



TRUE PLANTS

CHLOROPHYTA

**PHYCOPLAST ABSENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL**

ULVOPHYCEAE

**PHYCOPLAST PRESENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL**

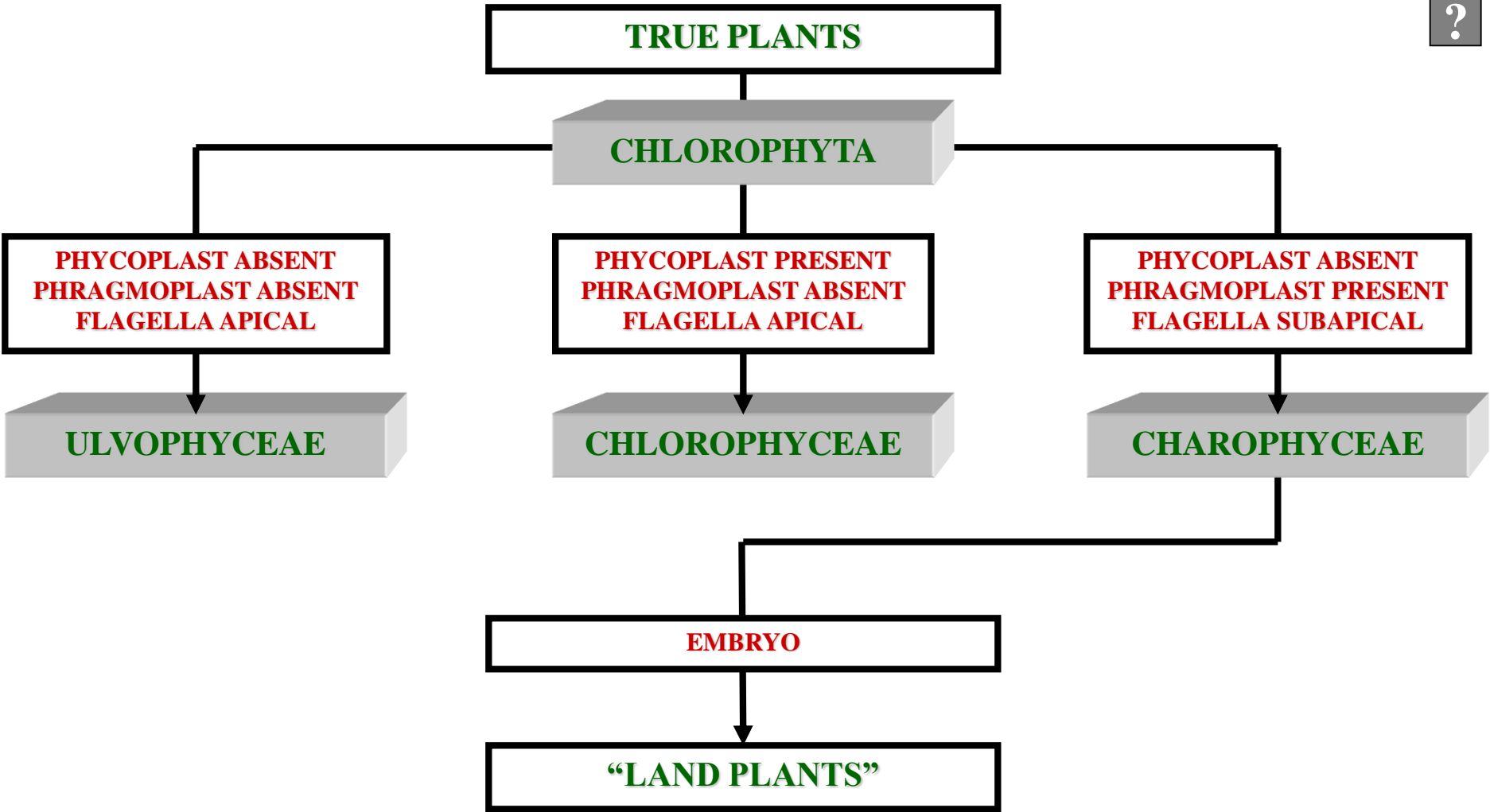
CHLOROPHYCEAE

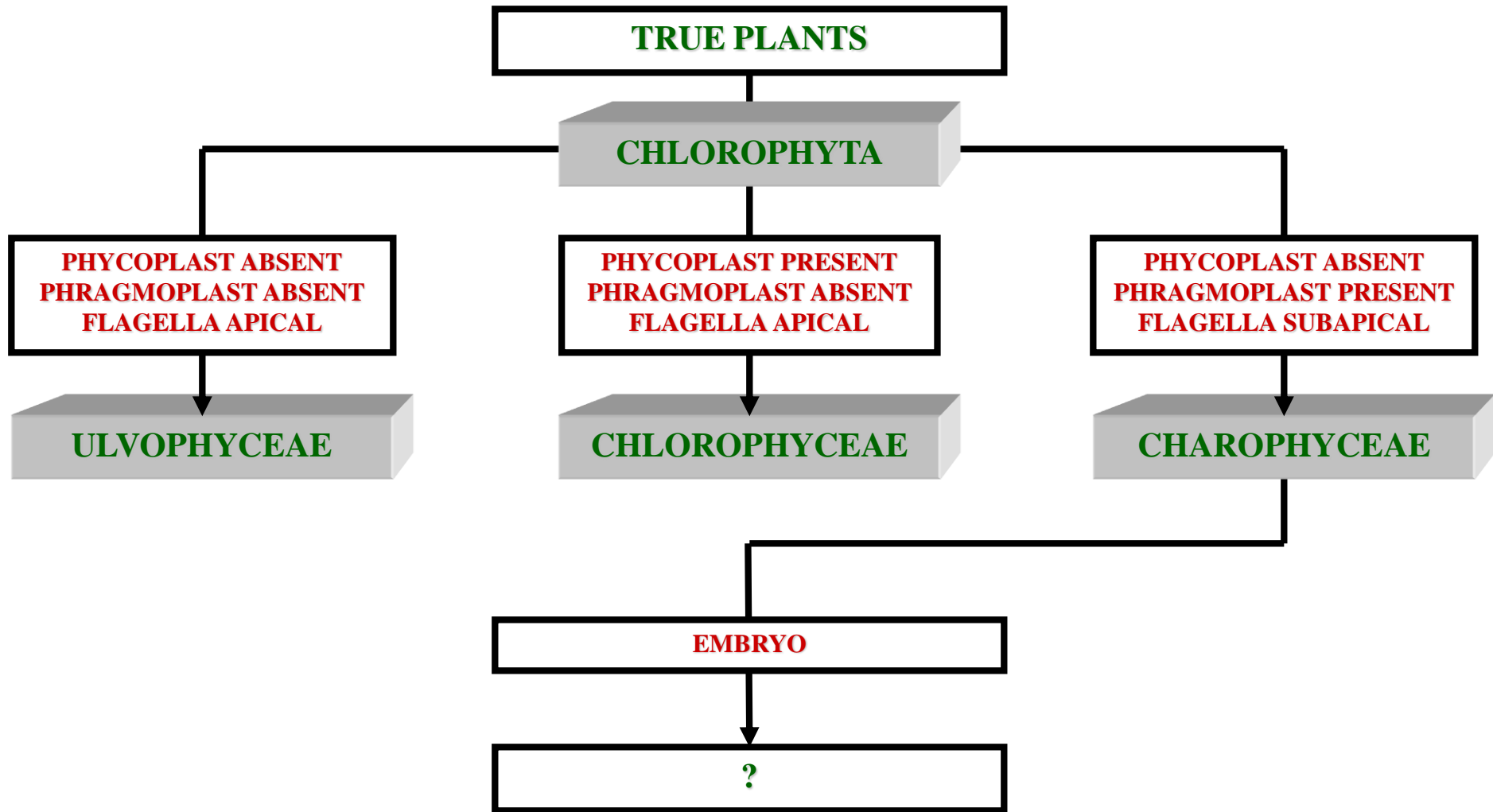
**PHYCOPLAST ABSENT
PHRAGMOPLAST PRESENT
FLAGELLA SUBAPICAL**

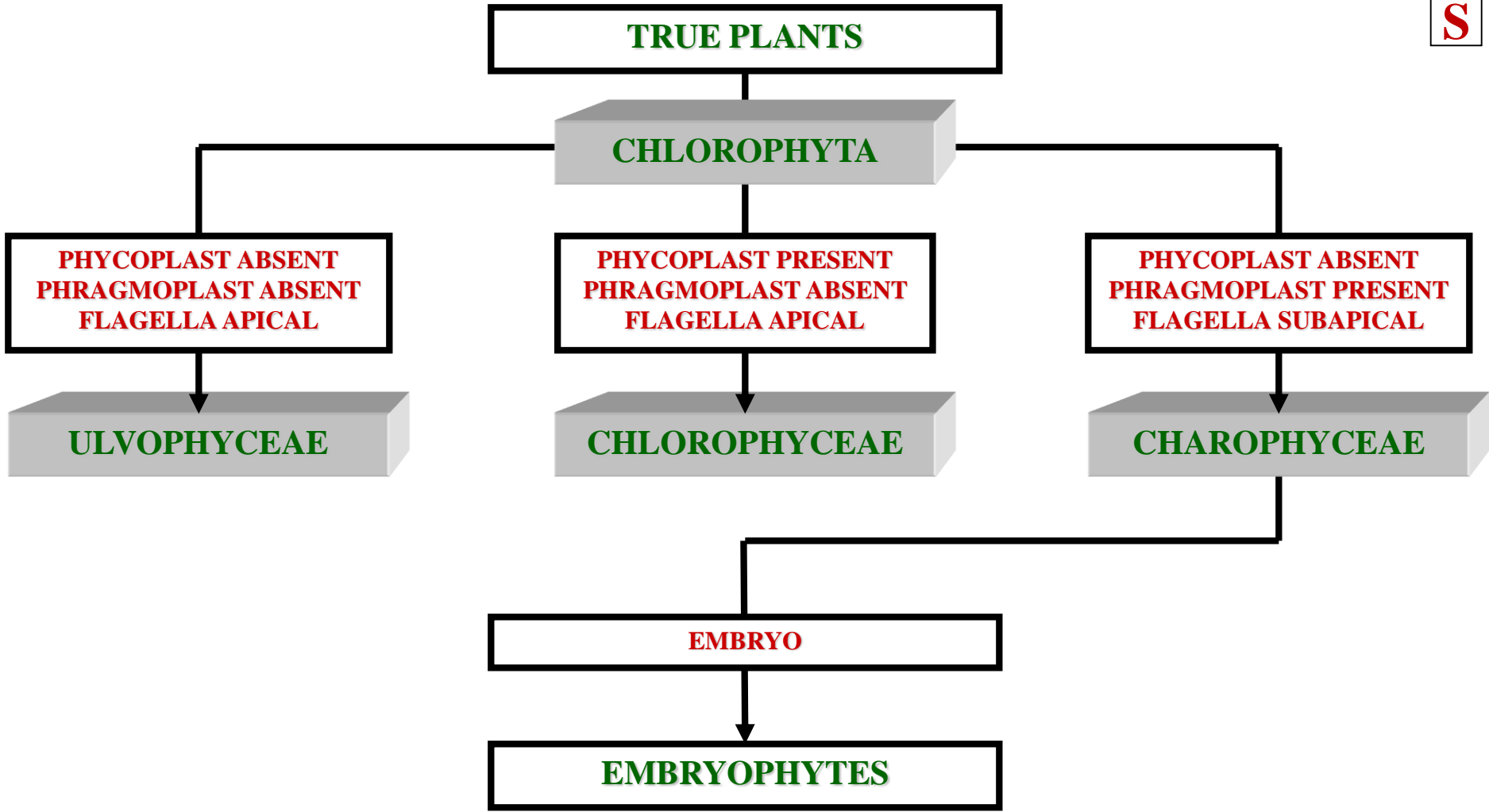
CHAROPHYCEAE

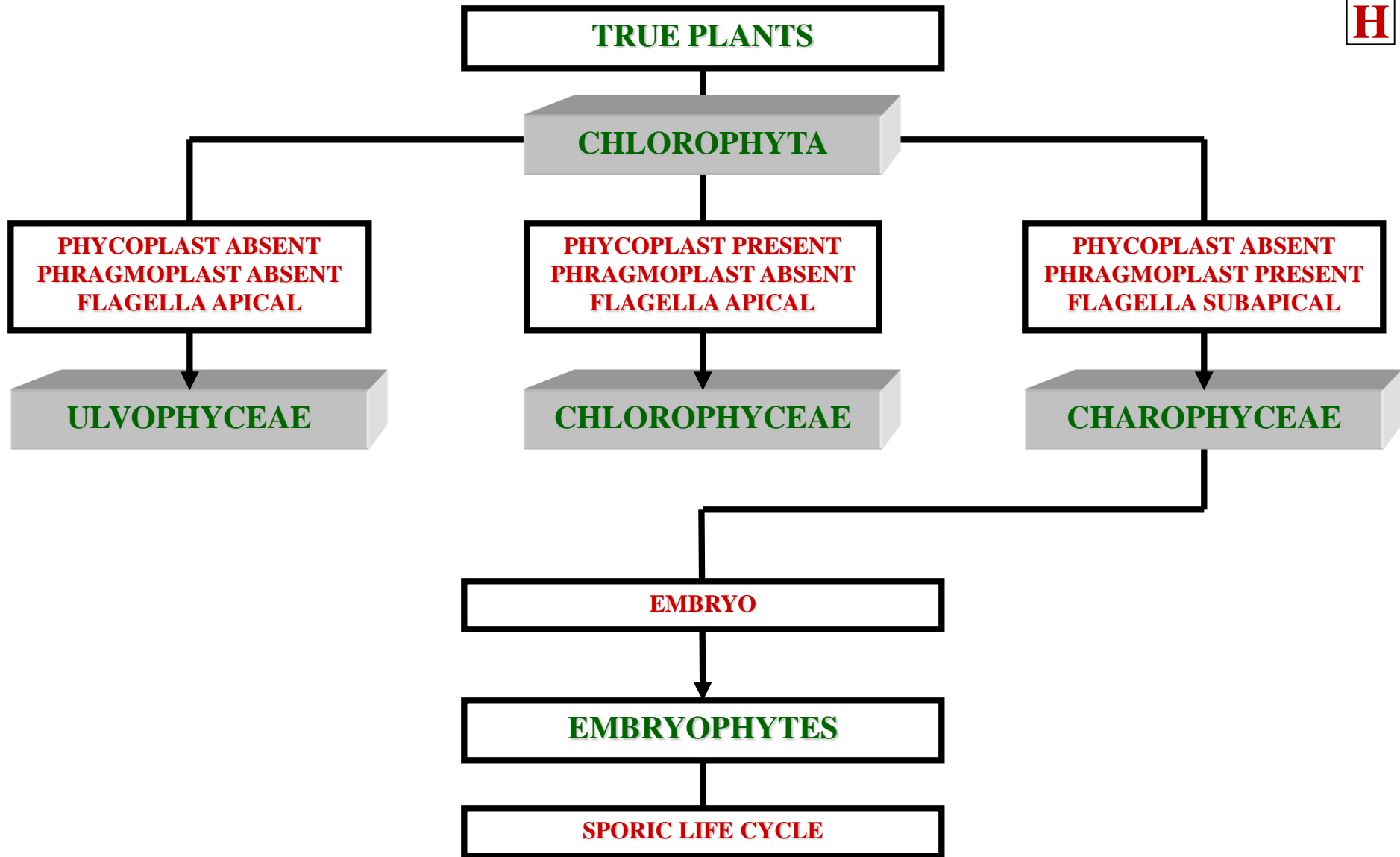
EMBRYO

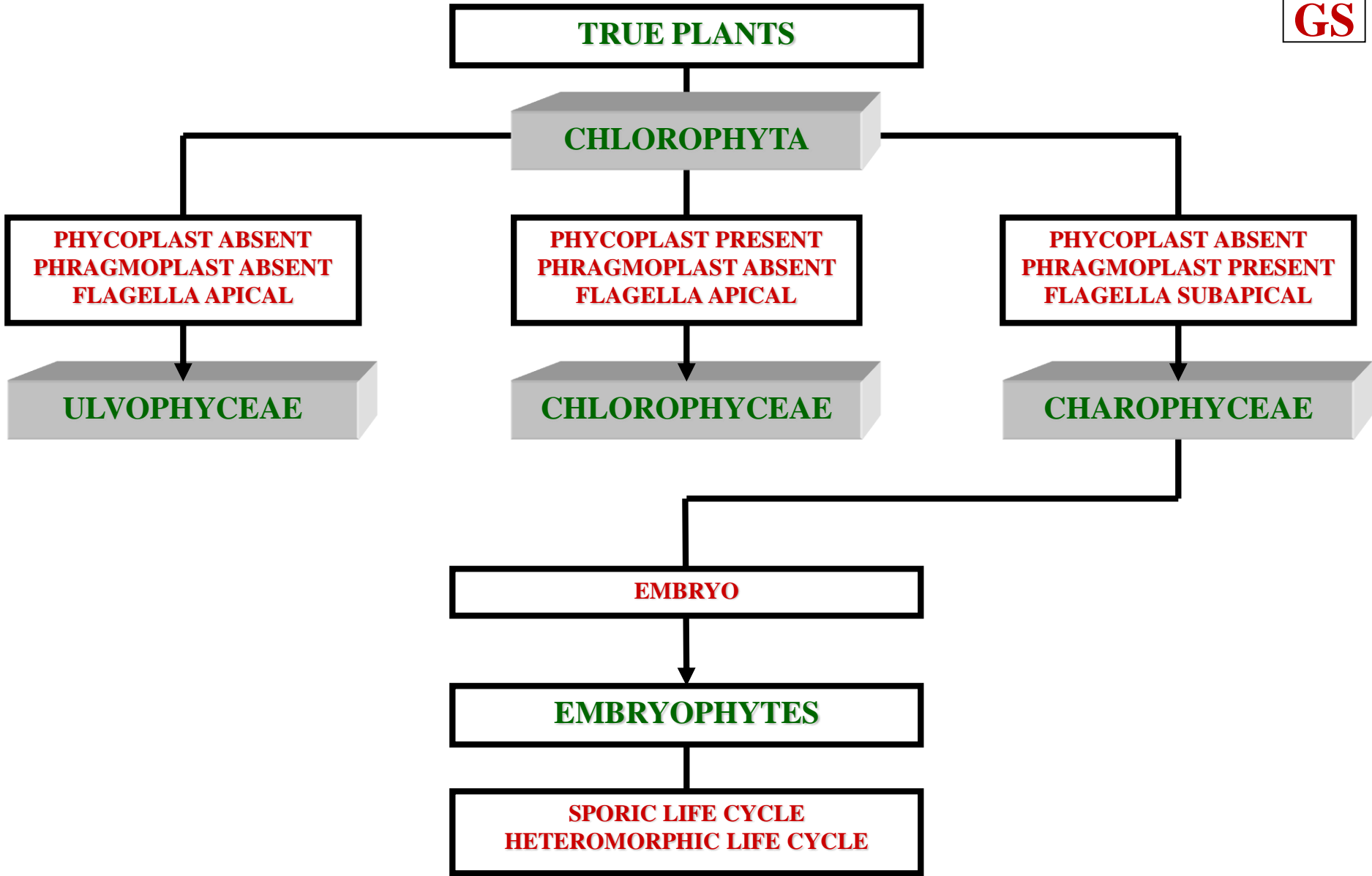
“LAND PLANTS”

