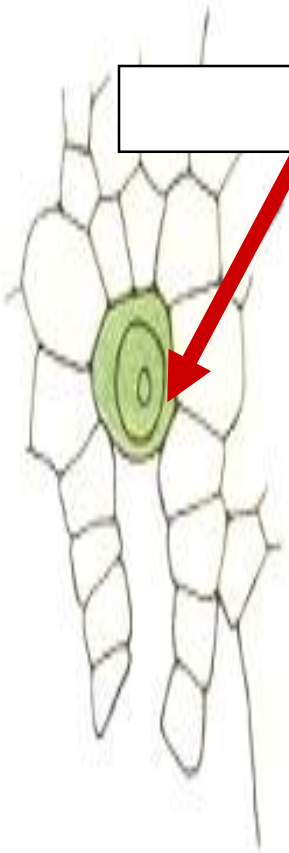
**MULTIFLAGELLATED
SPERM**

ARCHEGONIUM

EGG

ANTHERIDIUM

S



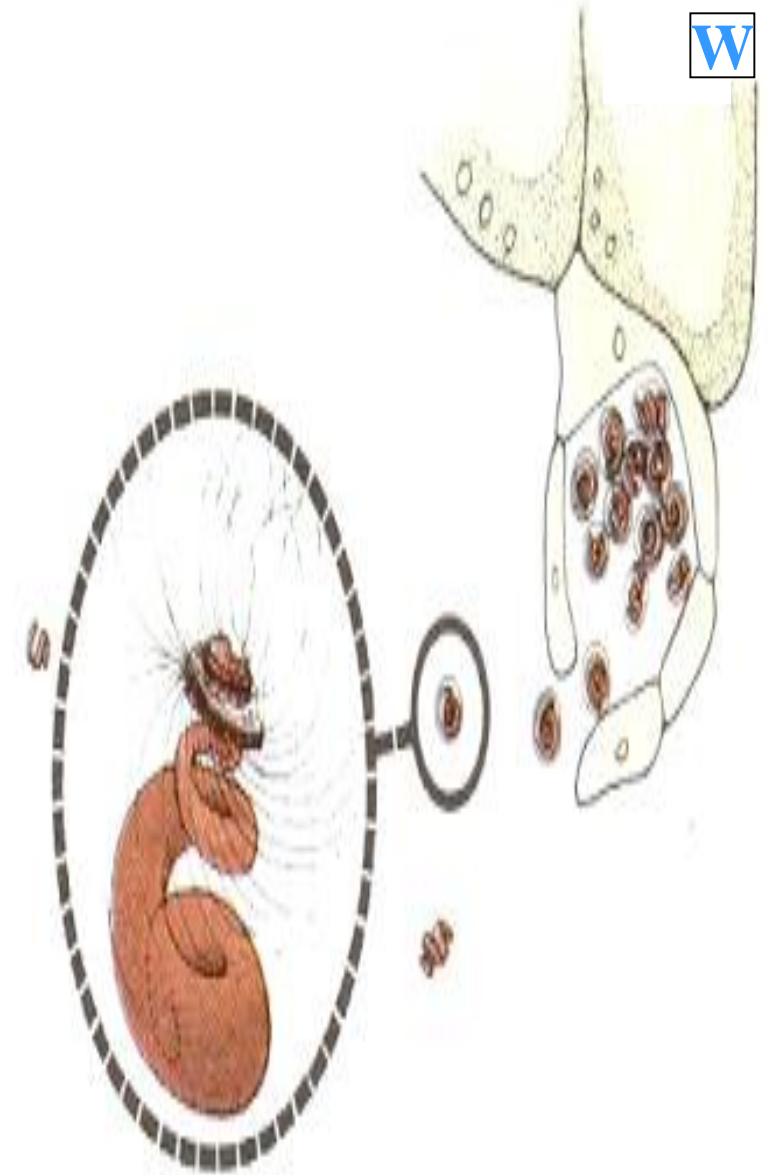