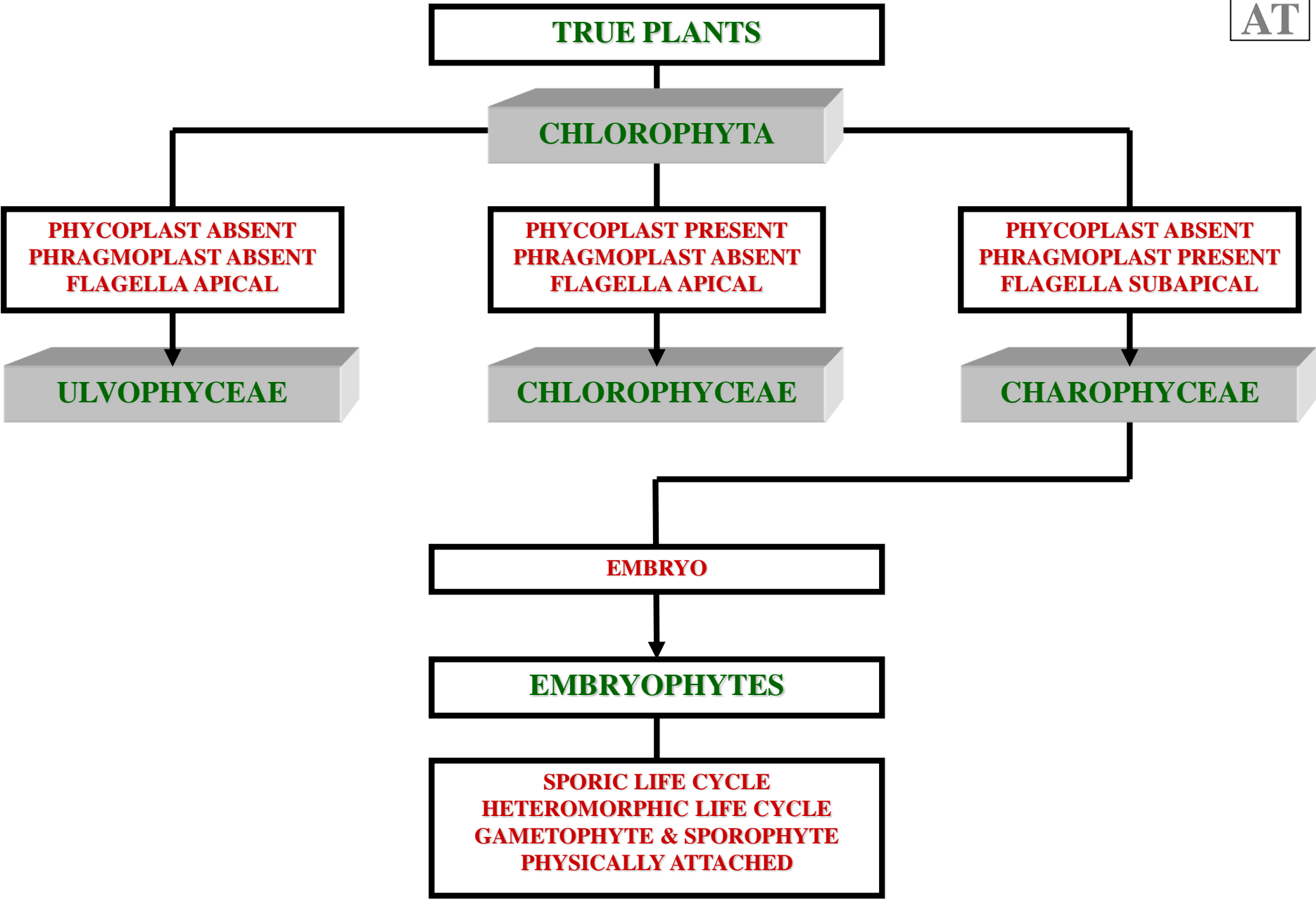














TRUE PLANTS

CHLOROPHYTA

**PHYCOPLAST ABSENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL**

**PHYCOPLAST PRESENT
PHRAGMOPLAST ABSENT
FLAGELLA APICAL**

**PHYCOPLAST ABSENT
PHRAGMOPLAST PRESENT
FLAGELLA SUBAPICAL**

ULVOPHYCEAE

CHLOROPHYCEAE

CHAROPHYCEAE

EMBRYO

EMBRYOPHYTES

**SPORIC LIFE CYCLE
HETEROMORPHIC LIFE CYCLE
GAMETOPHYTE & SPOROPHYTE
PHYSICALLY ATTACHED
ANTITHETIC THEORY**

EMBRYOPHYTES

EMBRYOPHYTES

EMBRYOPHYTES



EMBRYO BEARING PLANTS

EMBRYOPHYTES

EMBRYOPHYTE LIFE CYCLE

PR

YOUNG SPOROPOPHYTE FROND

GAMETOPHYTE

FOOT

SHOOT APEX

RHIZOIDS

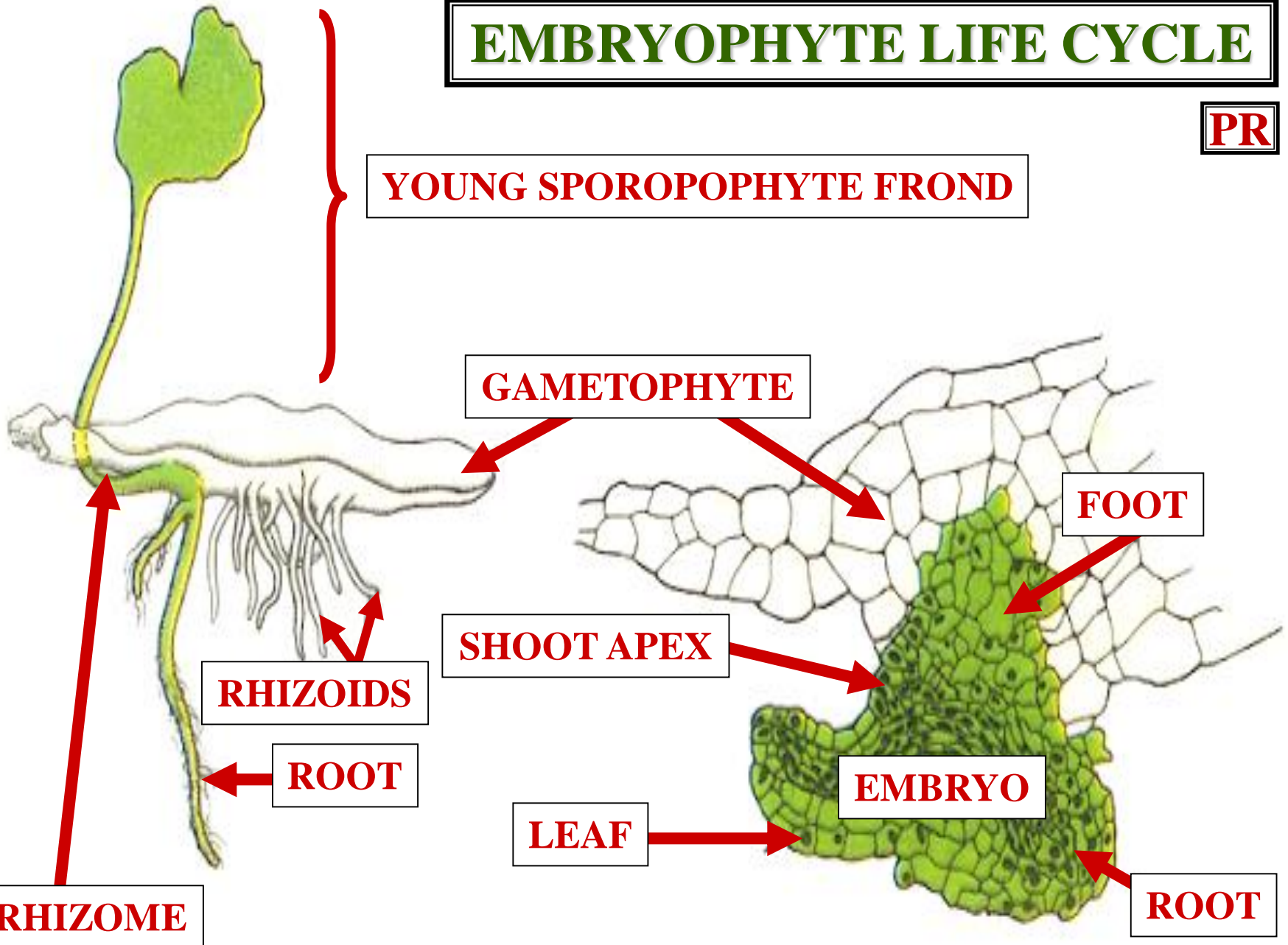
ROOT

EMBRYO

LEAF

ROOT

RHIZOME



EMBRYO: PRESENT

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YOUNG SPOROPOPHYTE FROND

GAMETOPHYTE

FOOT

SHOOT APEX

RHIZOIDS

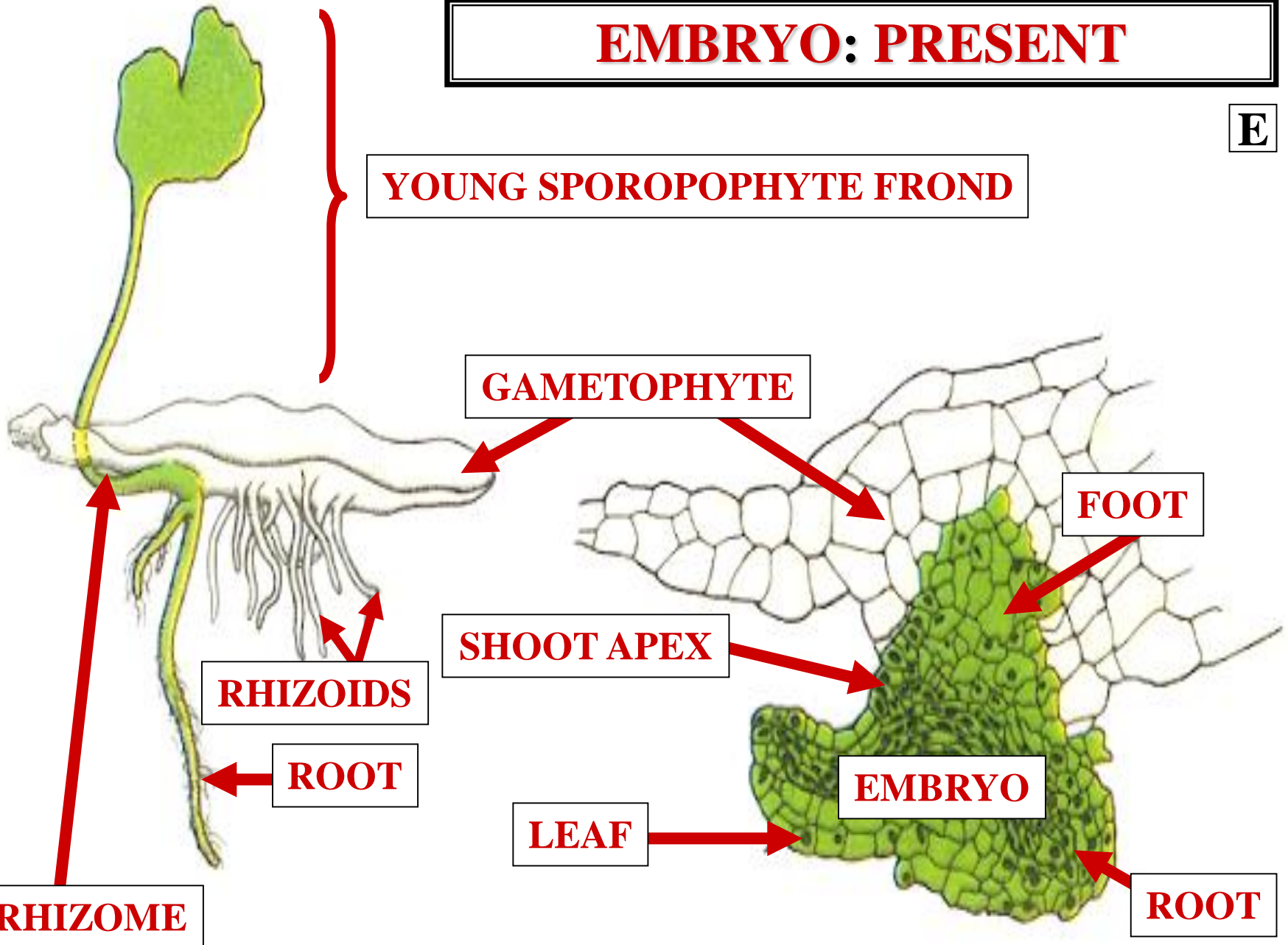
ROOT

EMBRYO

LEAF

ROOT

RHIZOME



EMBRYO



EMBRYO

**MULTICELLULAR
IMMATURE
SPOROPHYTE**

EMBRYO

**EMBRYO
IMMATURE SPOROPHYTE**

YOUNG SPOROPOPHYTE FROND



GAMETOPHYTE

FOOT

SHOOT APEX

RHIZOIDS

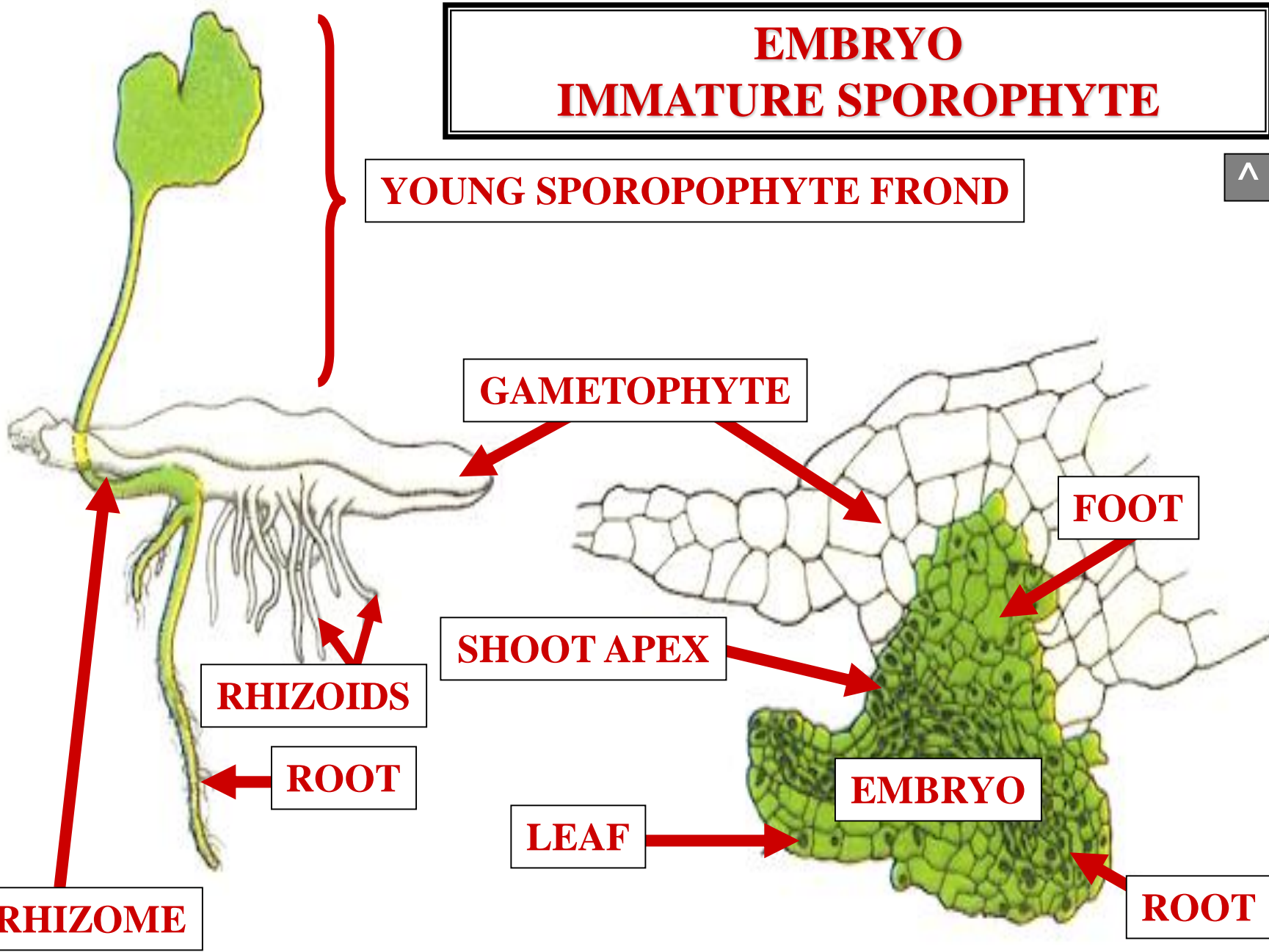
ROOT

EMBRYO

LEAF

ROOT

RHIZOME

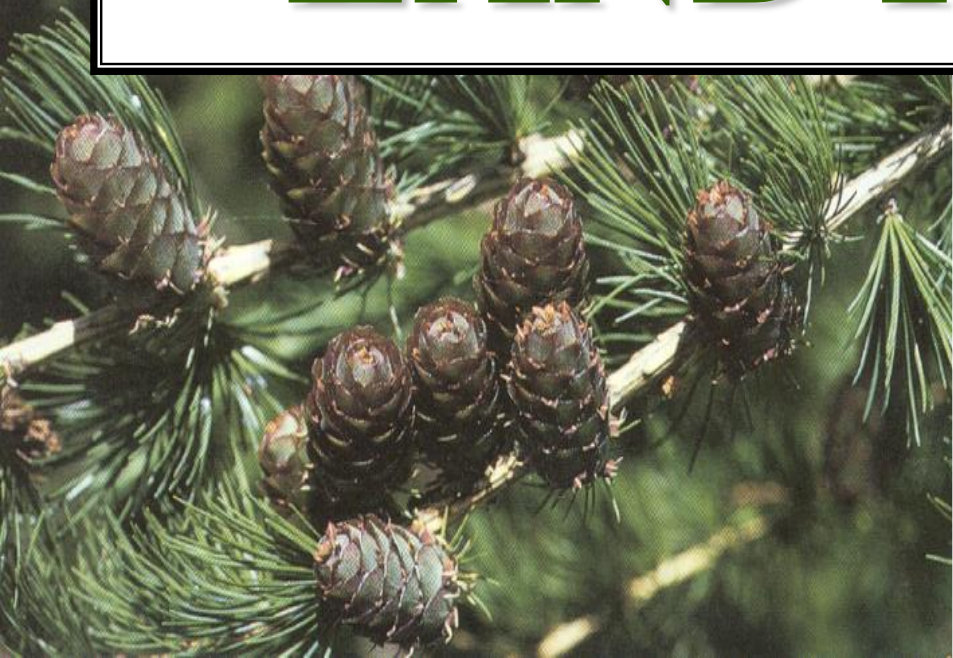




COMMON NAME



“LAND PLANTS”





“LAND PLANTS”
MADE TRANSITION FROM
AQUATIC MARINE HABITAT
TO
TERRESTRIAL HABITAT



EMBRYOPHYTE TERRESTRIAL ADAPTATIONS

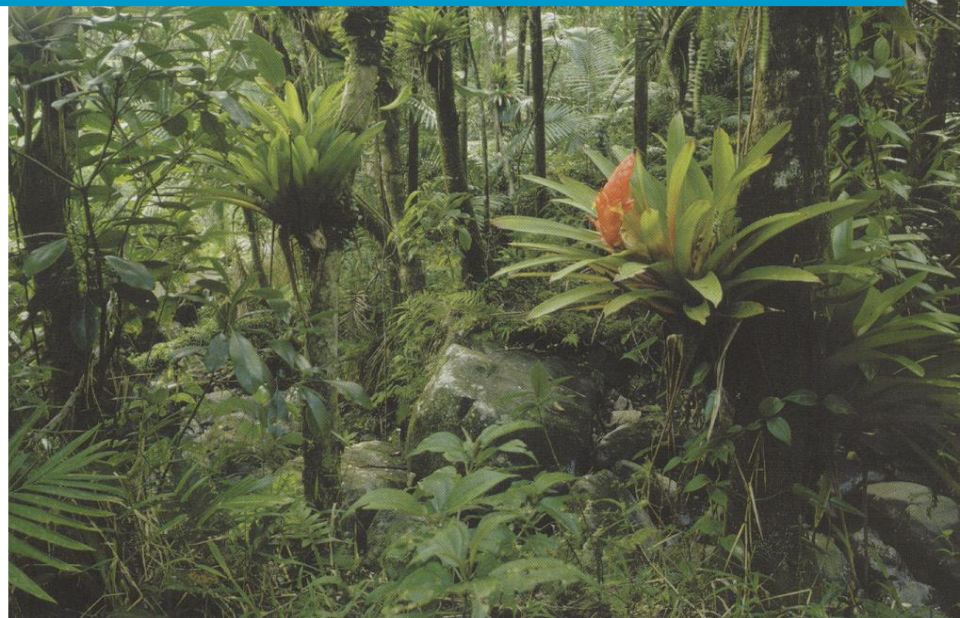


CRITICAL TERRESTRIAL ADAPTATION





WATER RETENTION



CUTICLE

CUTICLE



CUTICLE

EPIDERMIS WAX

CUTICLE

CUTICLE



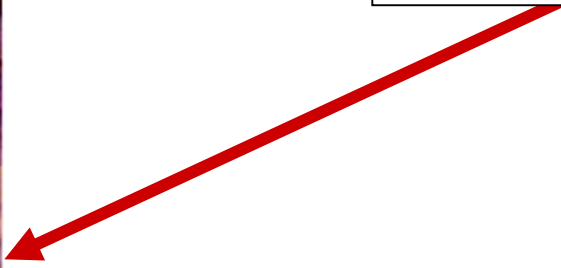
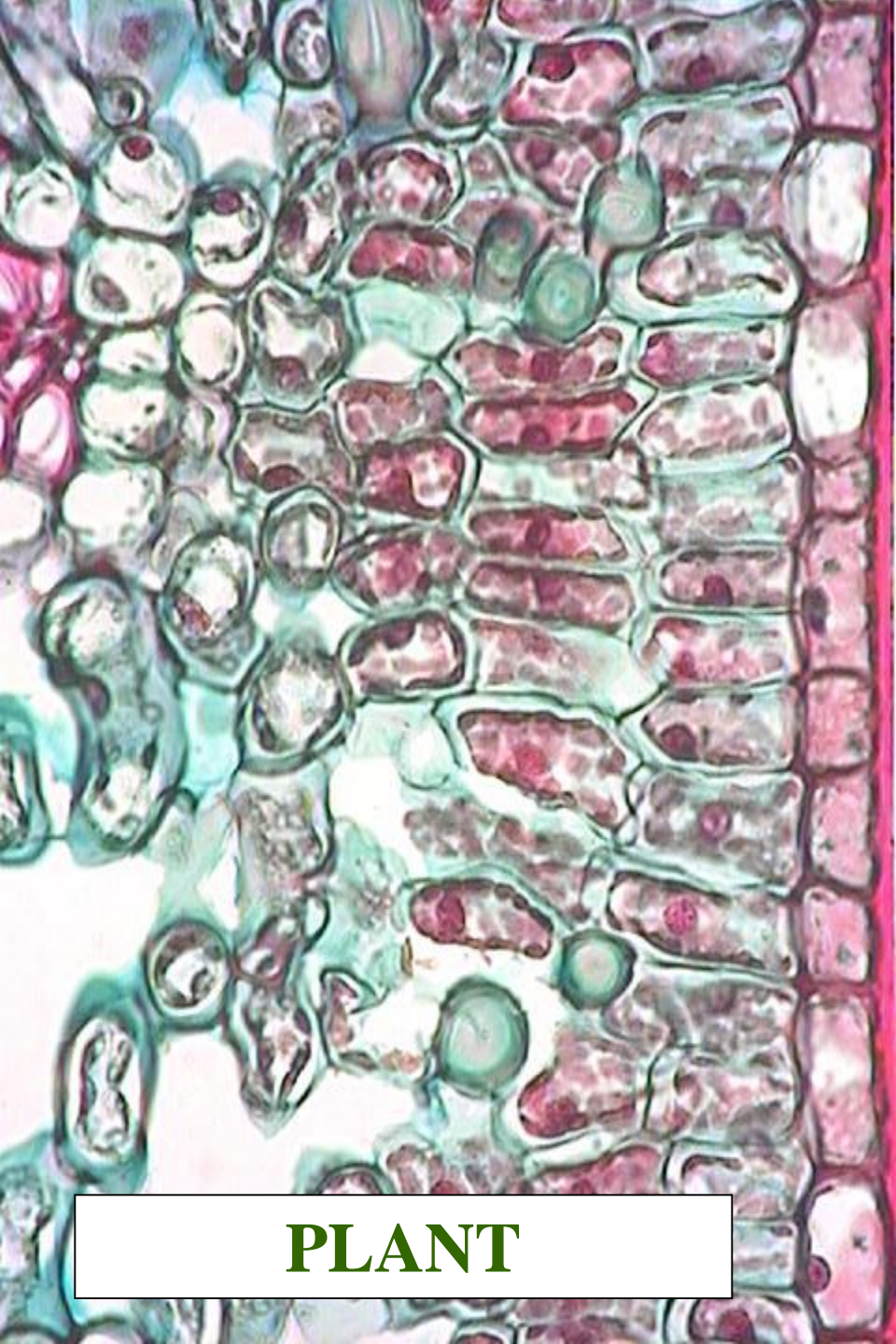
EPIDERMIS WAX

INHIBITS WATER LOSS

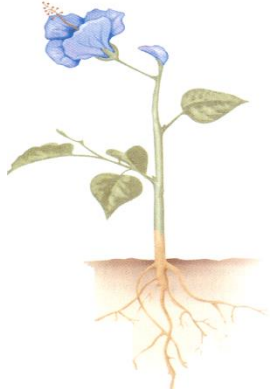
CUTICLE

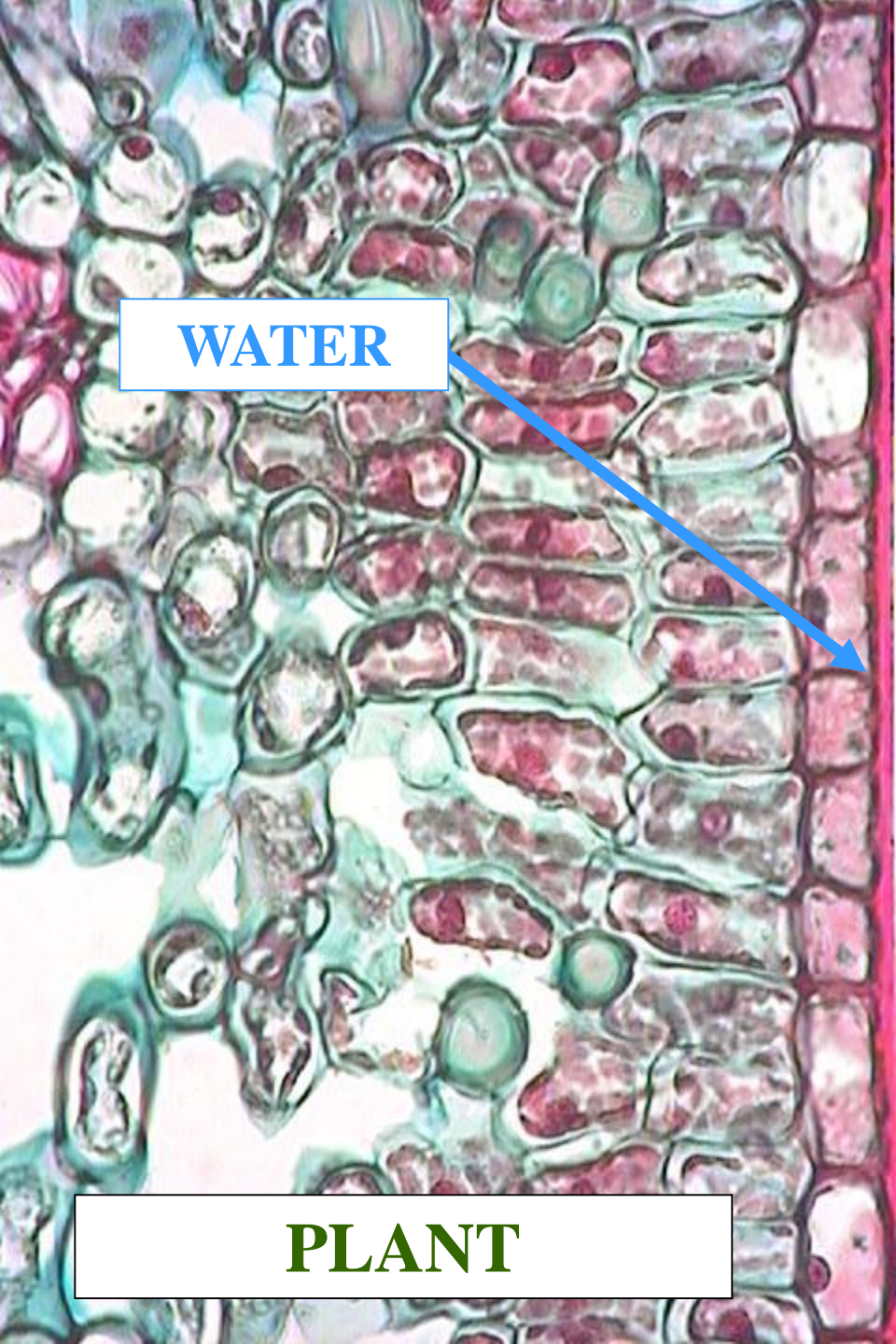
ATMOSPHERE

CUTICLE



PLANT



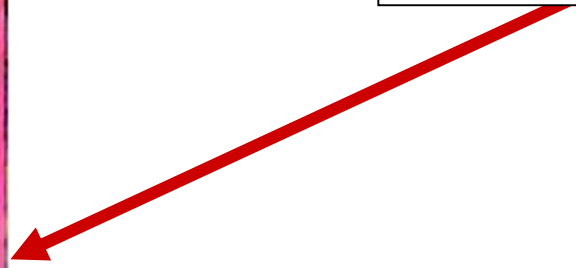
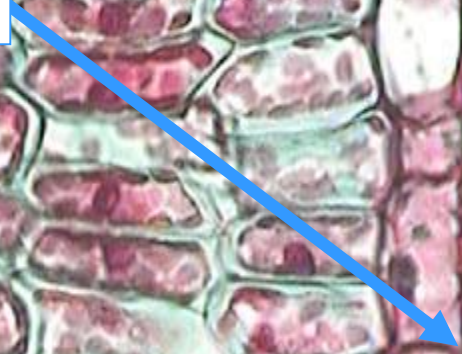


ATMOSPHERE



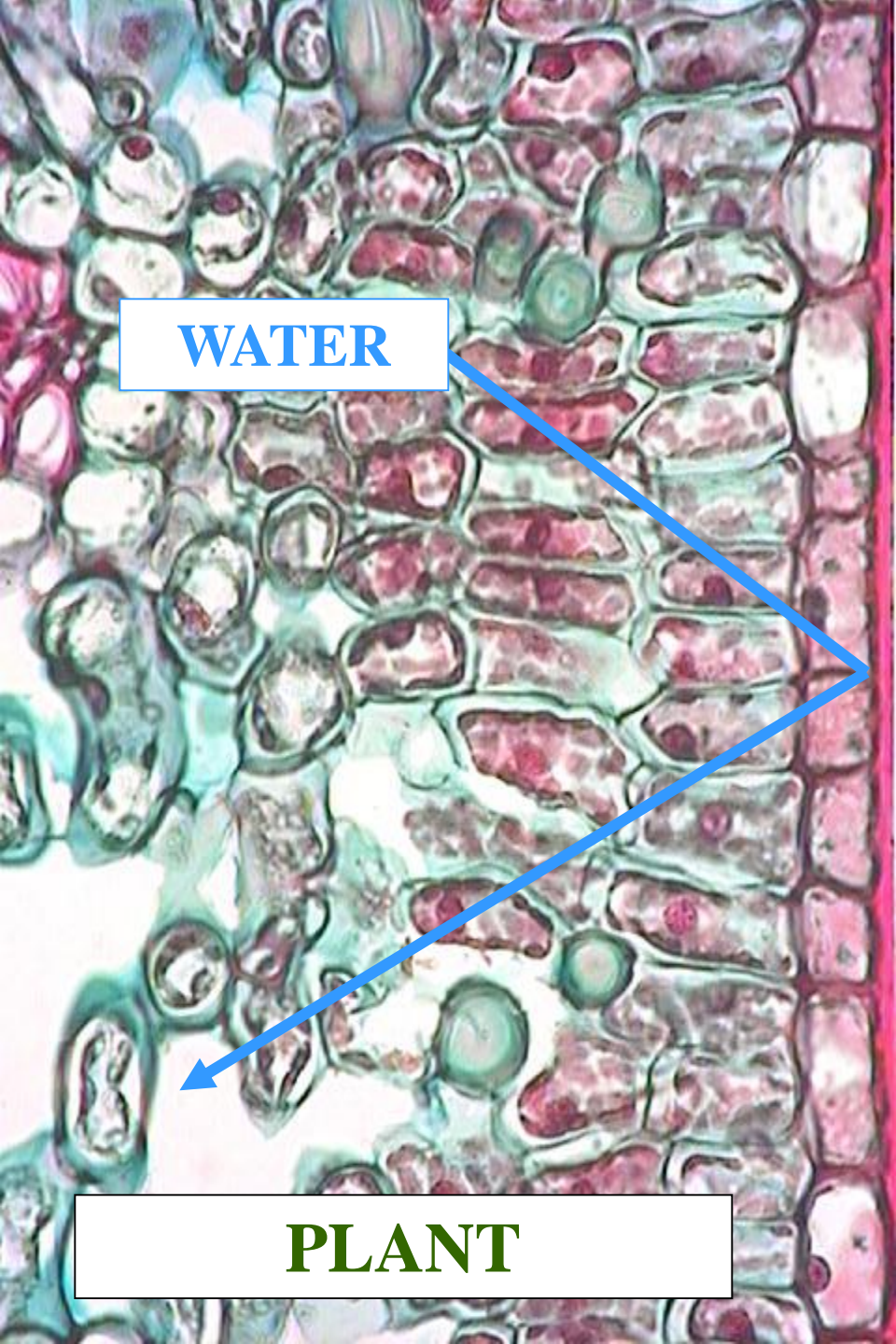
CUTICLE

WATER



PLANT





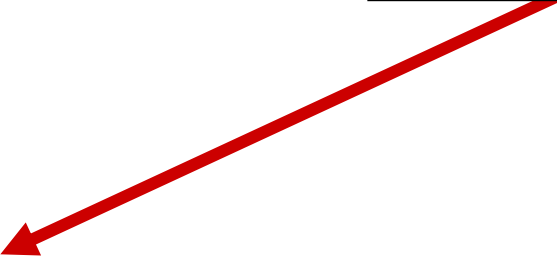
WATER

ATMOSPHERE

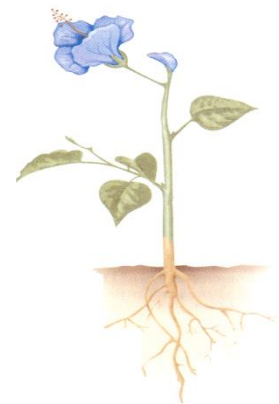
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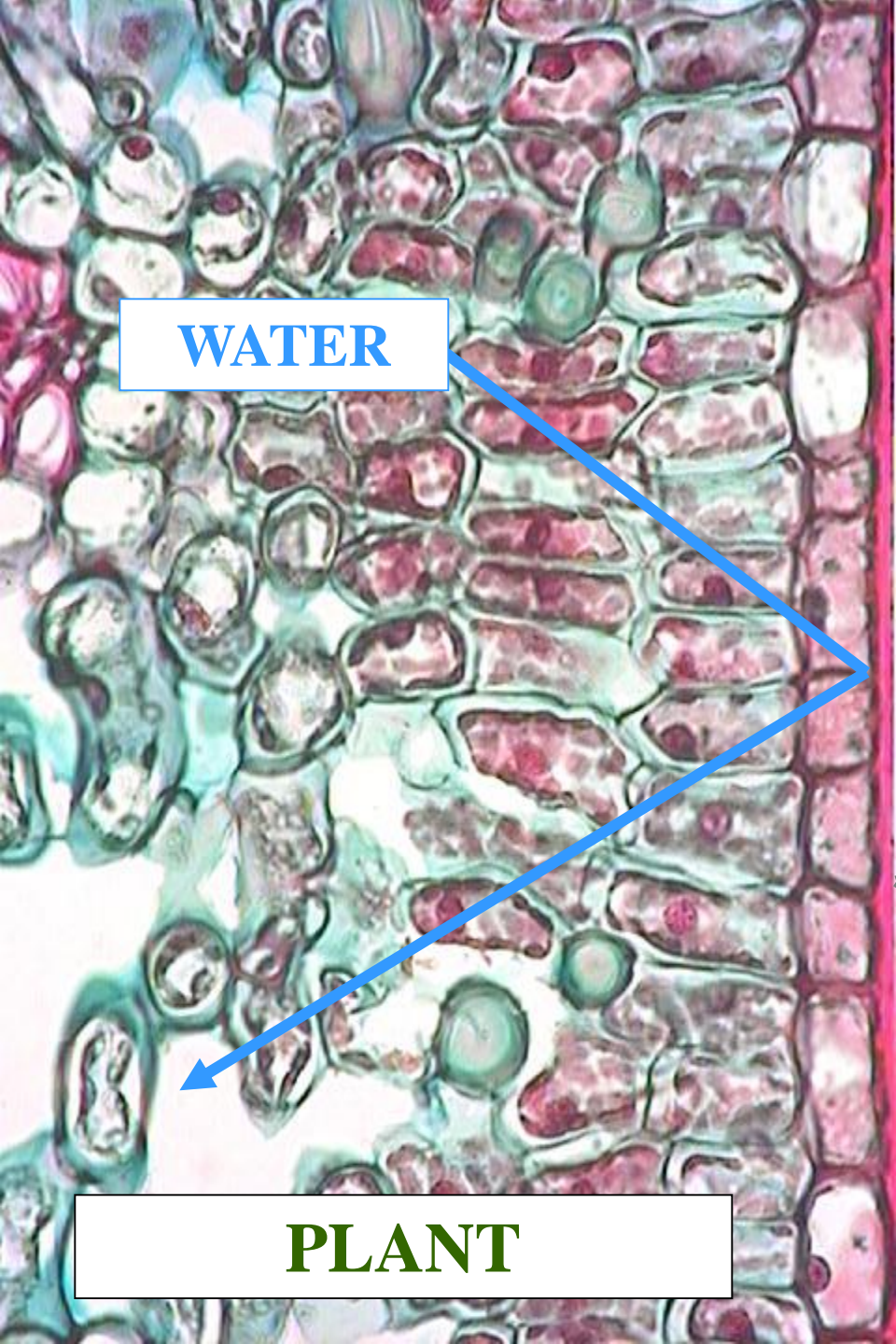
C

CUTICLE



PLANT





WATER

WATER

PLANT

PLANT

ATMOSPHERE

ATMOSPHERE

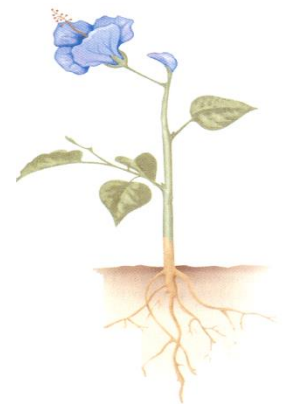
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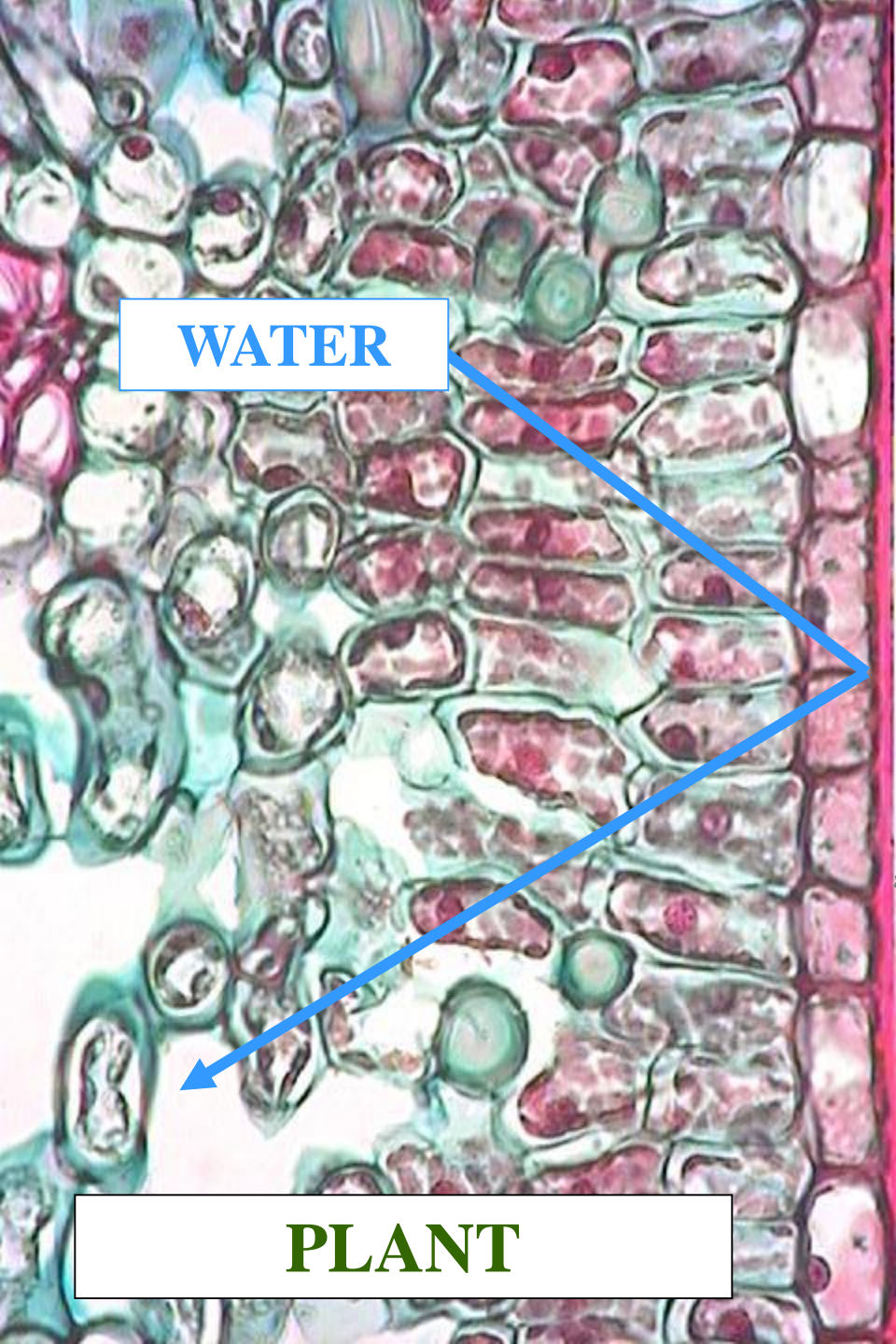
CUTICLE

CUTICLE

?

?





ATMOSPHERE



CUTICLE

WATER

CO₂

PLANT



STOMATES

STOMATE

STOMATE



**PERMITS
GAS EXCHANGE**

STOMATE

STOMATE

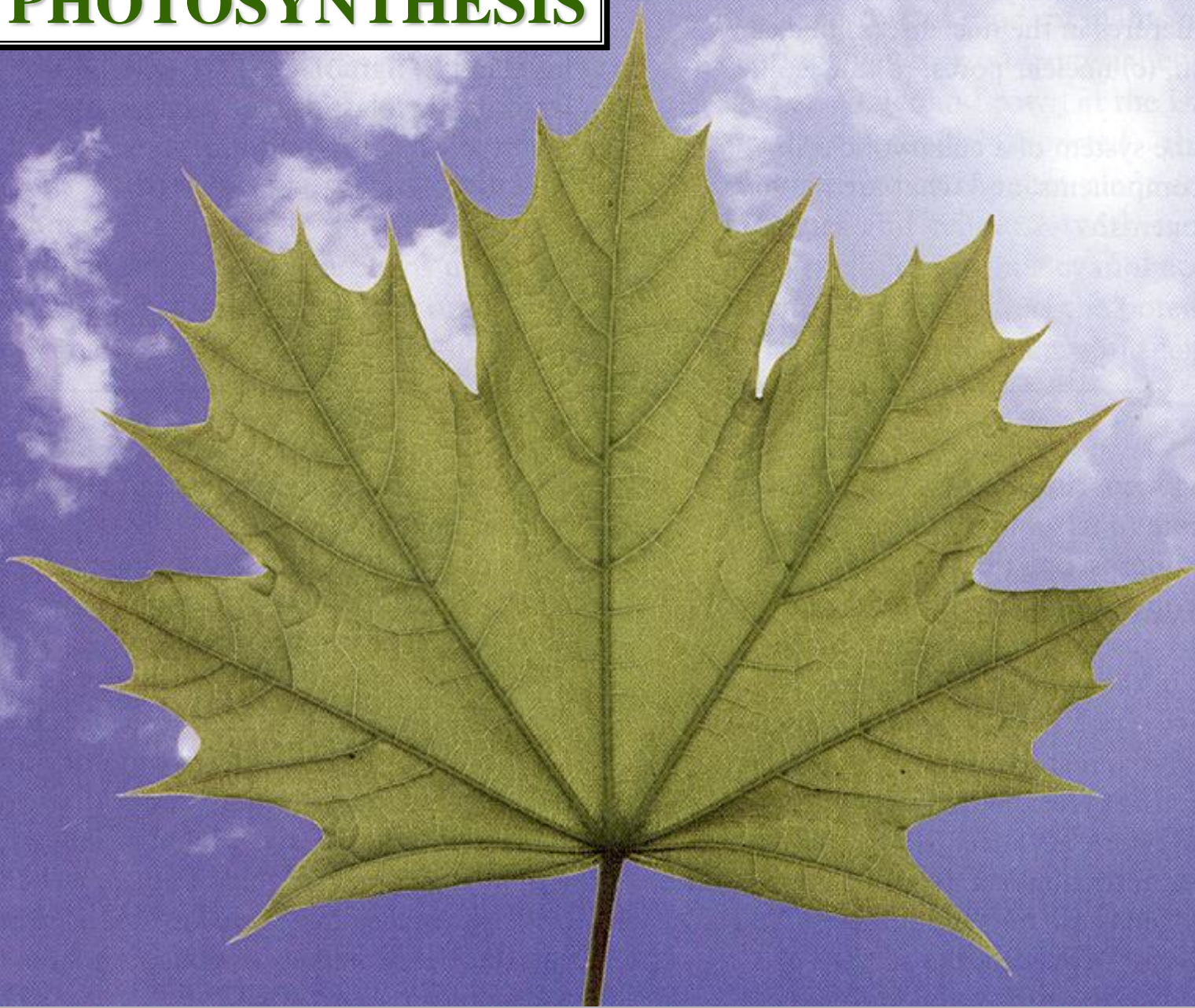


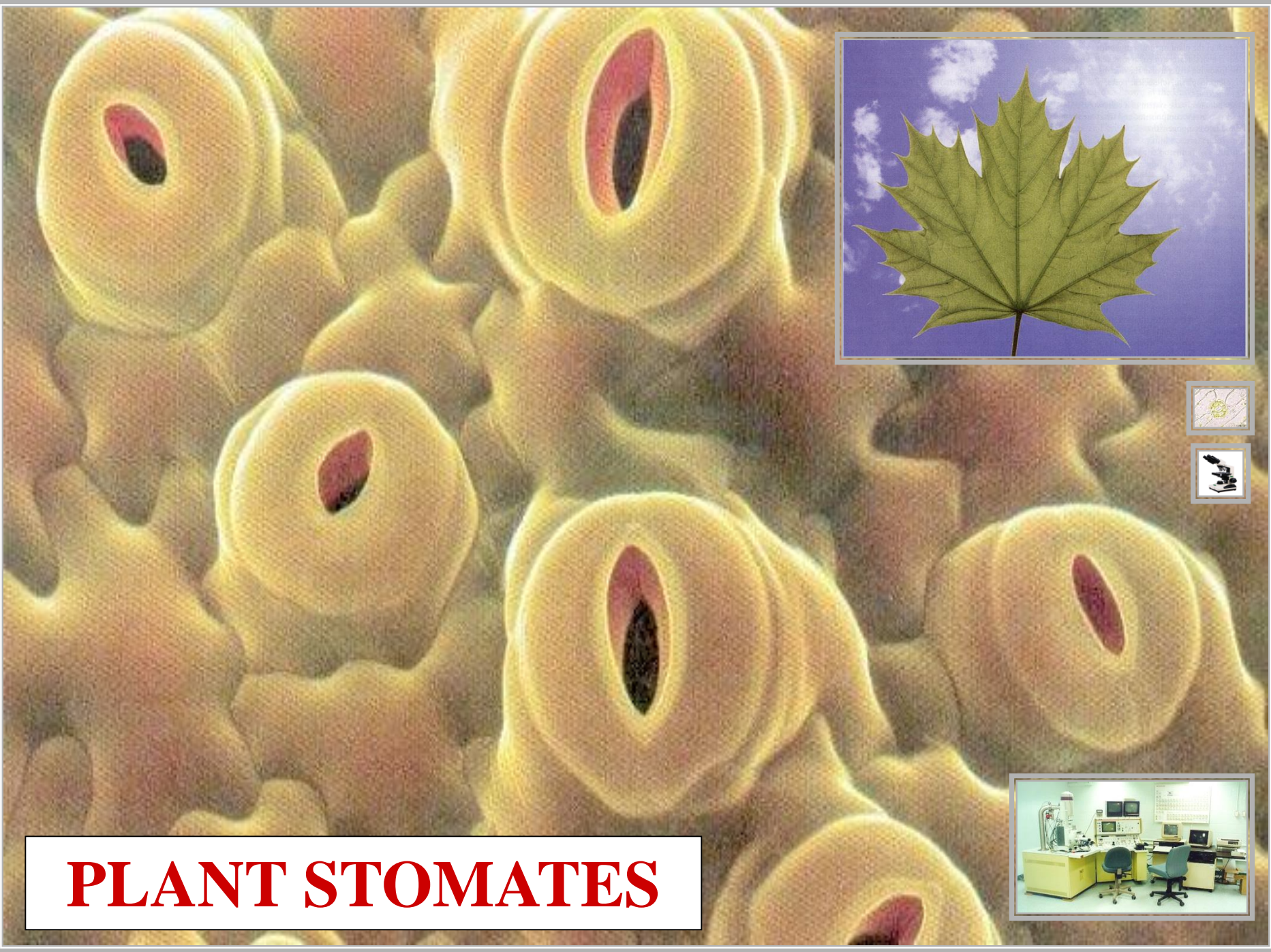
**PERMITS
GAS EXCHANGE**

**CO₂ FOR
PHOTOSYNTHESIS**

STOMATE

PHOTOSYNTHESIS





PLANT STOMATES



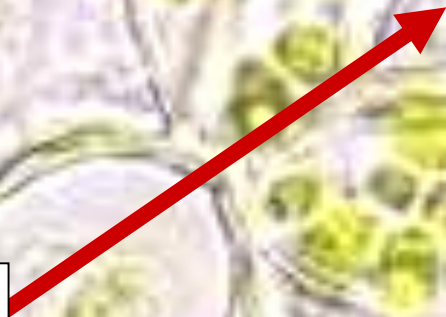
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PLANT STOMATE

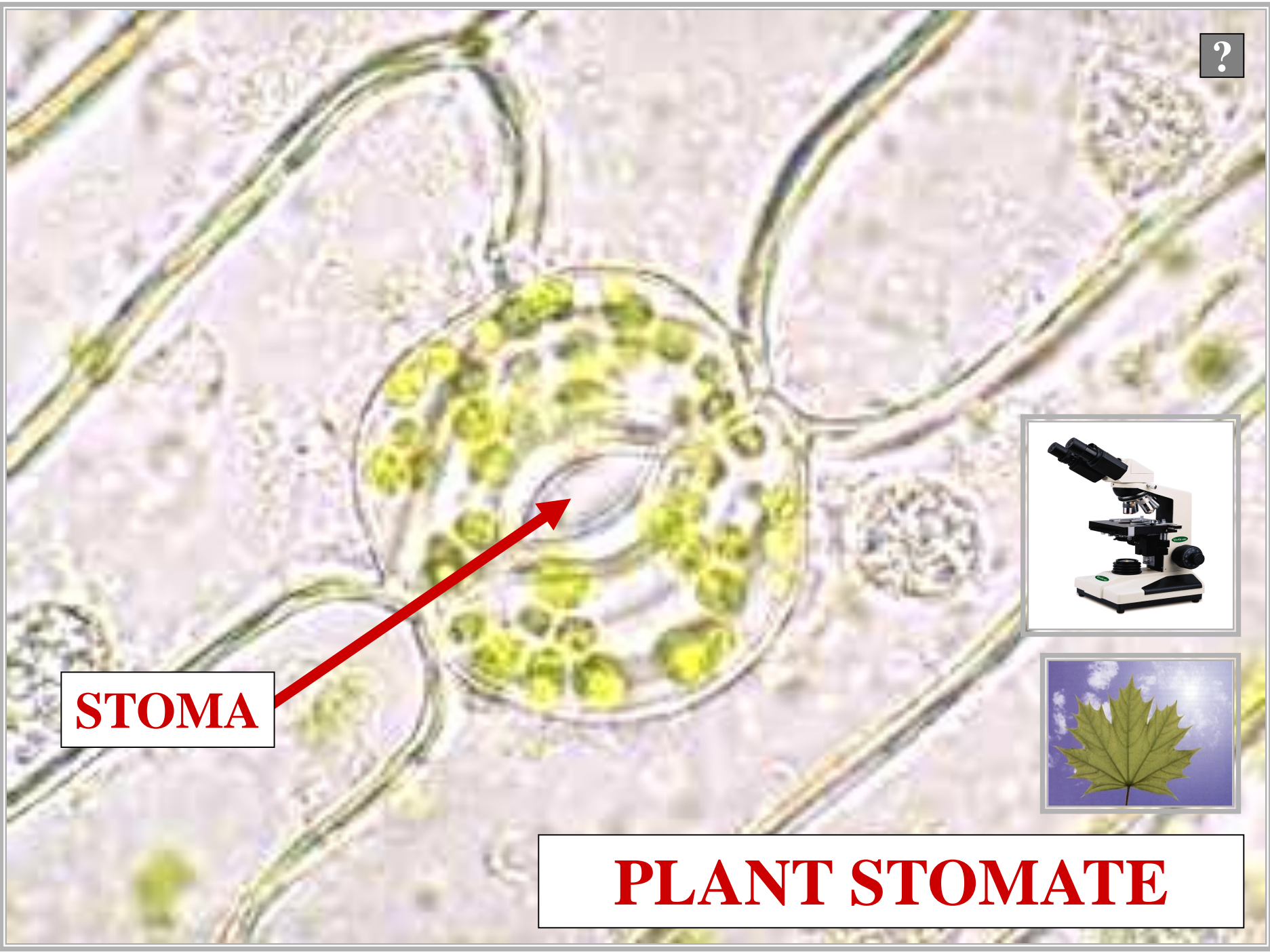
S

?