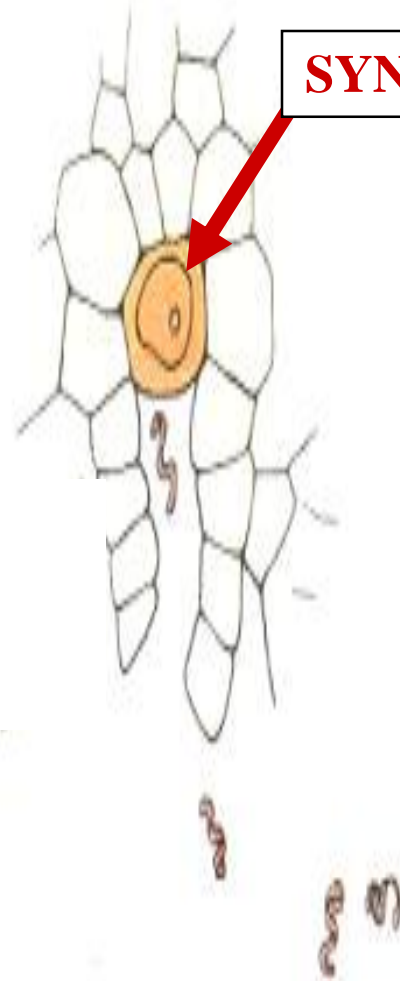
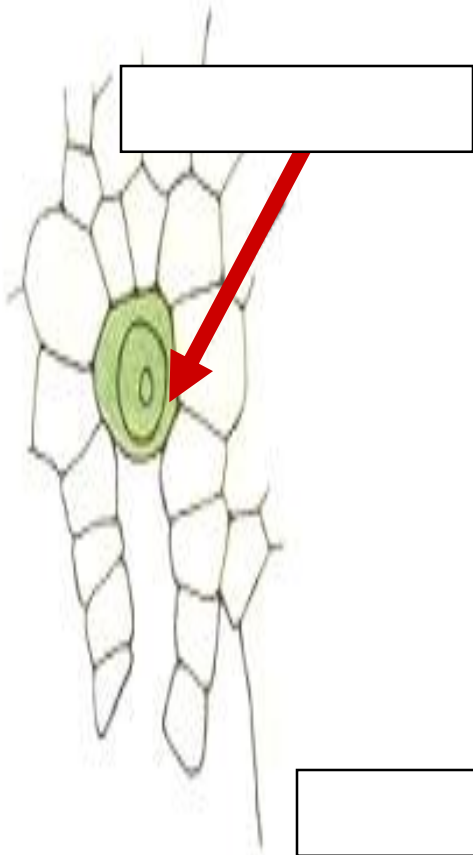
MULTIFLAGELLATED SPERM