PLANT STOMATE

?



STOMA



PLANT STOMATE

?

STOMA



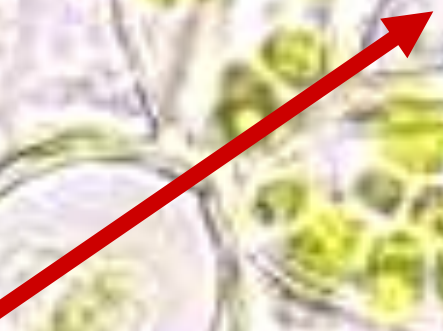
PLANT STOMATE



GUARD CELLS



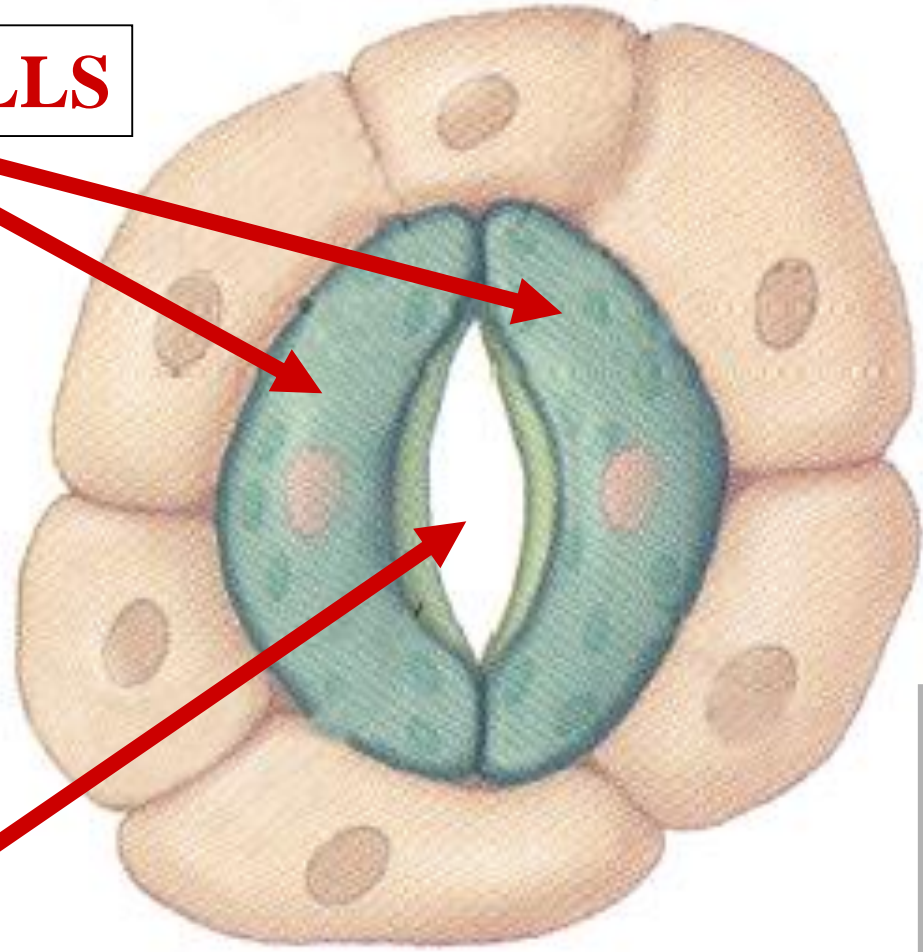
STOMA



PLANT STOMATE

PLANT STOMATE

GUARD CELLS



STOMA

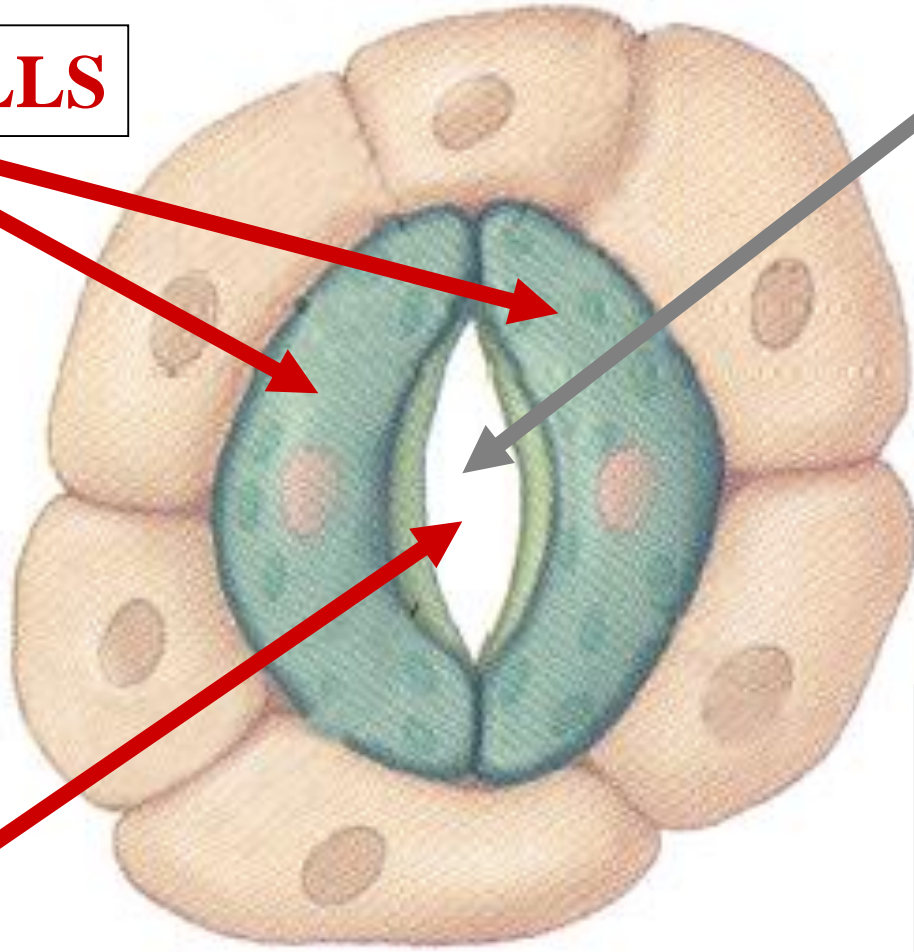


PLANT STOMATE

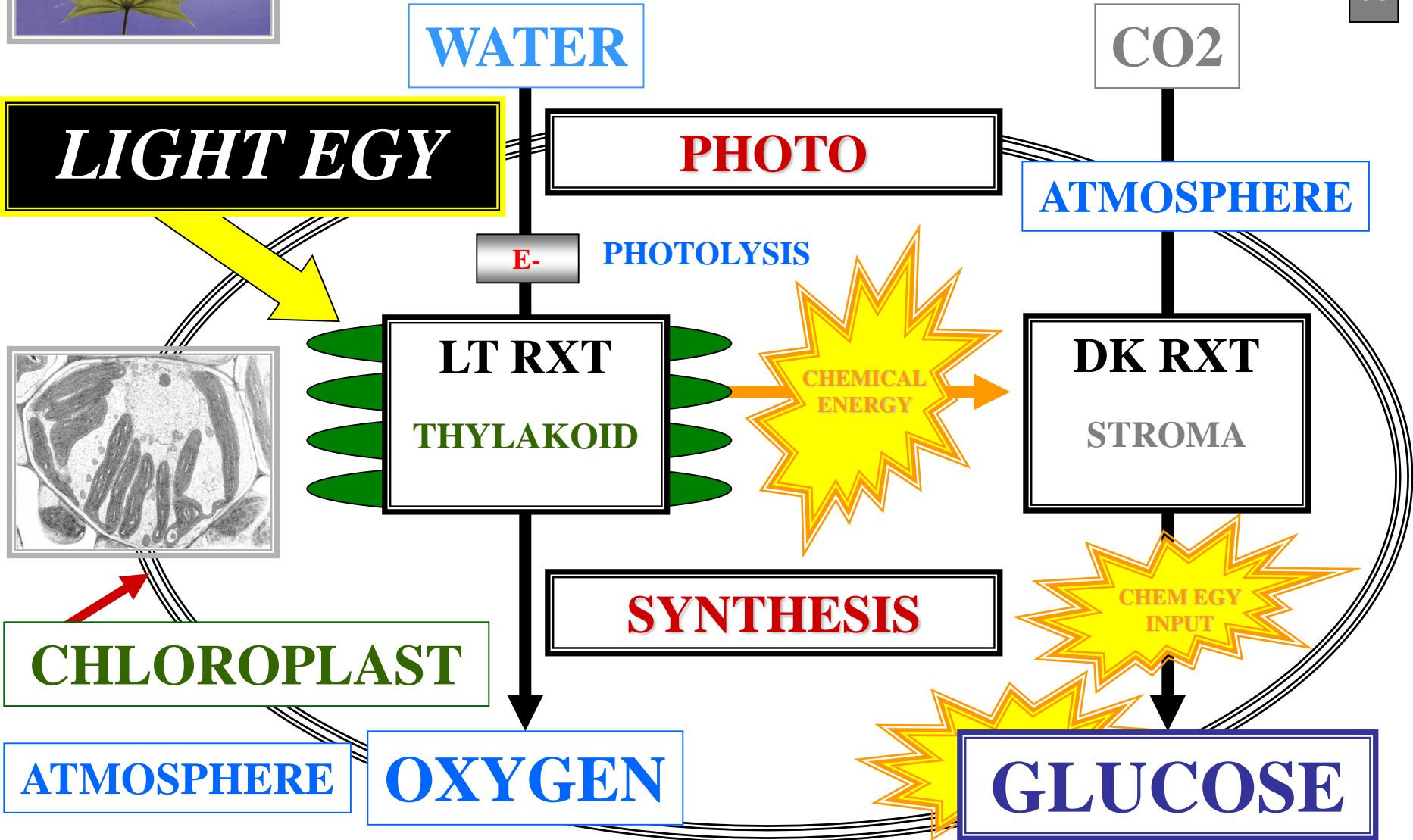
GUARD CELLS

CO₂

STOMA



PHOTOSYNTHESIS



SPOROPOLLENIN

SPOROPOLLENIN

SPOROPOLLENIN



SPORE WAX

SPOROPOLLENIN

SPOROPOLLENIN



SPORE WAX

INHIBITS WATER LOSS

SPOROPOLLENIN

SPOROPOLLENIN



S

SPORE WAX

INHIBITS WATER LOSS

**PERMITS SPORE
WIND DISPERSAL**

SPOROPOLLENIN





SPOROPOLLENIN



A microscopic view of a spore, likely a pollen grain, showing a highly textured, spiky surface. The spore is orange-brown in color and has a complex, multi-lobed structure with sharp, pointed edges. The background is black.

**INHIBITS
WATER
LOSS**

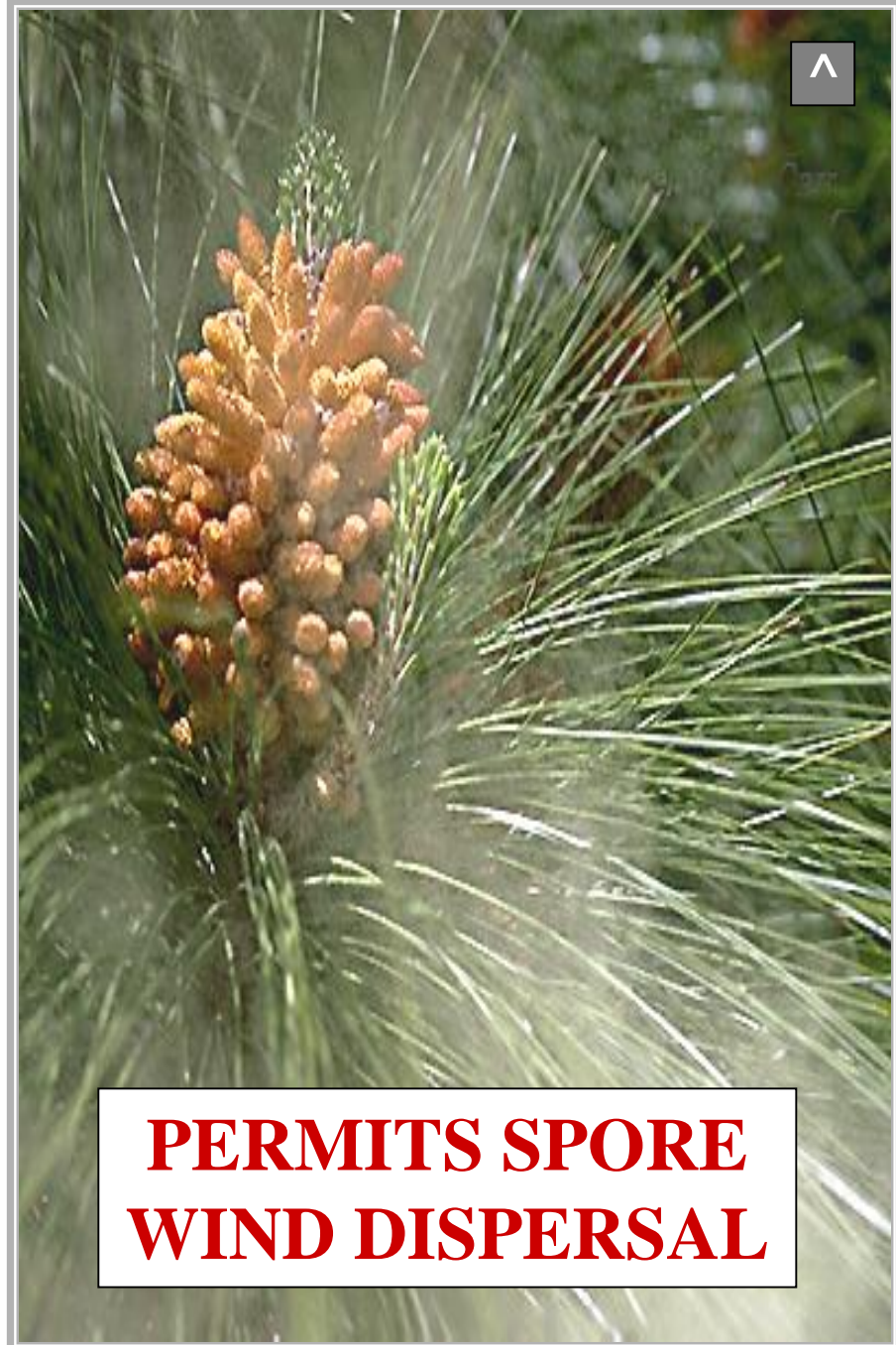
SPOROPOLLENIN



A close-up photograph of a single, large, orange-brown spore. The spore has a highly textured, waxy surface with numerous sharp, pointed protrusions or spines radiating from its center. The background is solid black, making the spore stand out prominently.

**INHIBITS
WATER
LOSS**

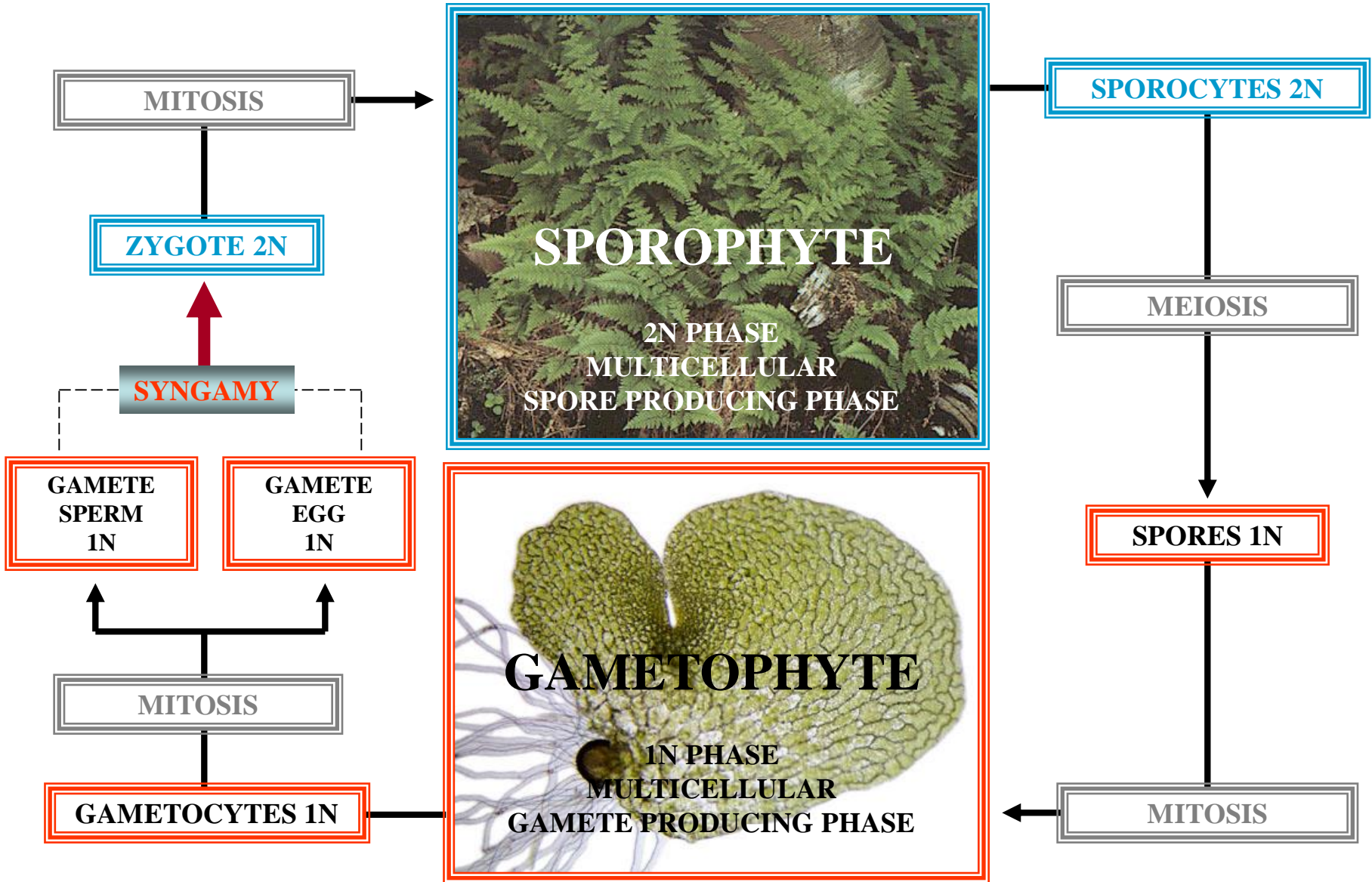
SPOROPOLLENIN



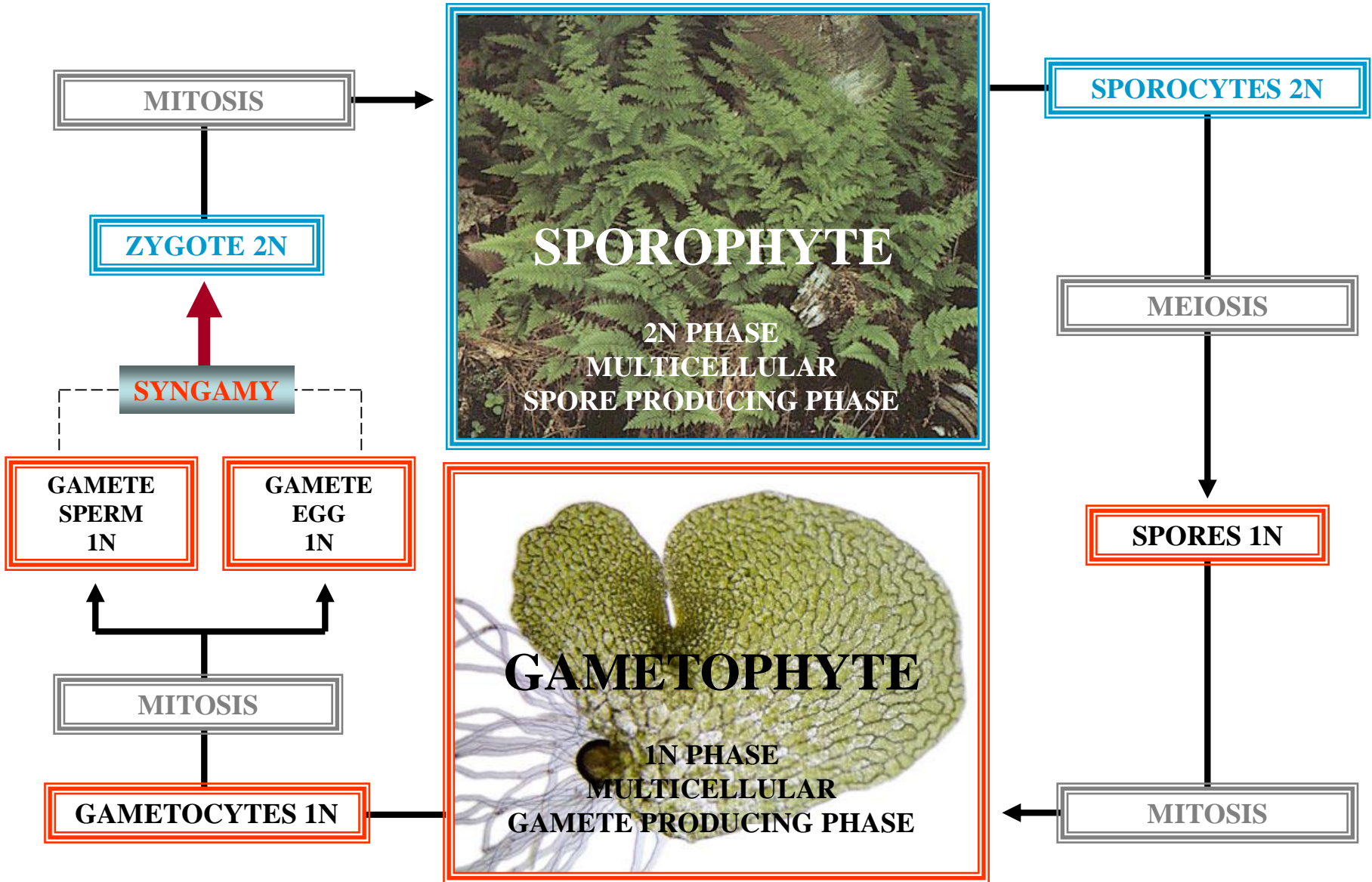


EMBRYOPHYTE LIFE CYCLE

EMBRYOPHYTE LIFE CYCLE

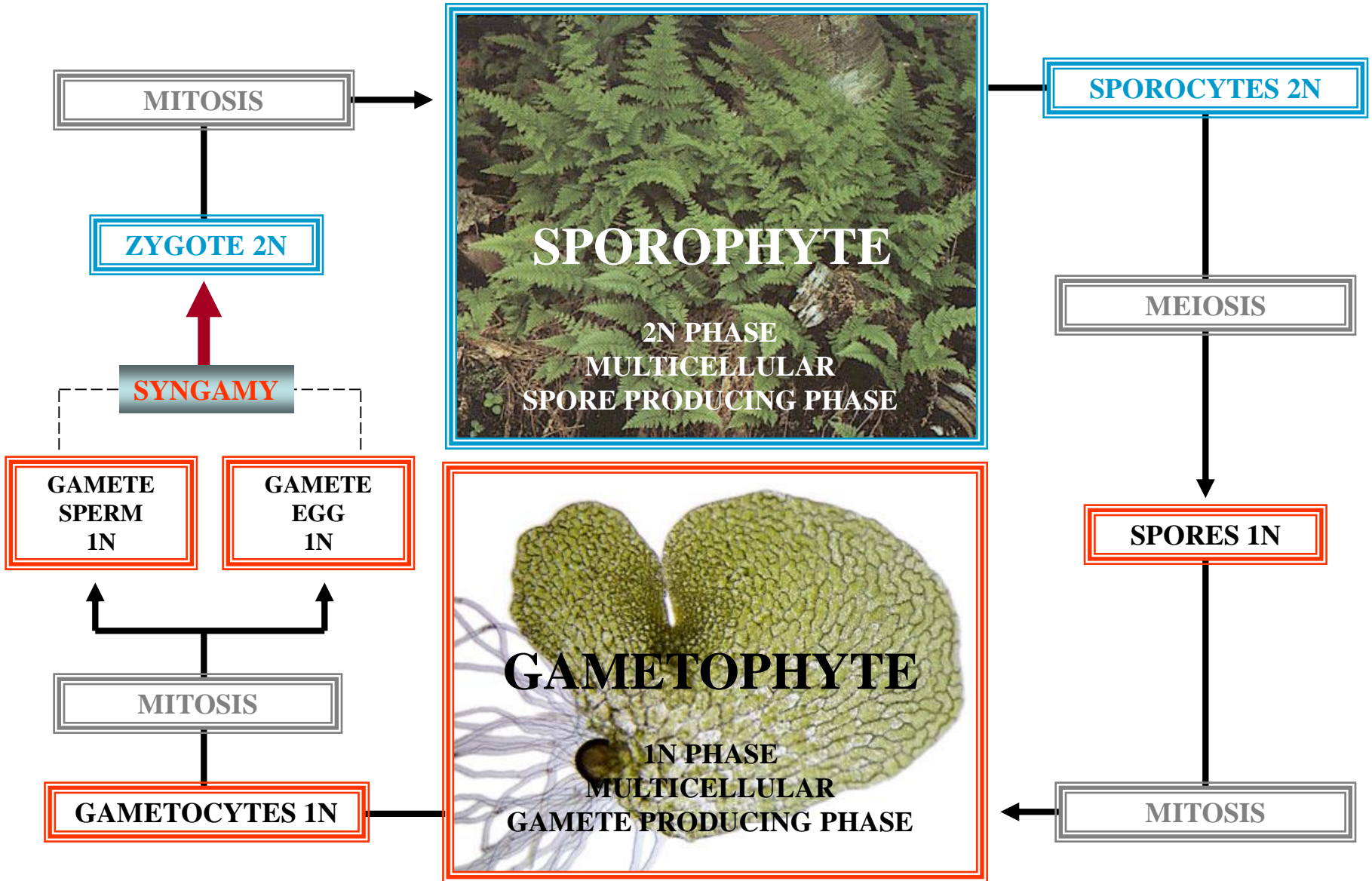


EMBRYOPHYTE SPORIC LIFE CYCLE

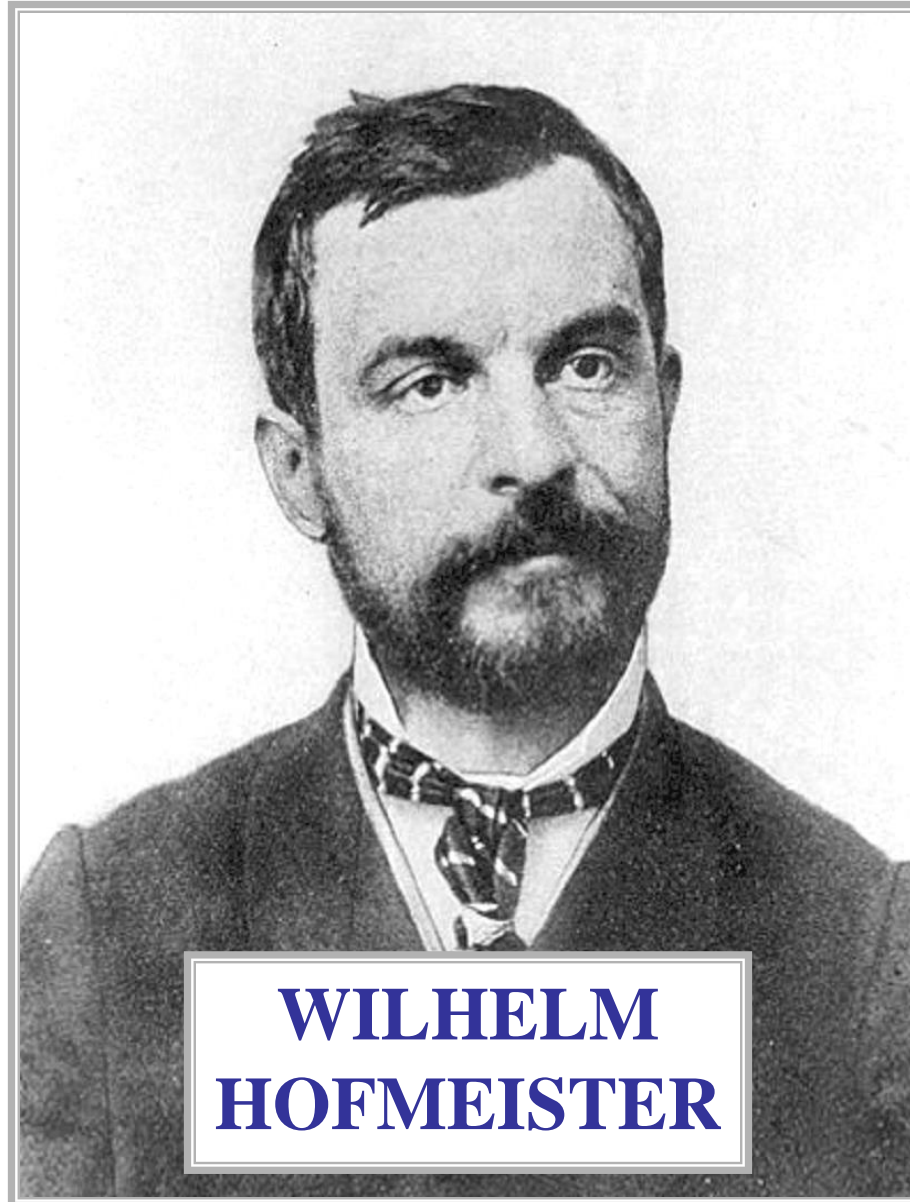




EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



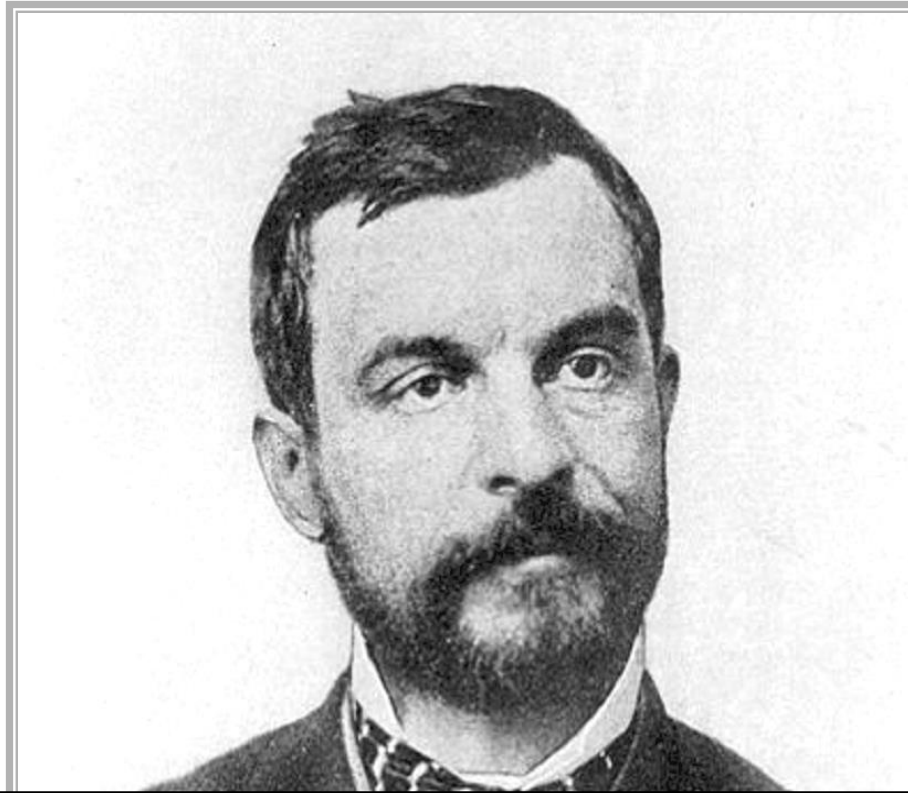
PLANT MORPHOLOGIST



**WILHELM
HOFMEISTER**

PLANT MORPHOLOGIST

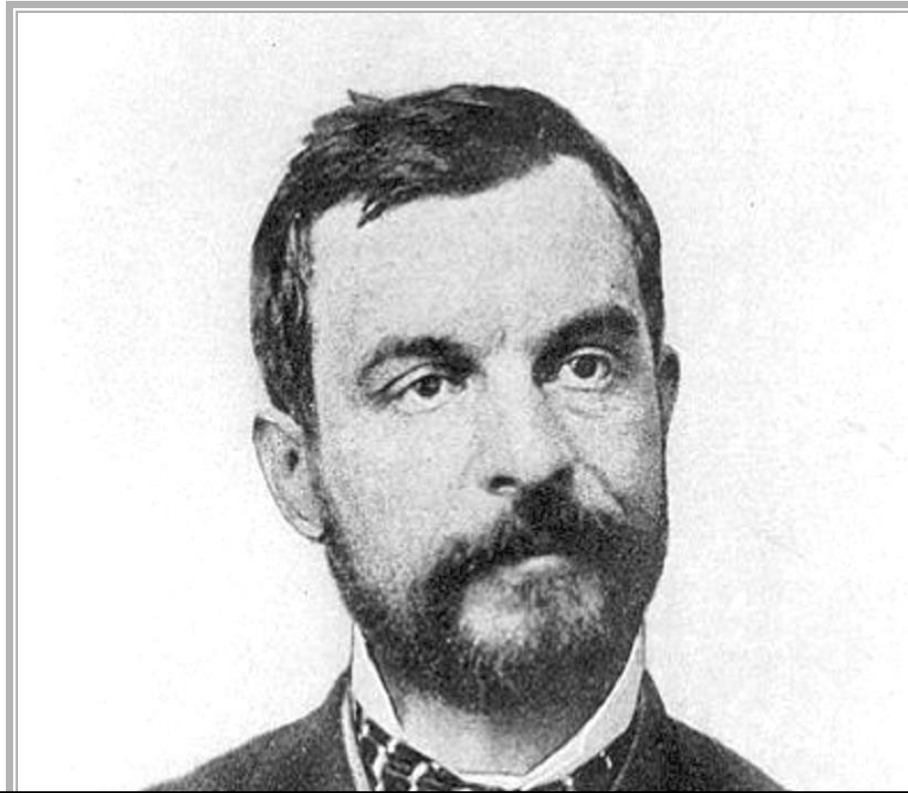
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ELICITATED EMBRYOPHYTE LIFE CYCLE