ARCHEGONIUM

SYNGAMY

ANTHERIDIUM

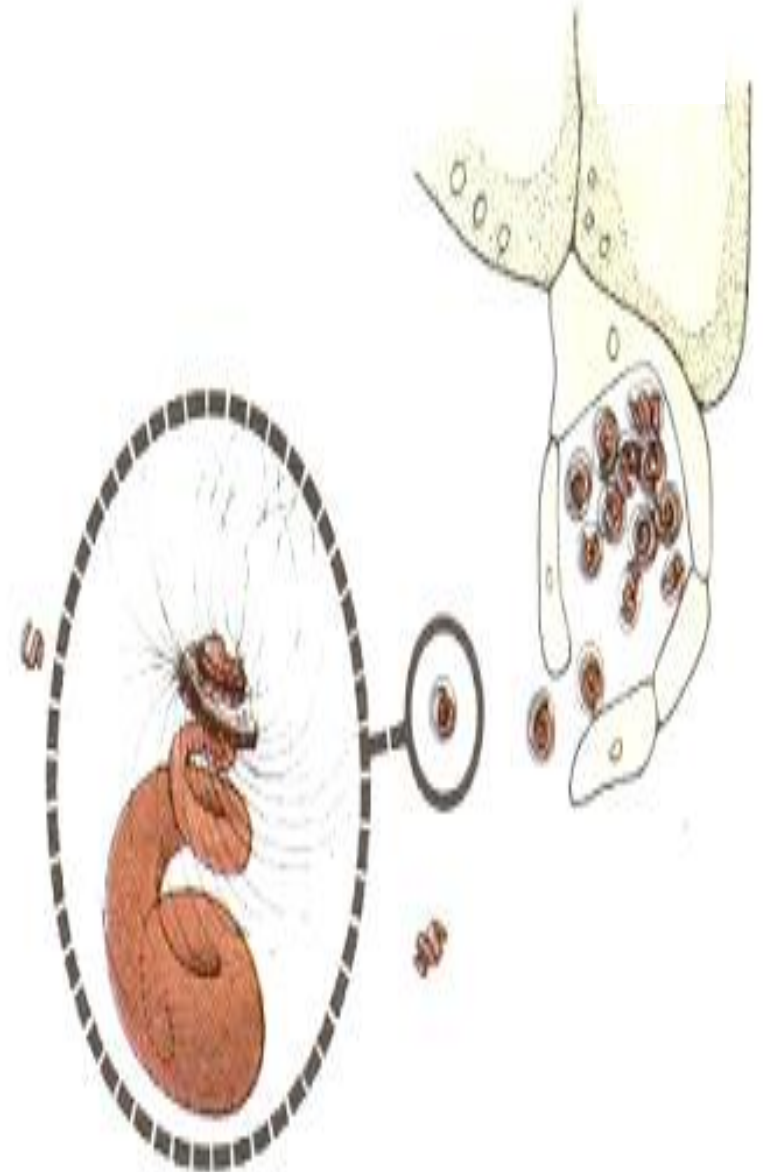
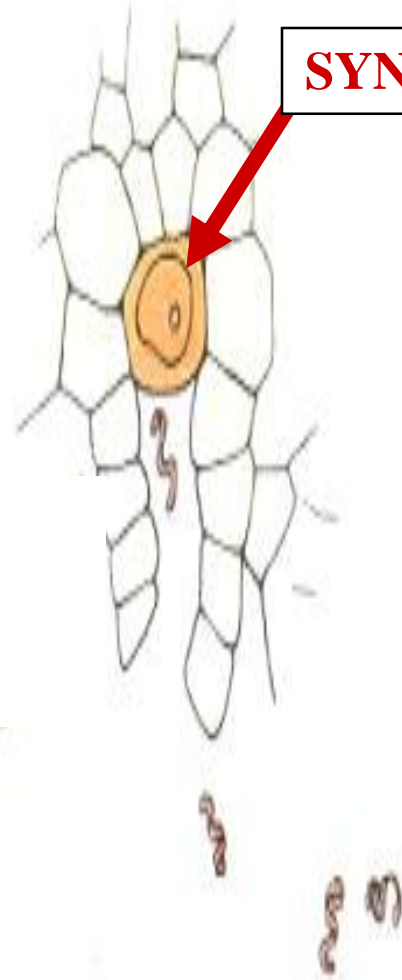
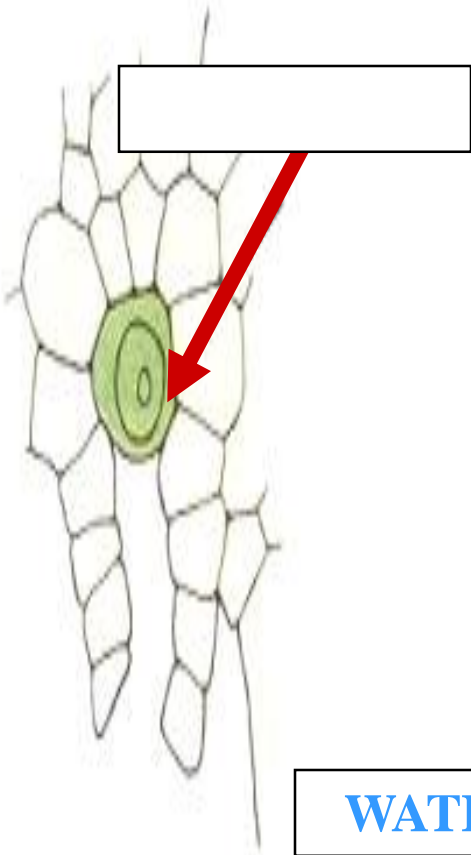


**MULTIFLAGELLATED
SPERM**

ARCHEGONIUM

SYNGAMY

ANTHERIDIUM



**MULTIFLAGELLATED
SPERM**

ARCHEGONIUM

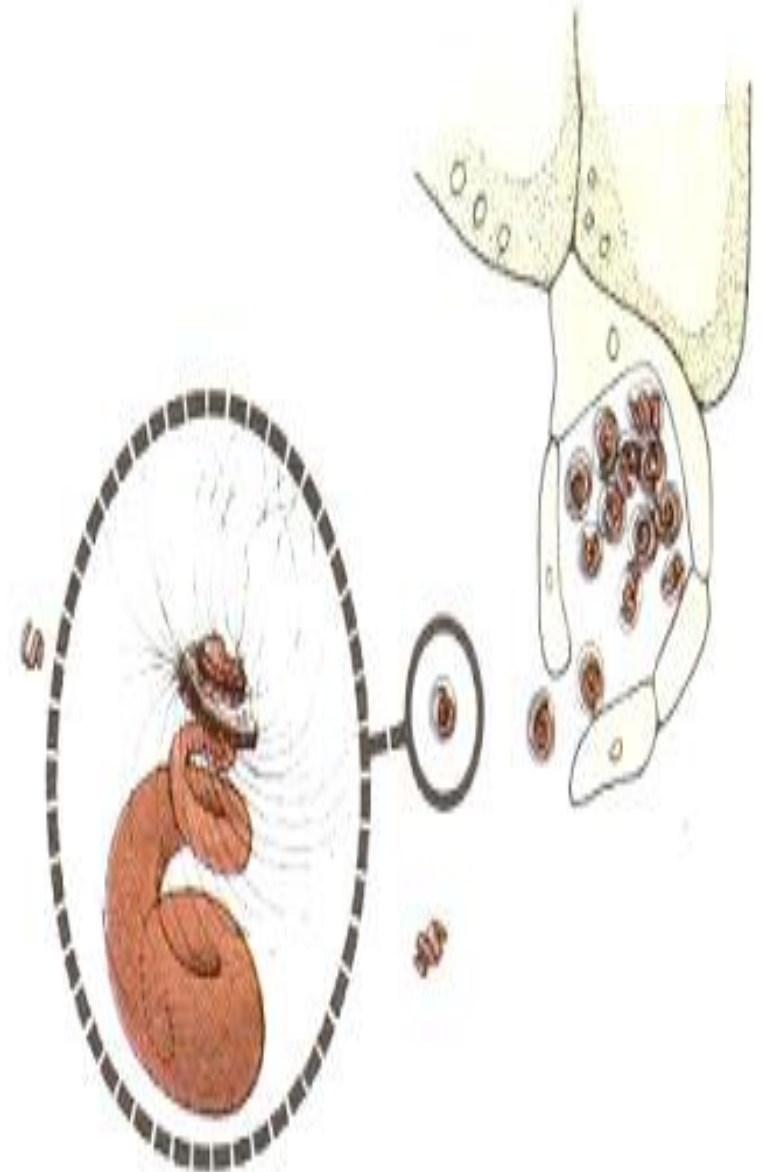
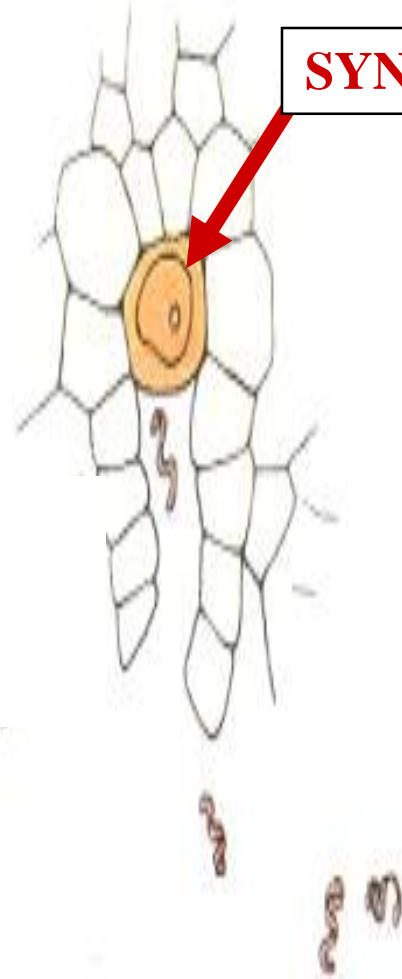
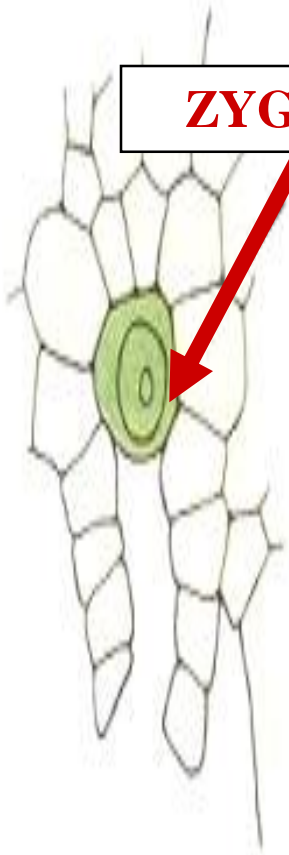
SYNGAMY