**WILHELM
HOFMEISTER**

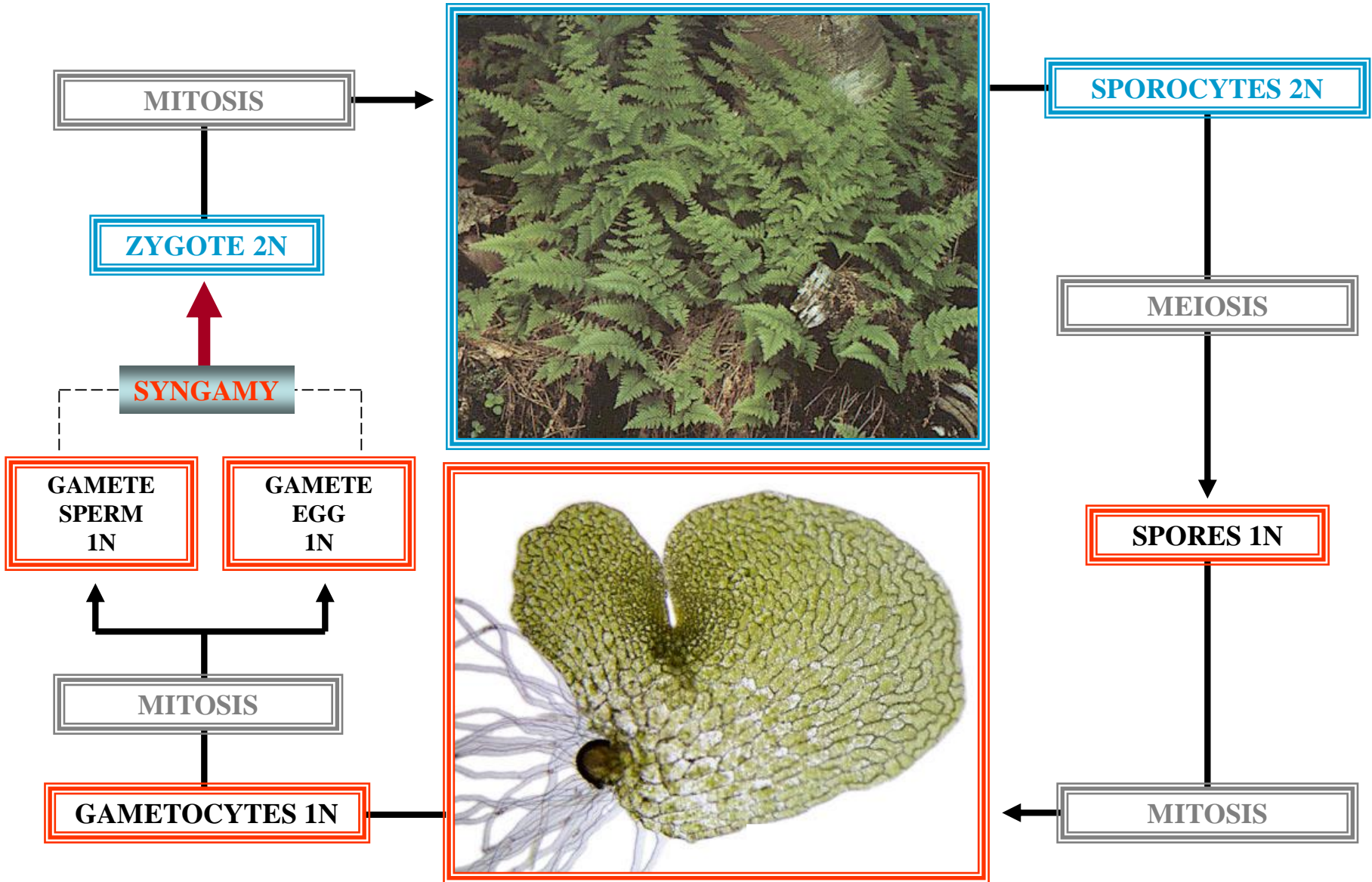
PLANT MORPHOLOGIST



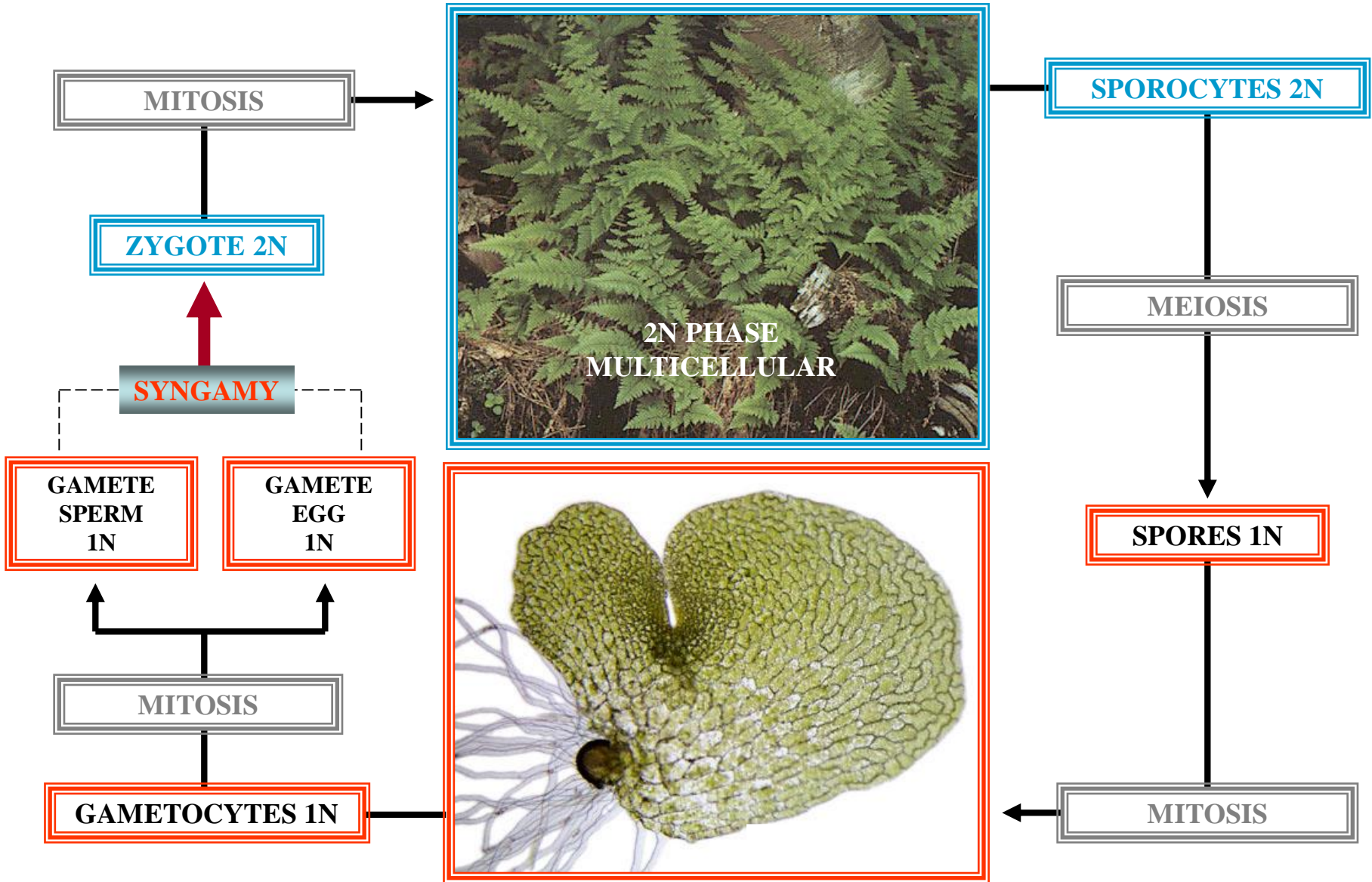
2N & 1N PHASES MULTICELLULAR

**WILHELM
HOFMEISTER**

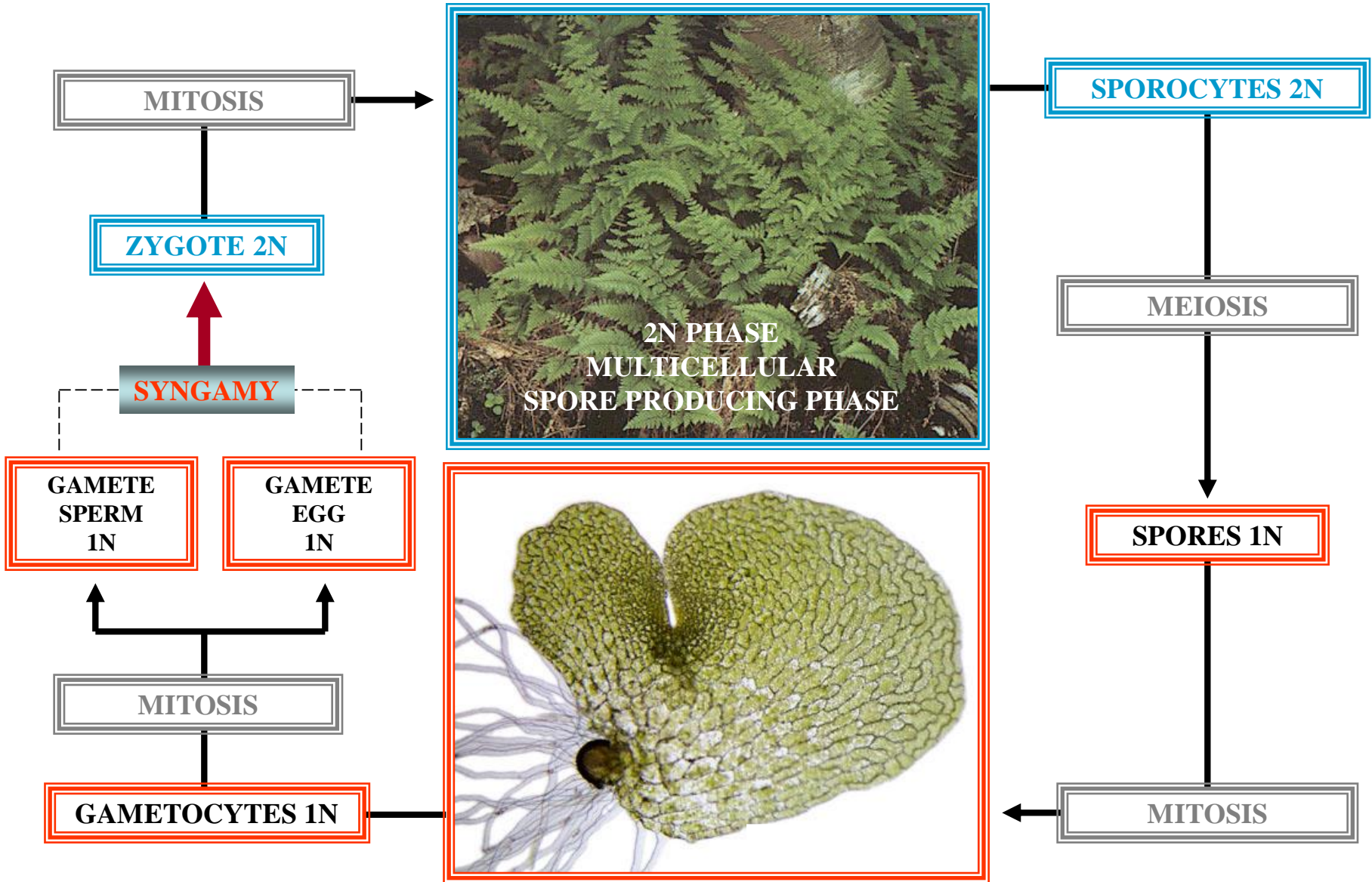
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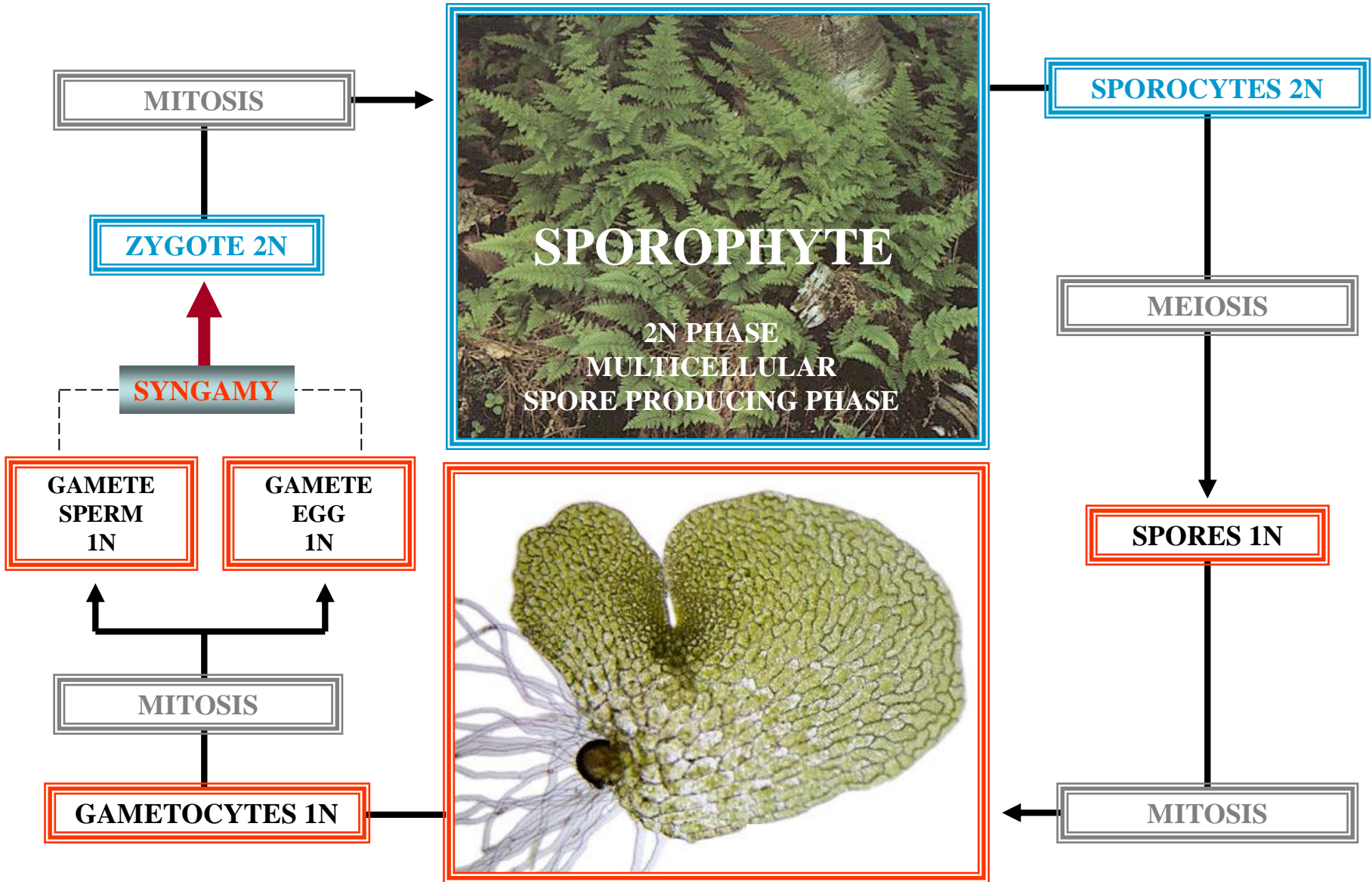
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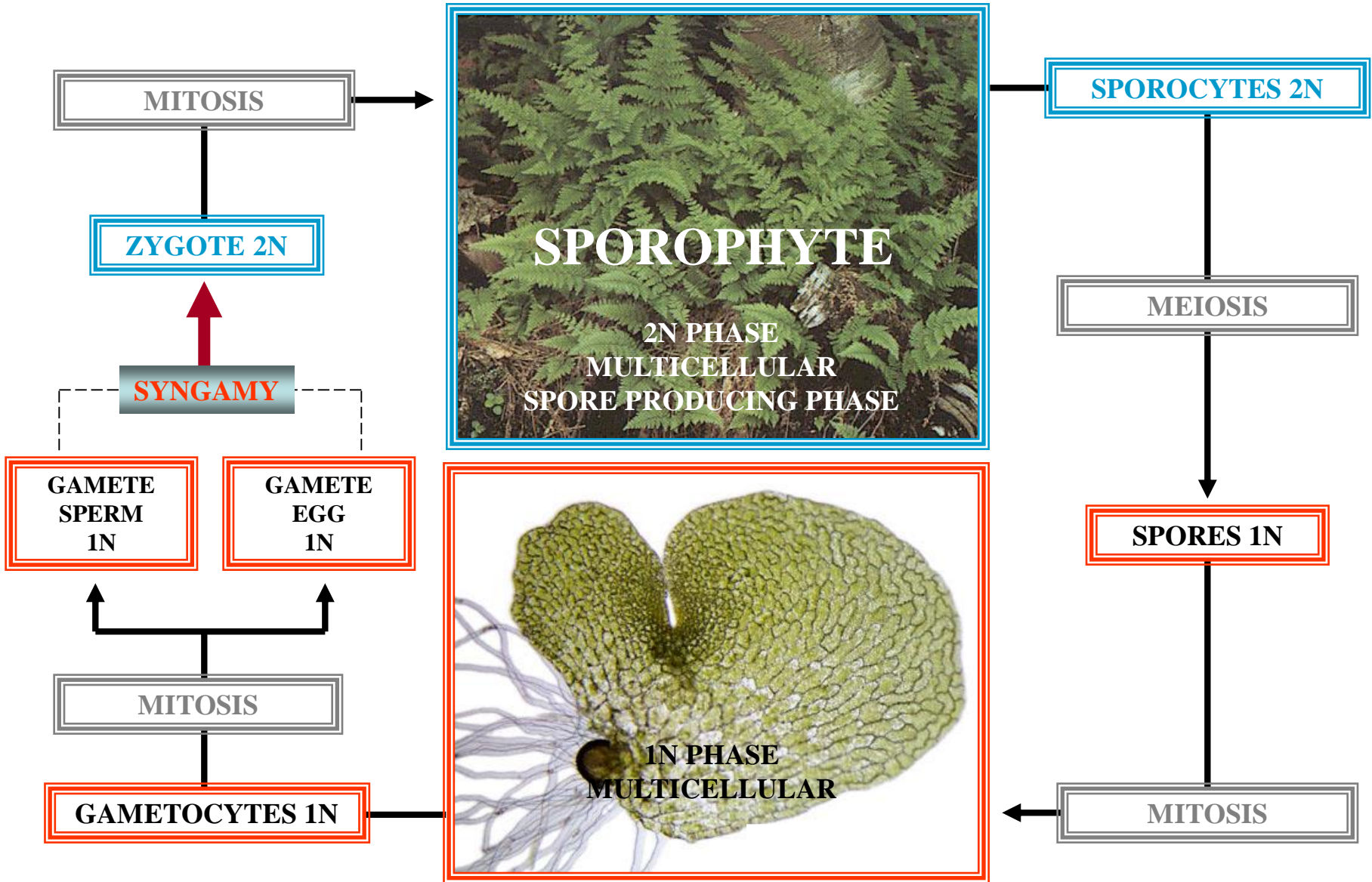
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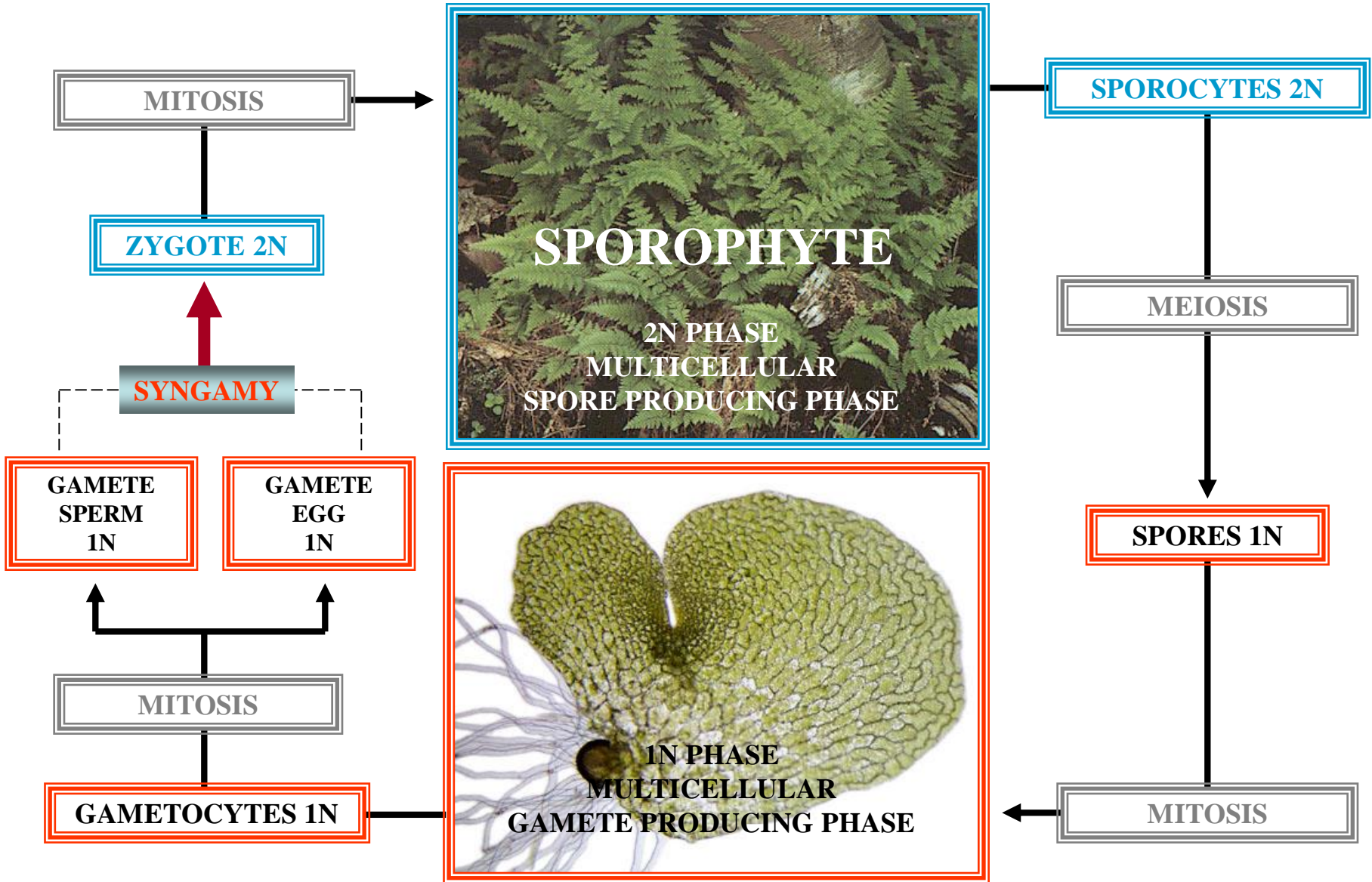
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE

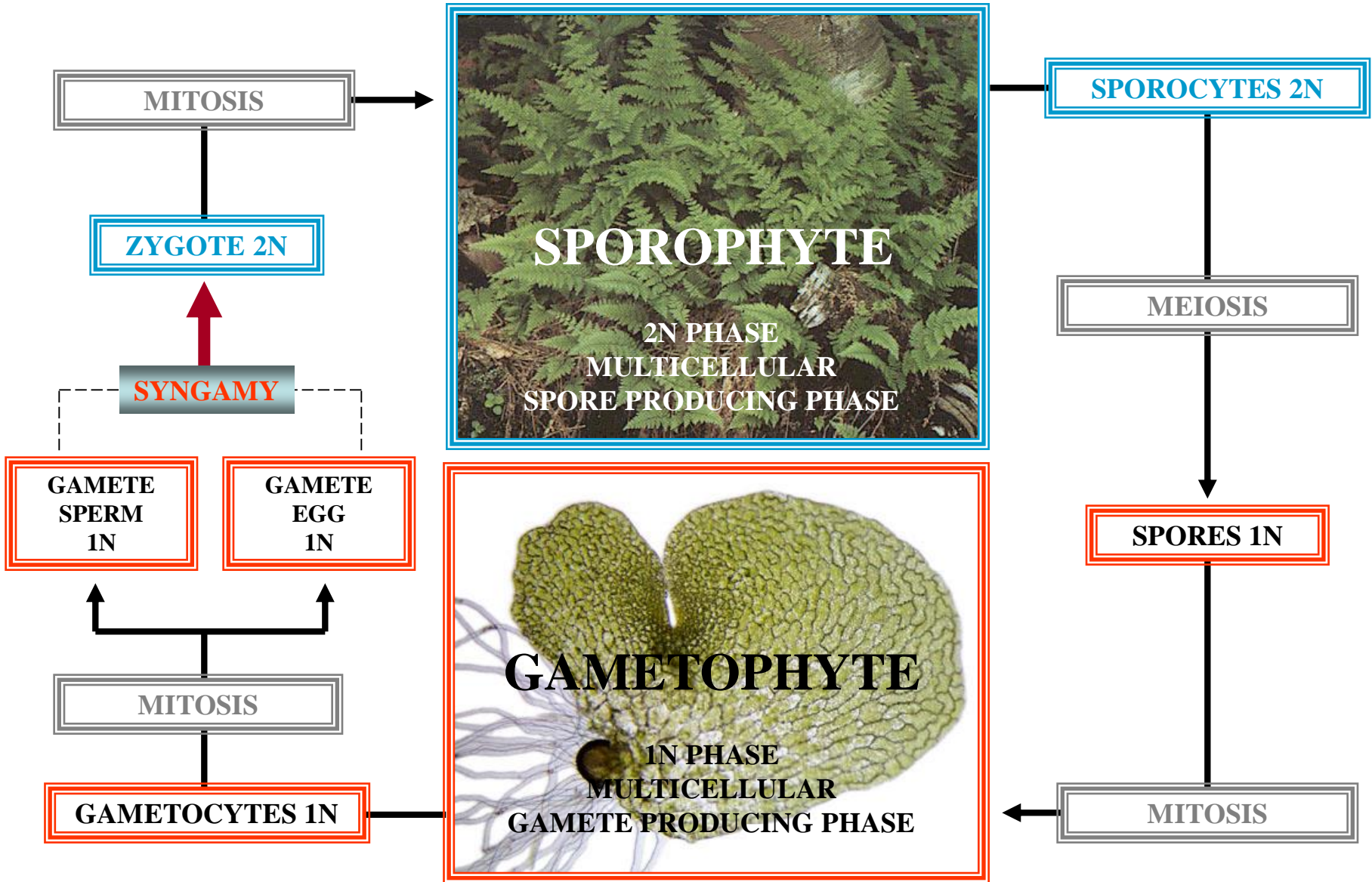


EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE





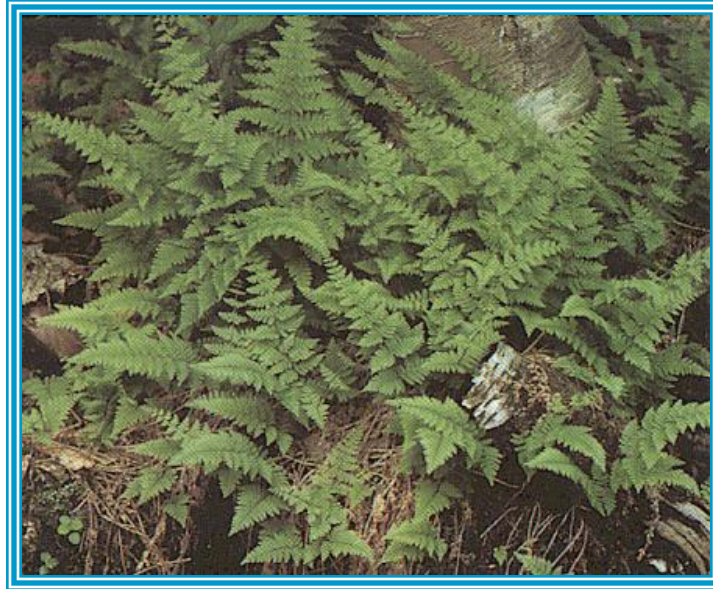
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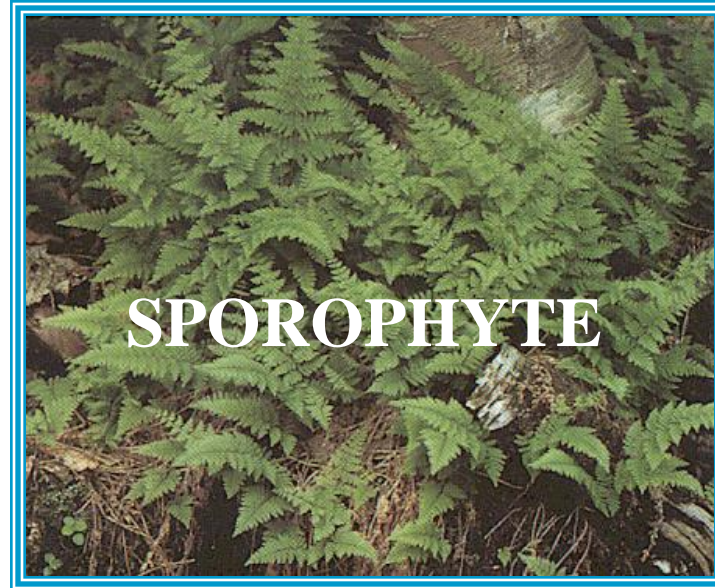


EMBRYOPHYTE LIFE CYCLE OVERVIEW

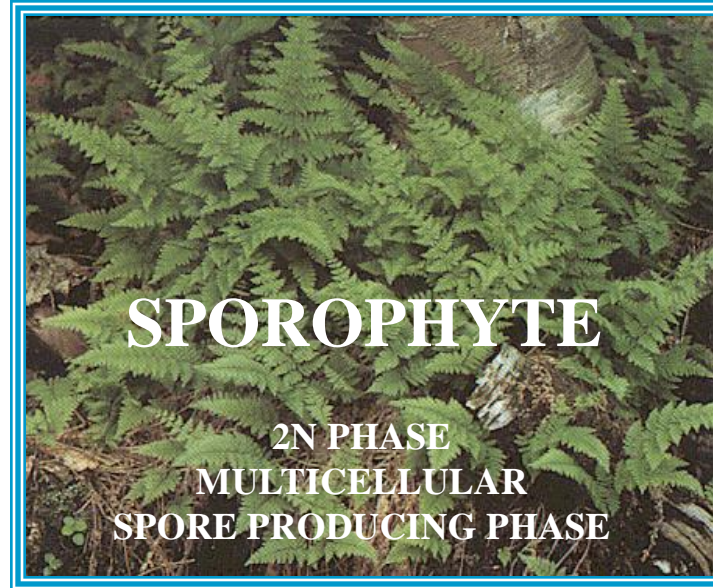
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



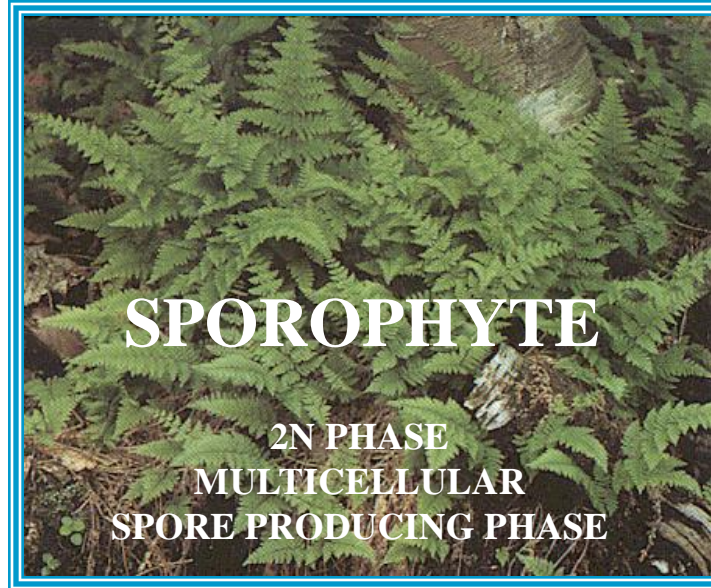
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE

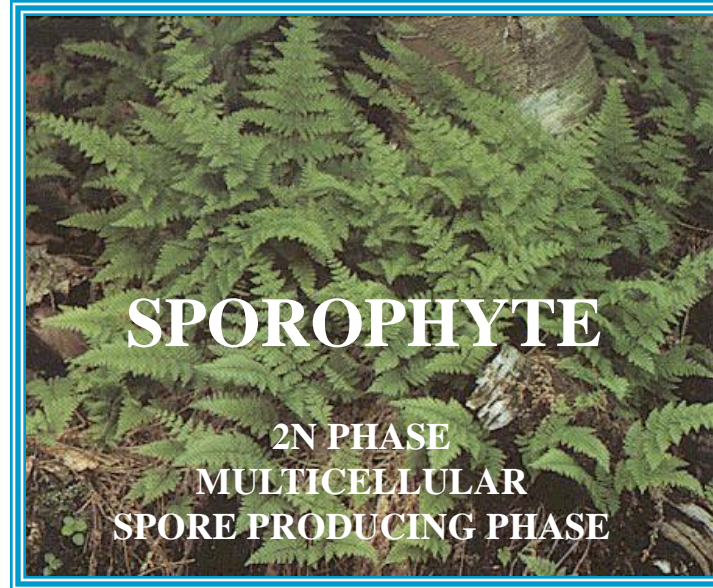


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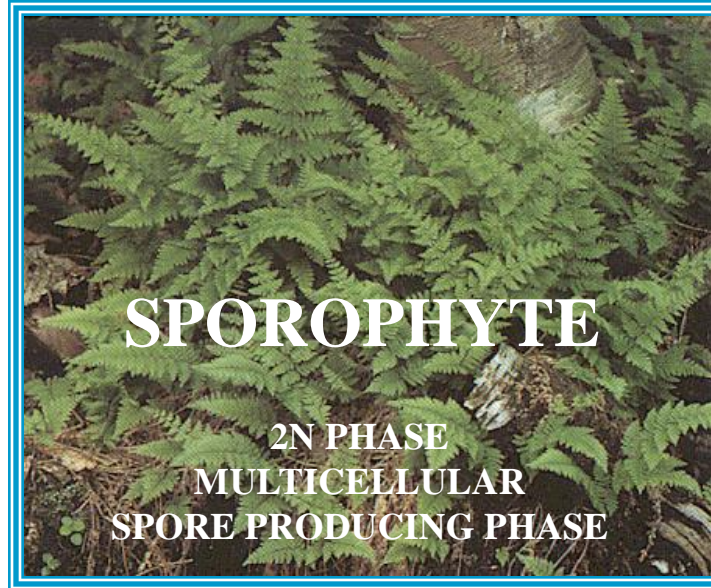
SPORANGIUM

EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPORANGIUM 2N

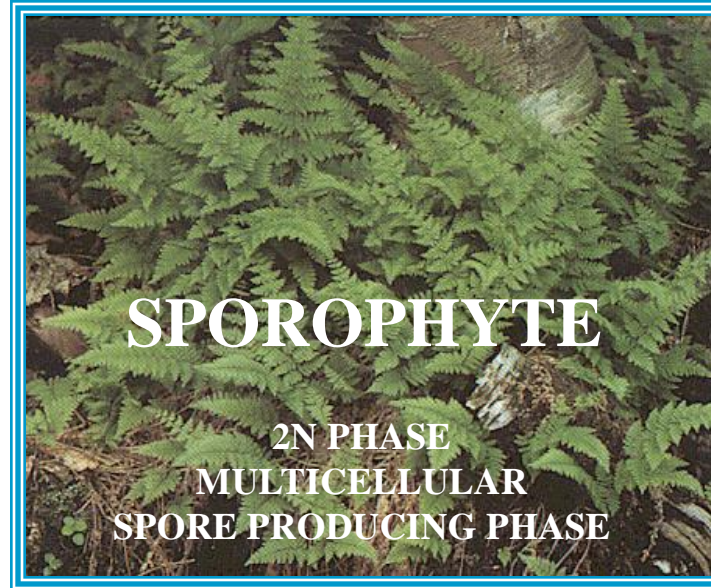
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES

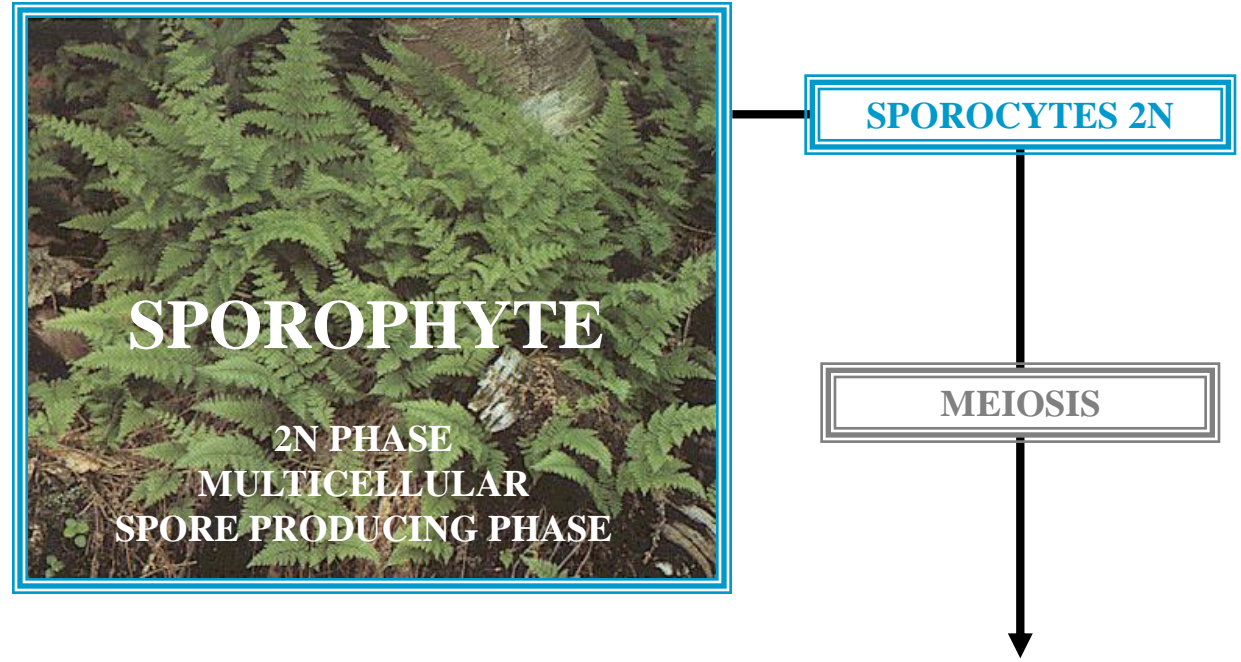
EMBRYOPHYTE

HETEROMORPHIC SPORIC LIFE CYCLE

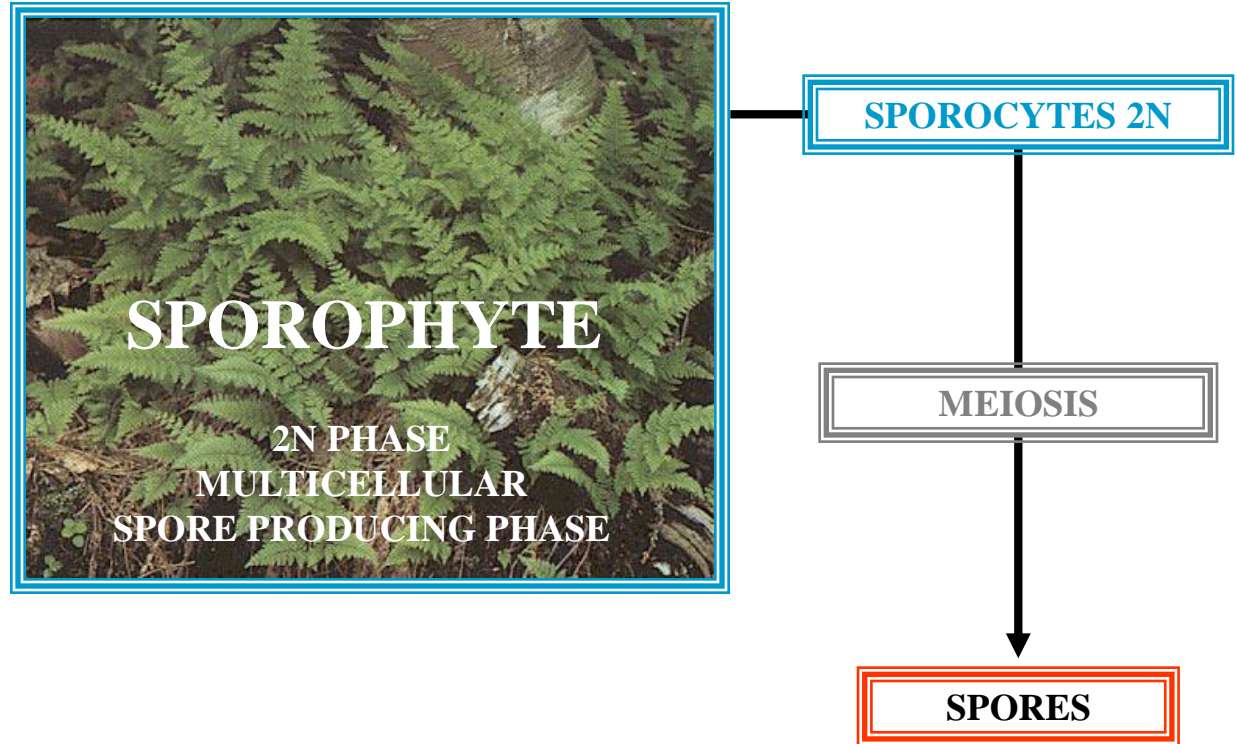


SPOROCTYES 2N

EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE

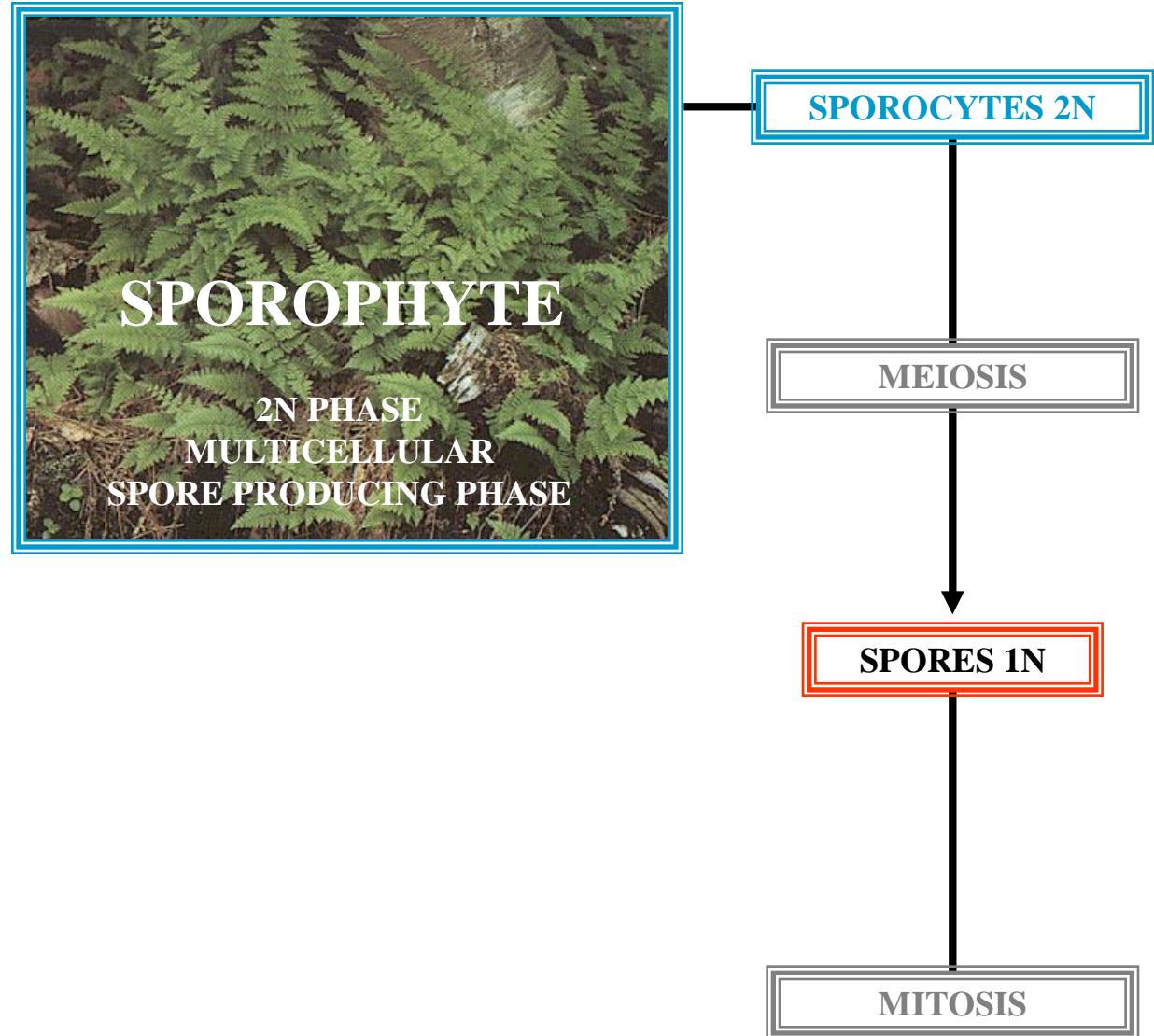


EMBRYOPHYTE

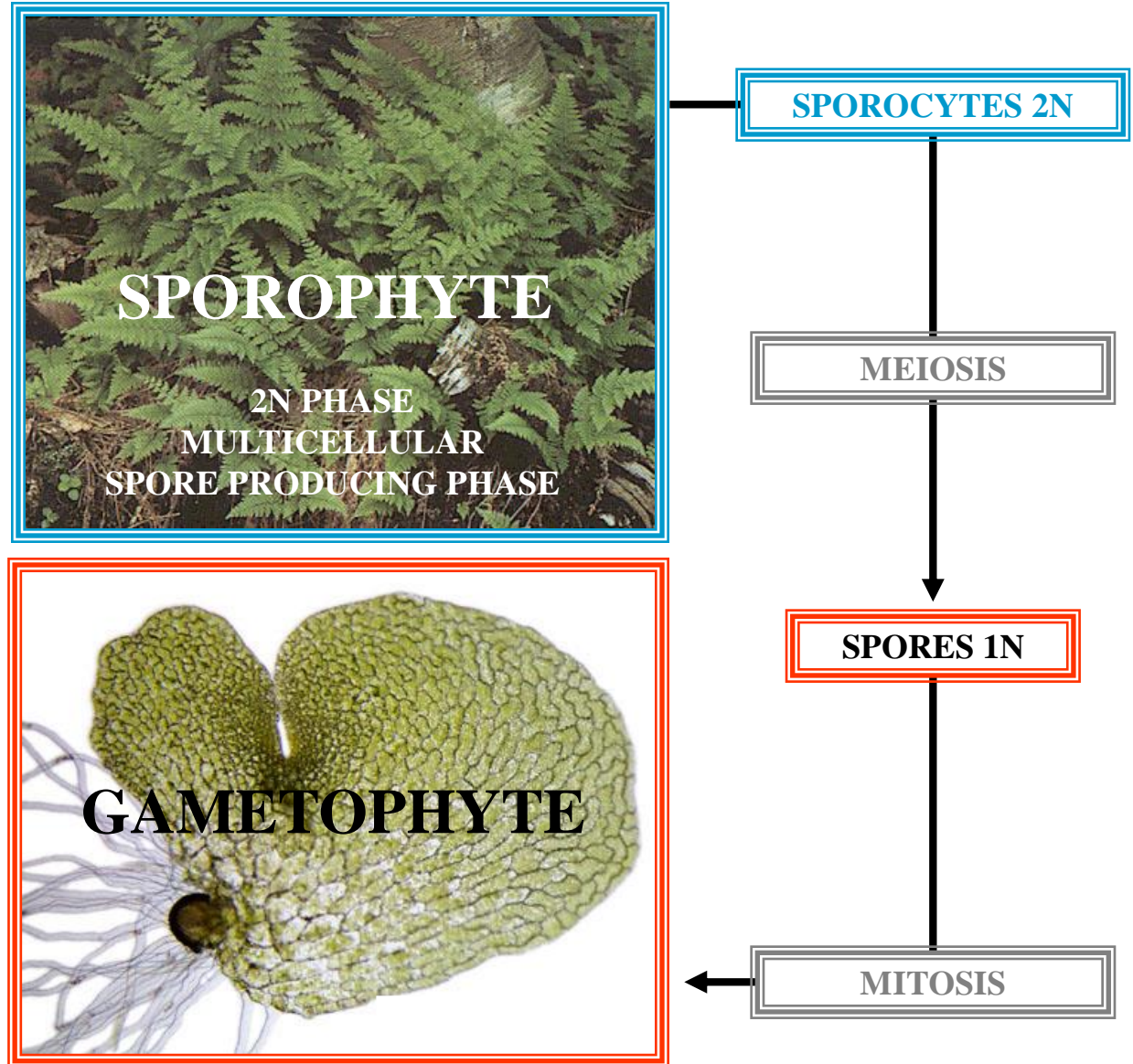
HETEROMORPHIC SPORIC LIFE CYCLE



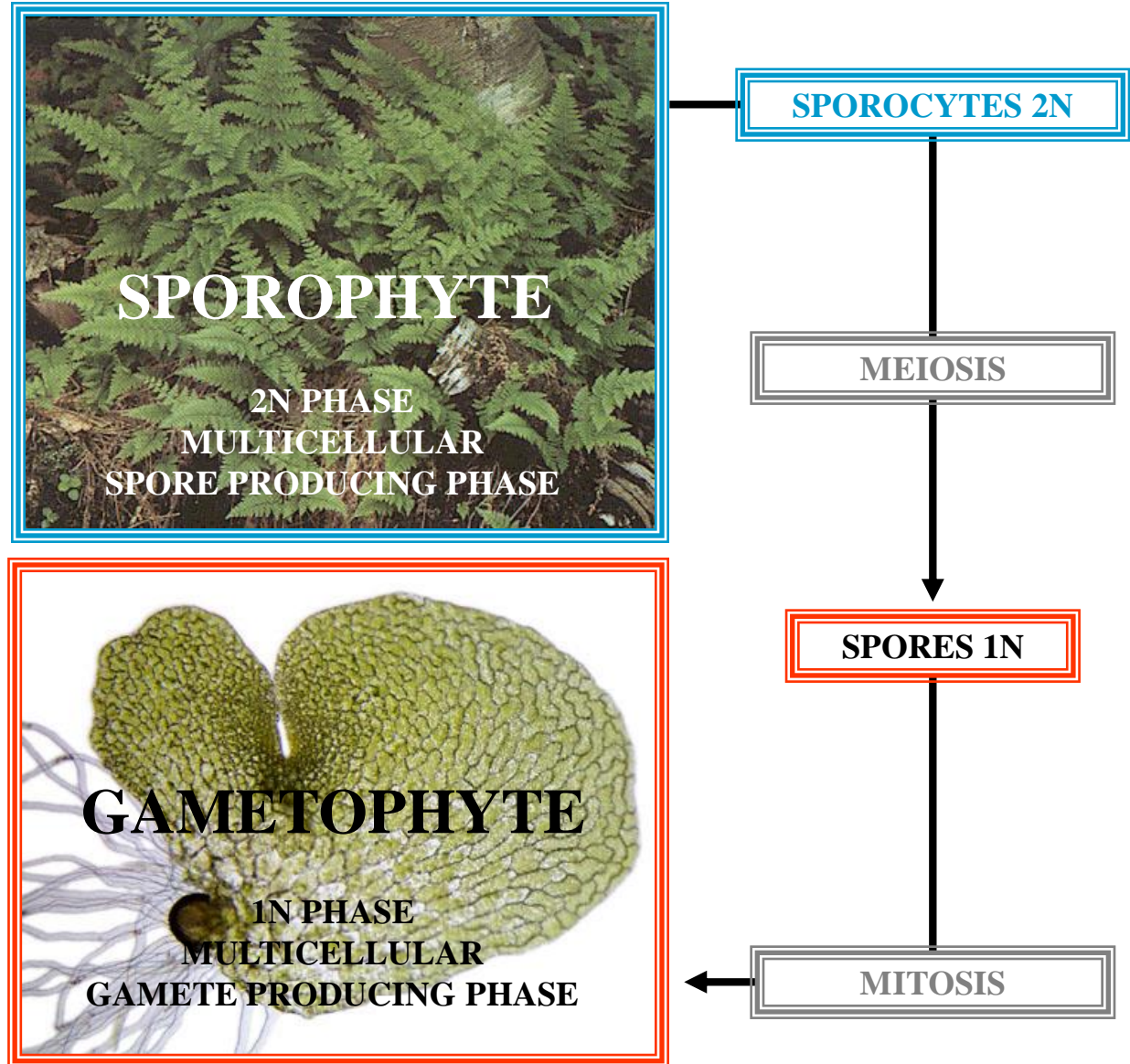
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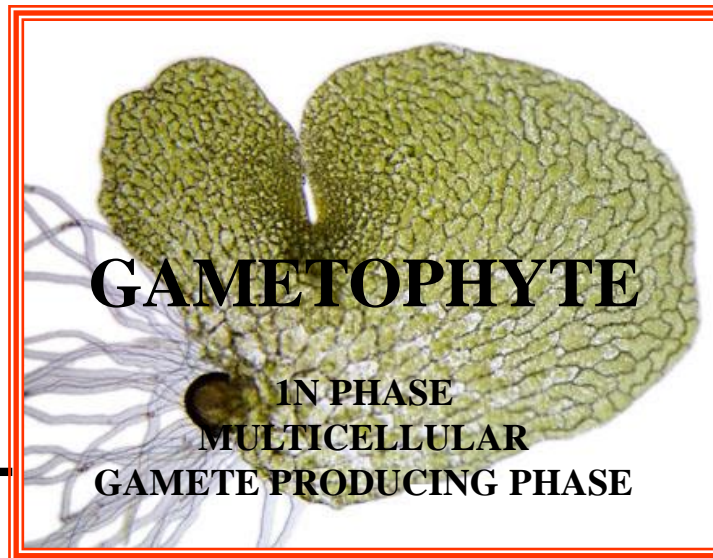
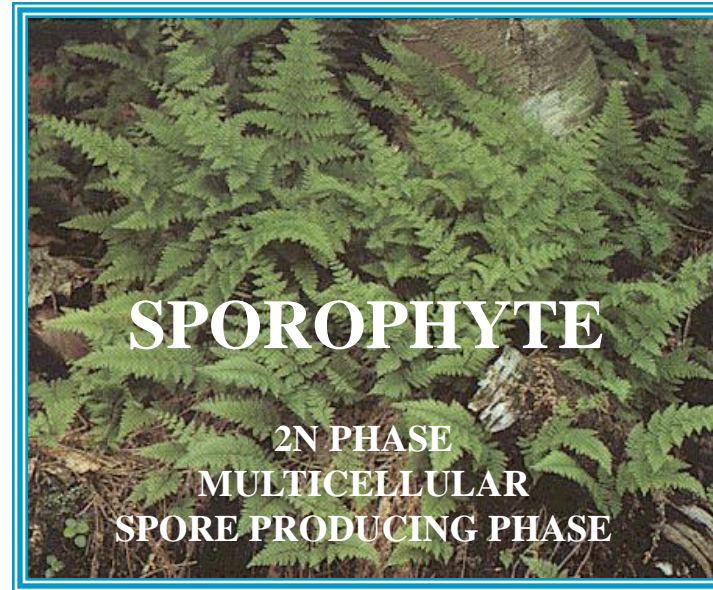
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES 2N

MEIOSIS

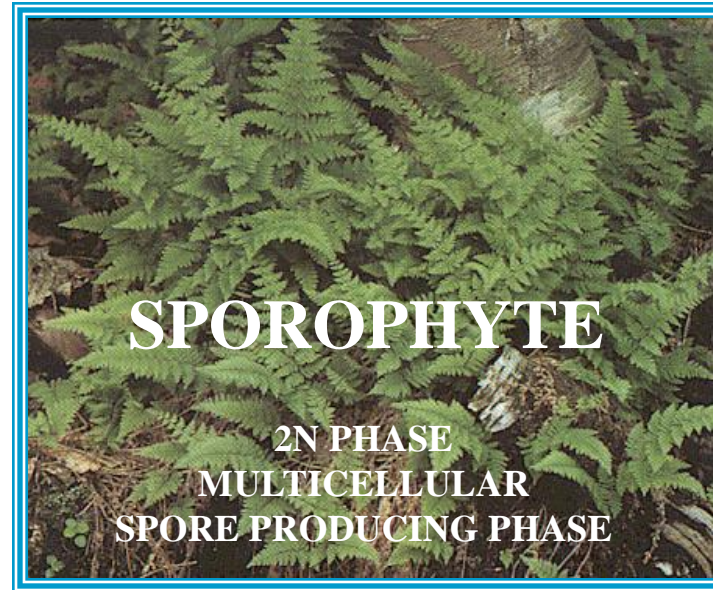
SPORES 1N

MITOSIS

GAMETANGIUM



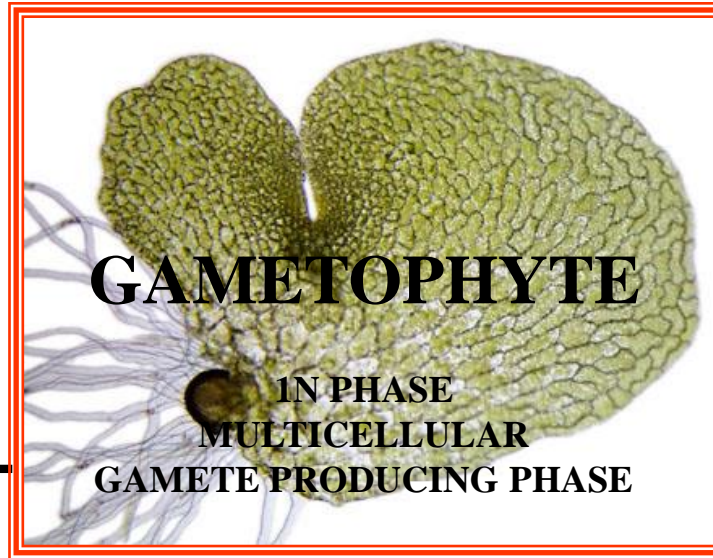
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES 2N

MEIOSIS

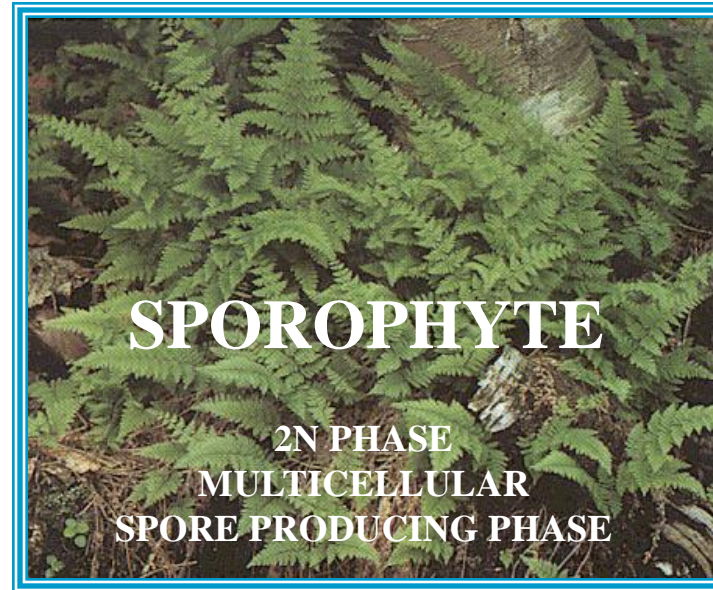
SPORES 1N



GAMETANGIUM 1N

MITOSIS

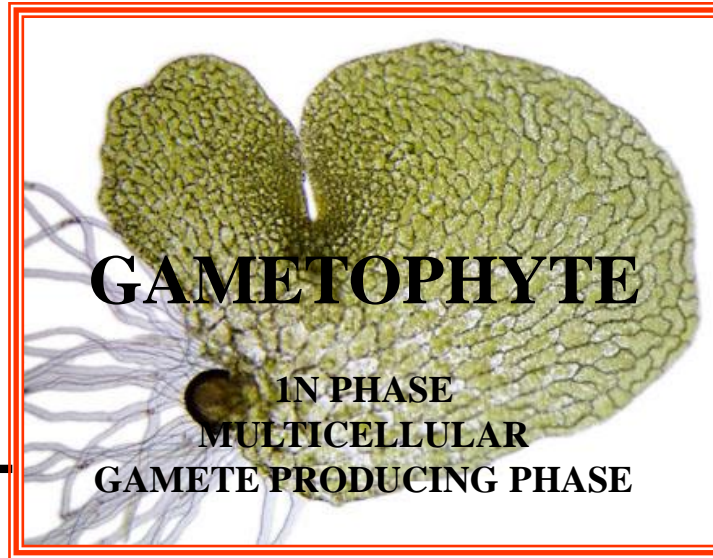
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES 2N

MEIOSIS

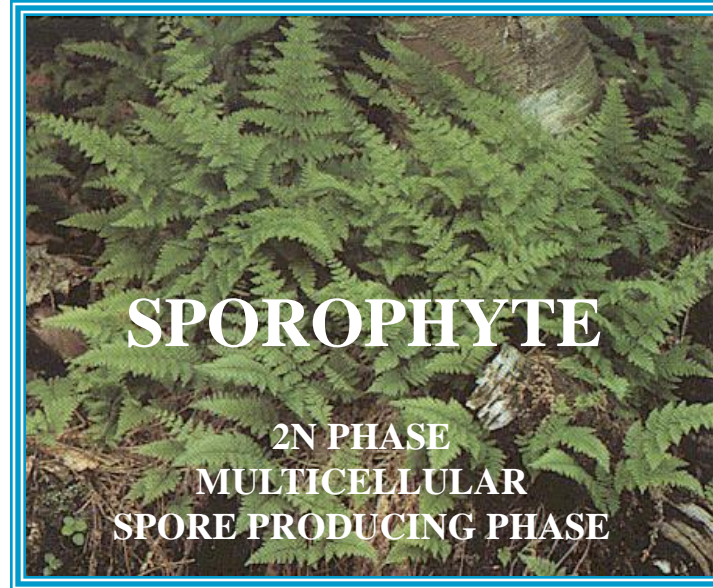
SPORES 1N



GAMETOCYTES

MITOSIS

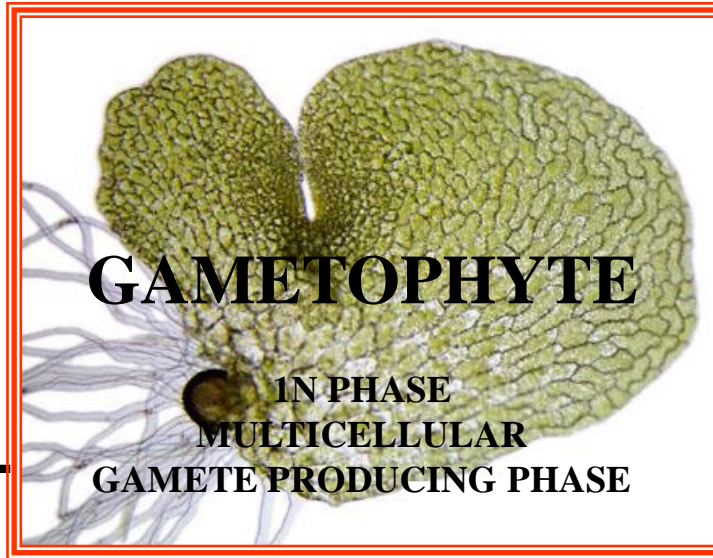
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES 2N