ANTHERIDIUM

ZYGOTE

WATER

**MULTIFLAGELLATED
SPERM**



ARCHEGONIUM

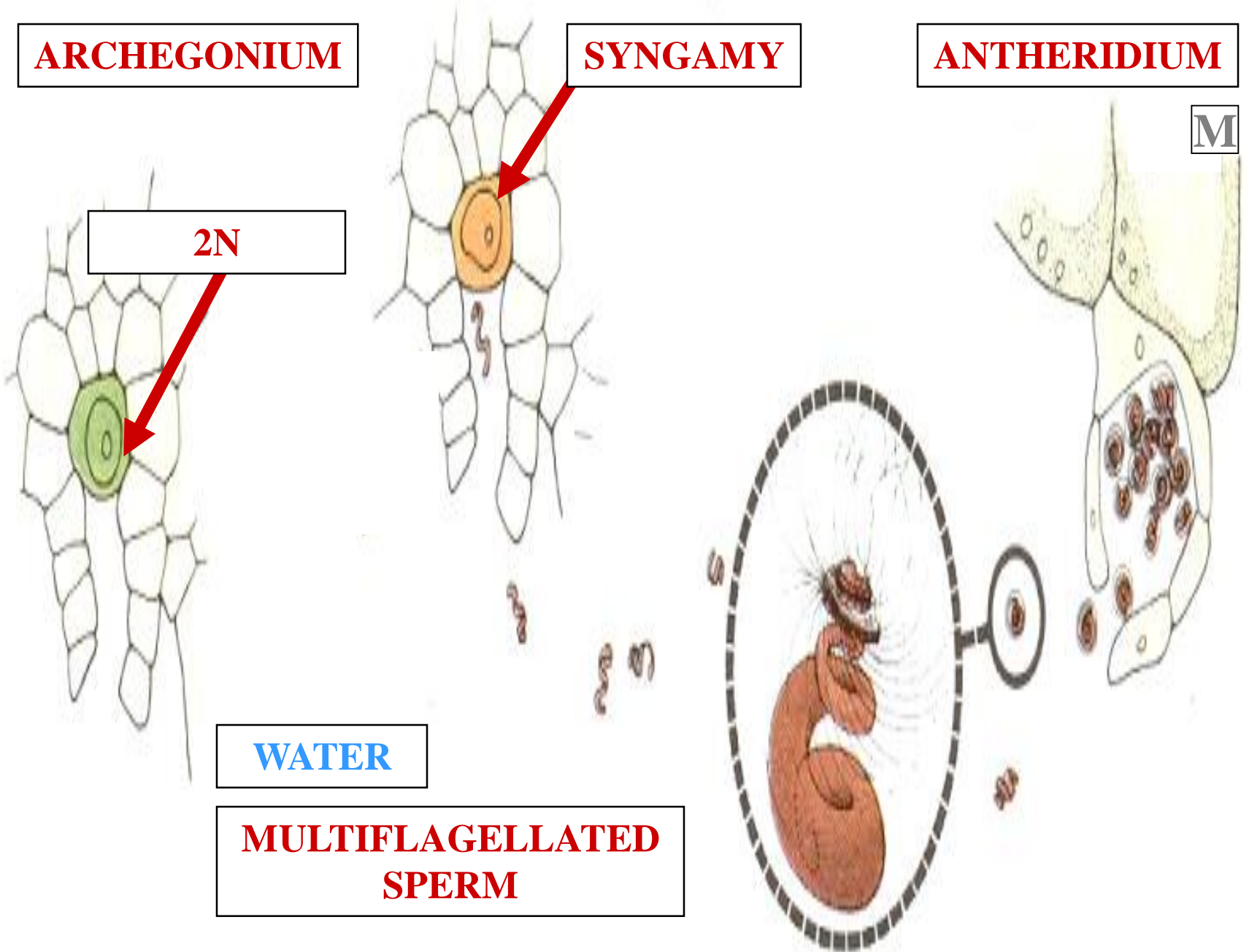
SYNGAMY

ANTHERIDIUM

2N

WATER

**MULTIFLAGELLATED
SPERM**



ARCHEGONIUM

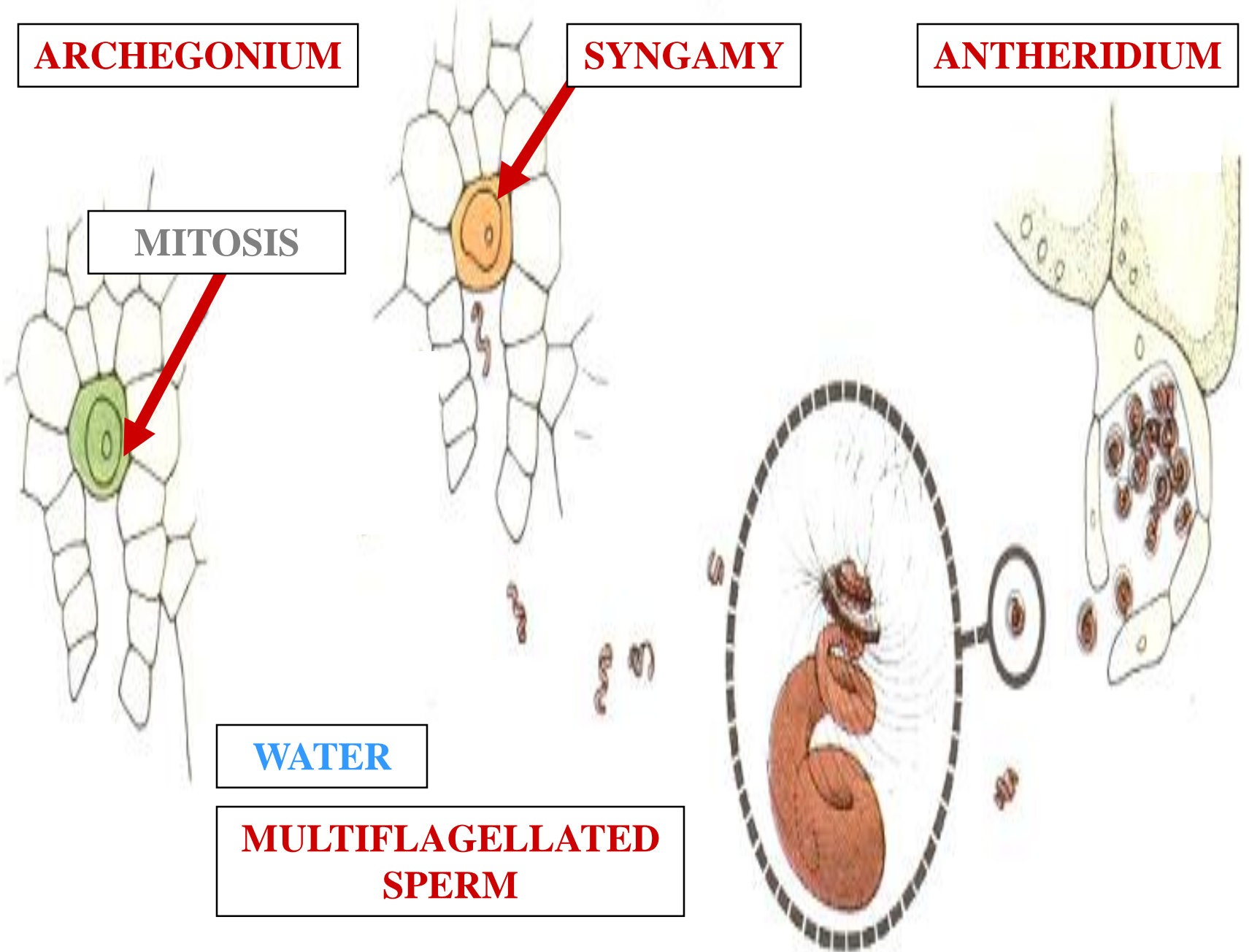
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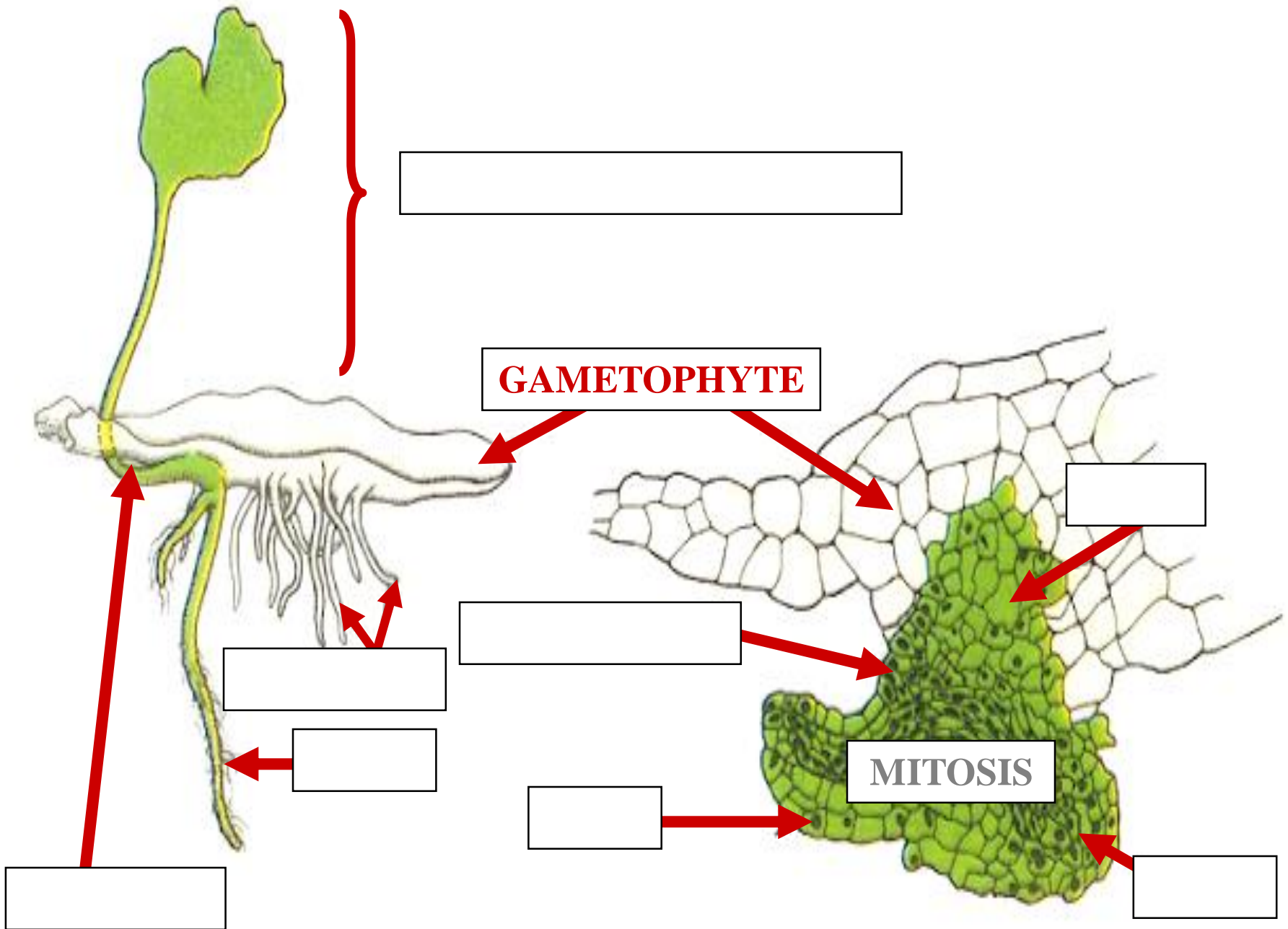
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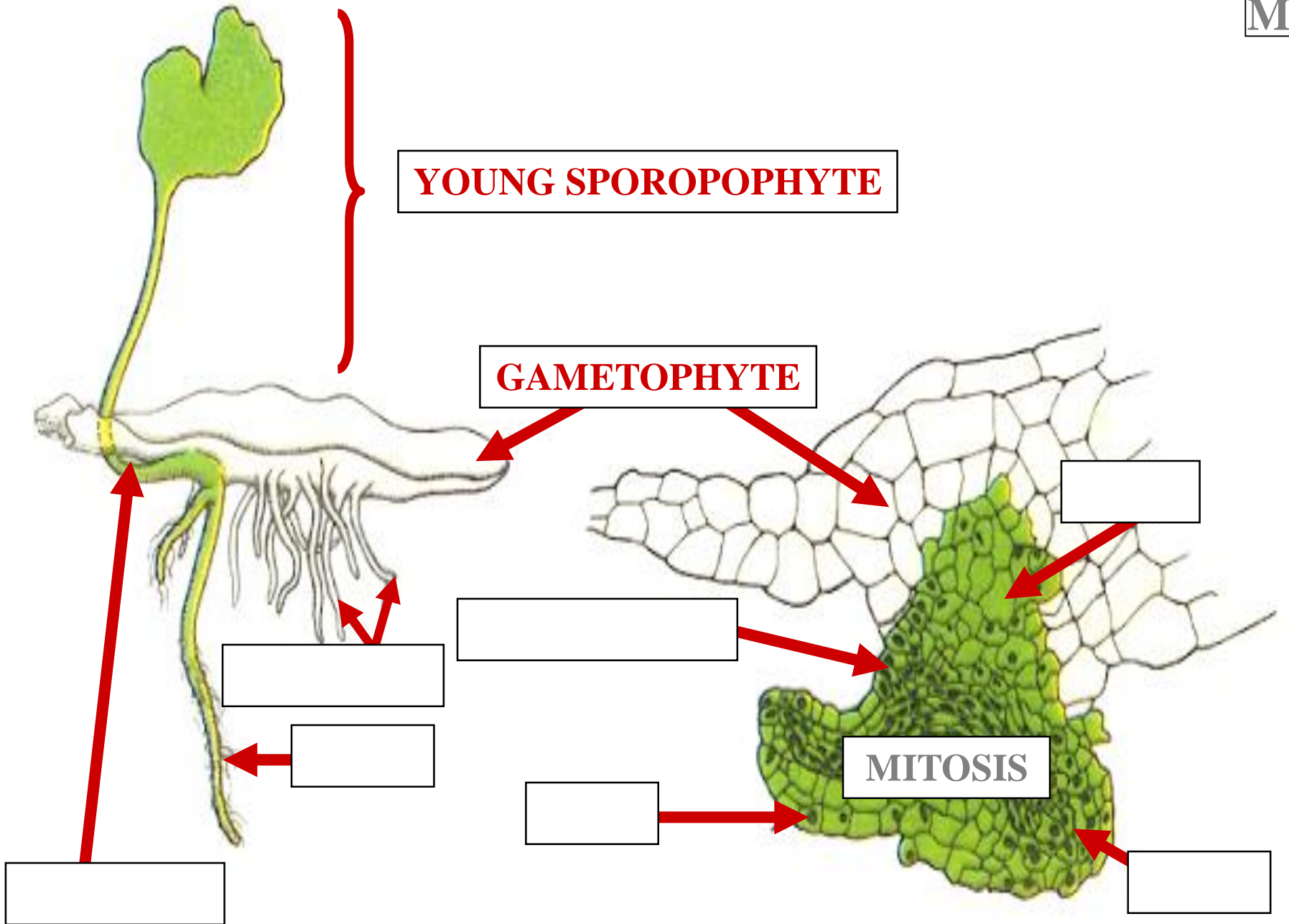
MITOSIS

WATER

**MULTIFLAGELLATED
SPERM**



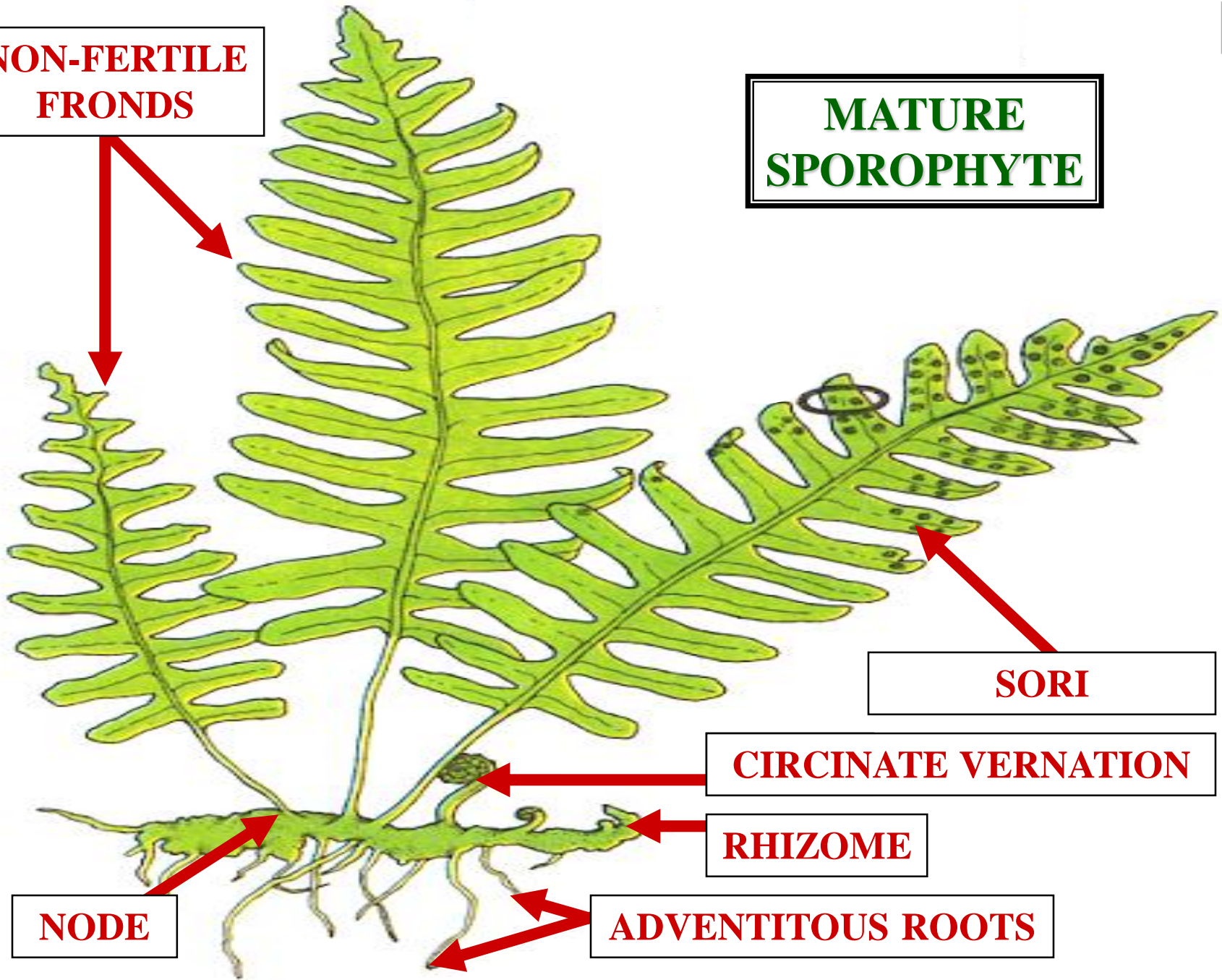






NON-FERTILE FRONDS

MATURE SPOROPHYTE



SORI

CIRCINATE VERNATION

RHIZOME

ADVENTITIOUS ROOTS

NODE