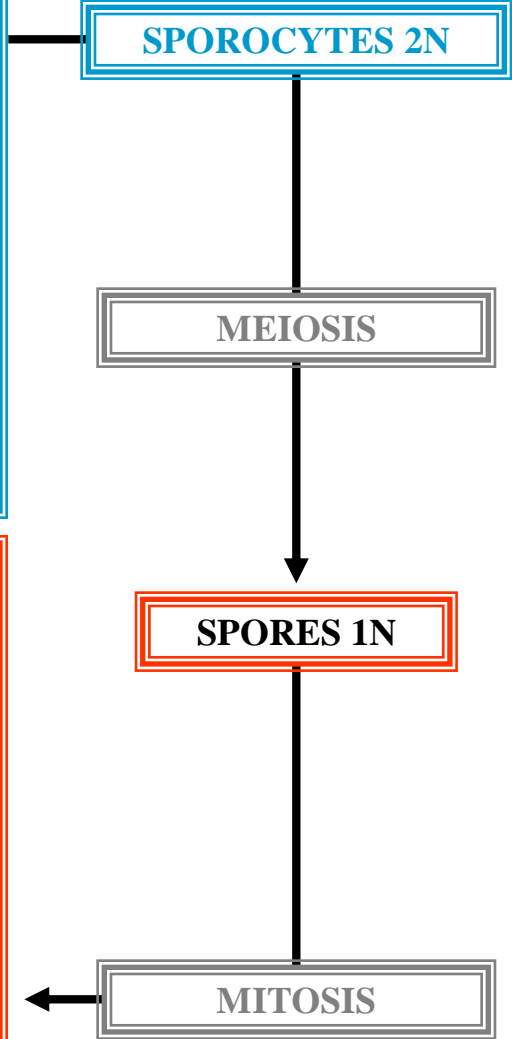
MEIOSIS

SPORES 1N

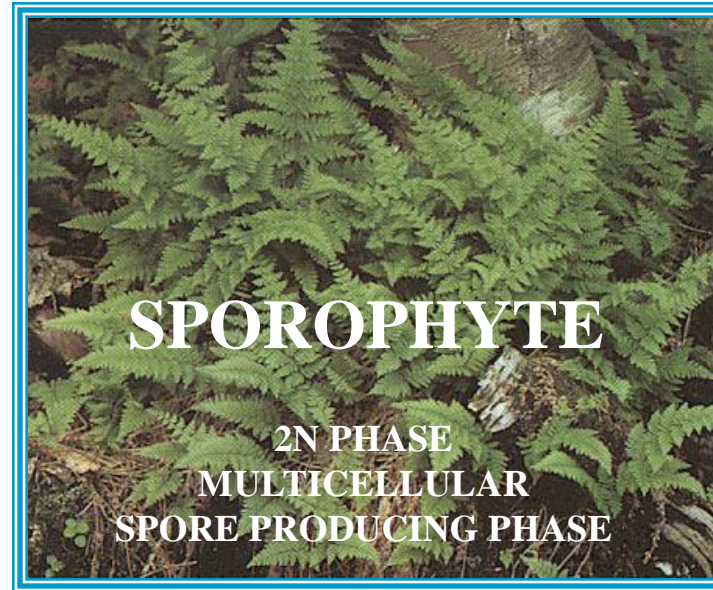


GAMETOCYTES 1N

MITOSIS



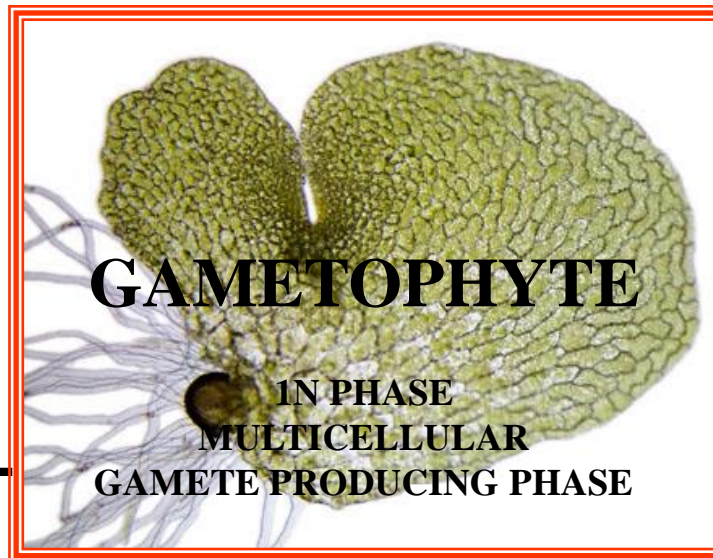
EMBRYOPHYTE HETEROMORPHIC SPORIC LIFE CYCLE



SPOROCTYES 2N

MEIOSIS

SPORES 1N



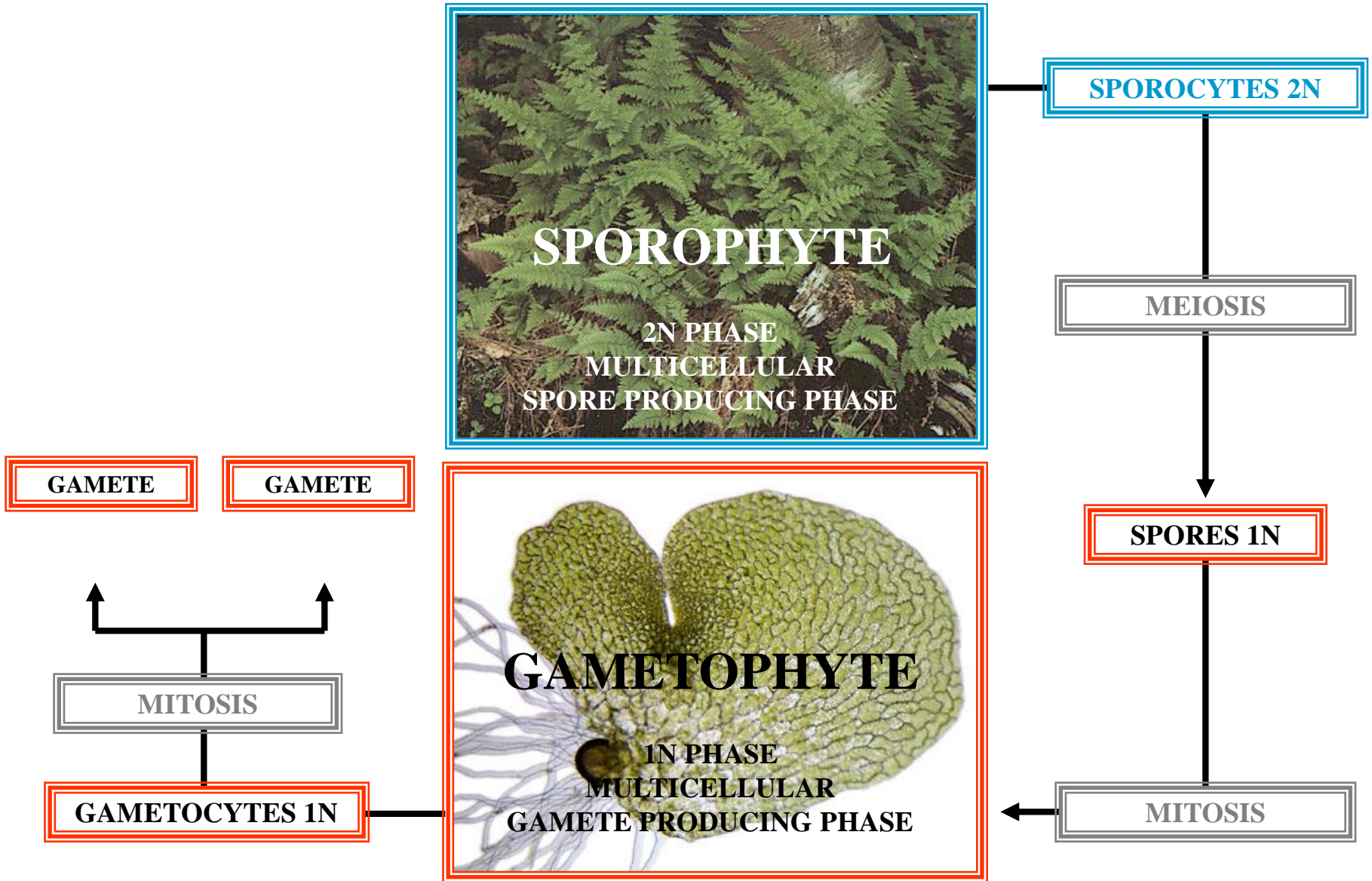
MITOSIS

GAMETOCYTES 1N

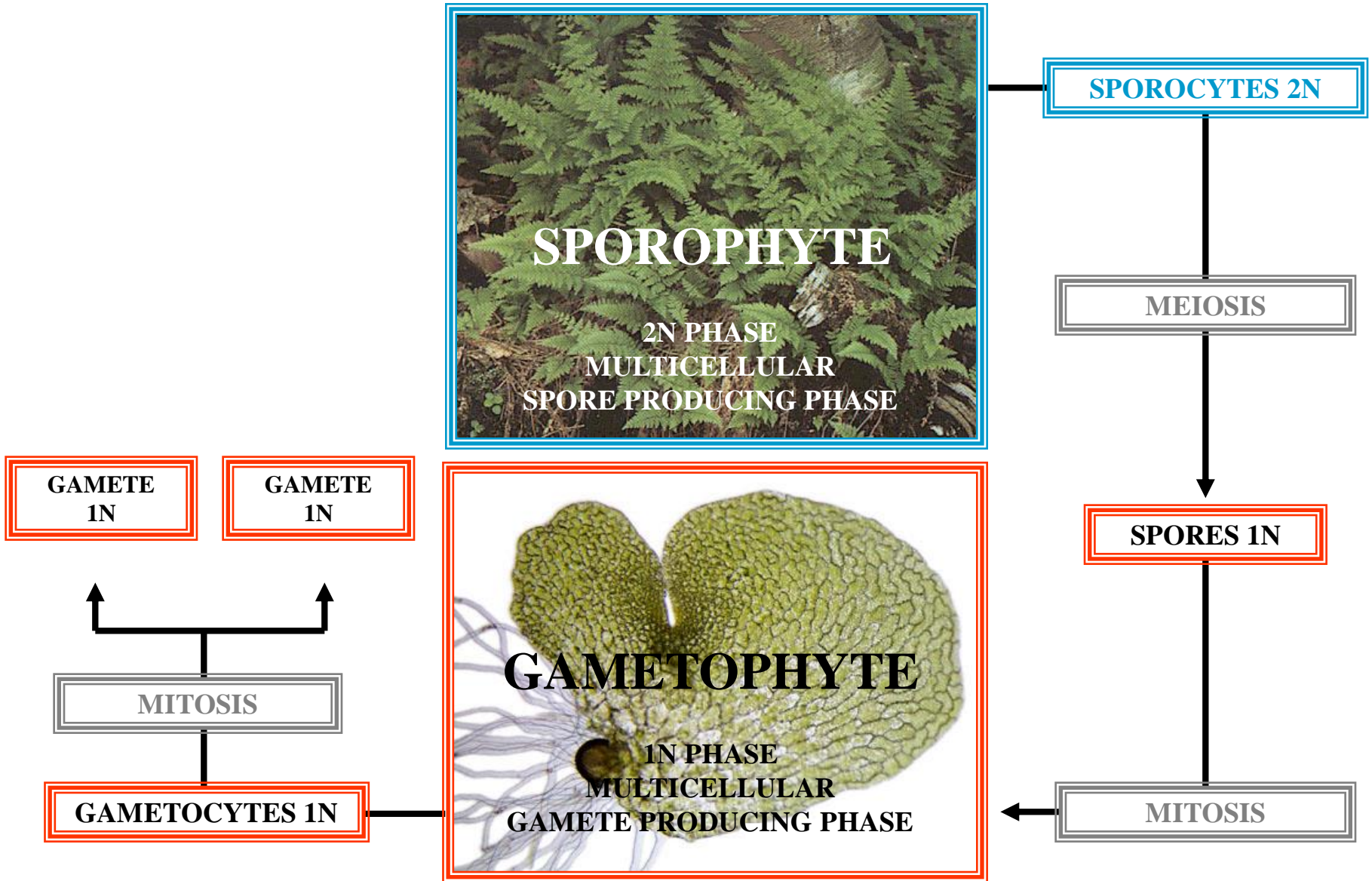
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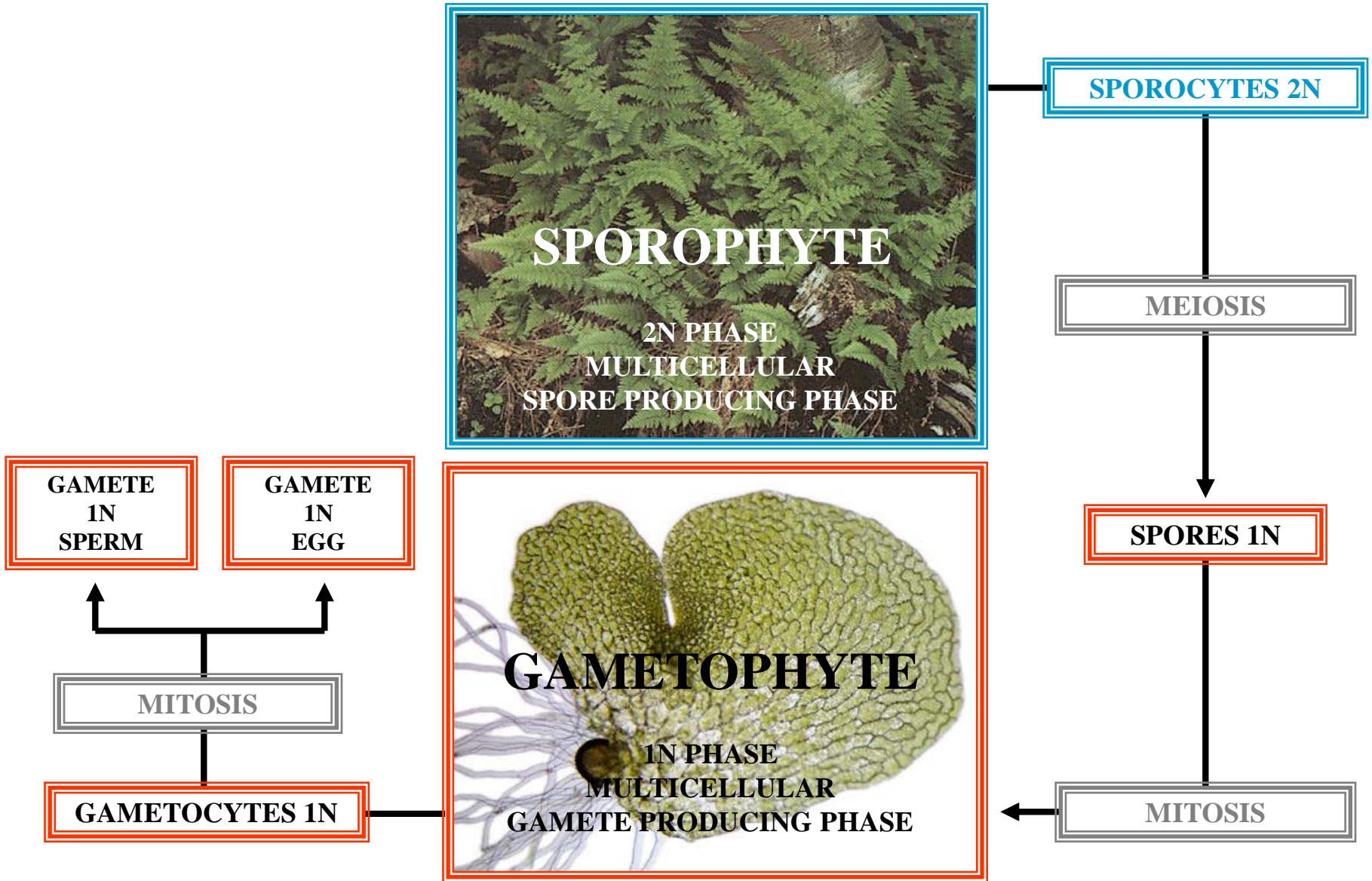
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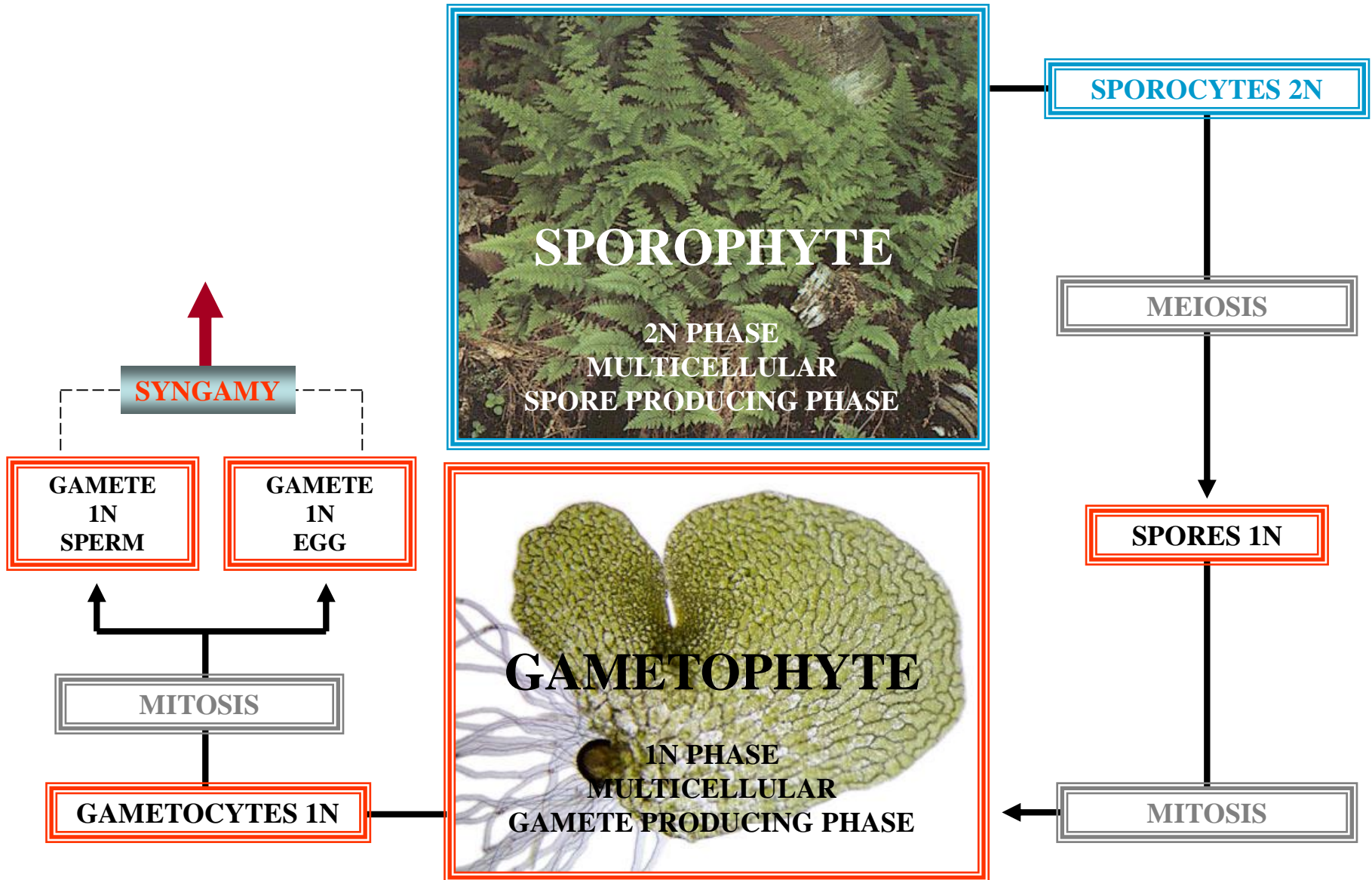
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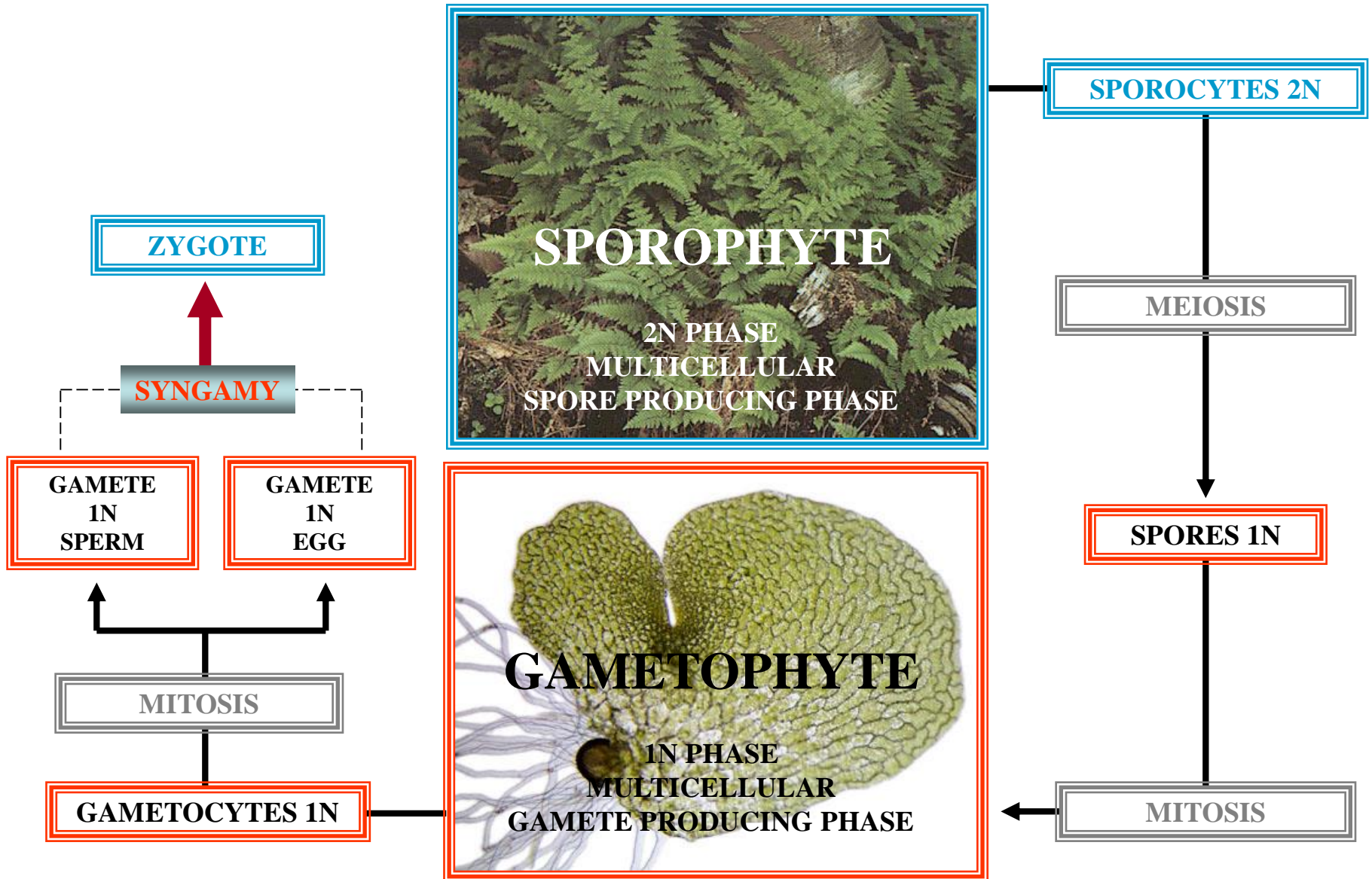
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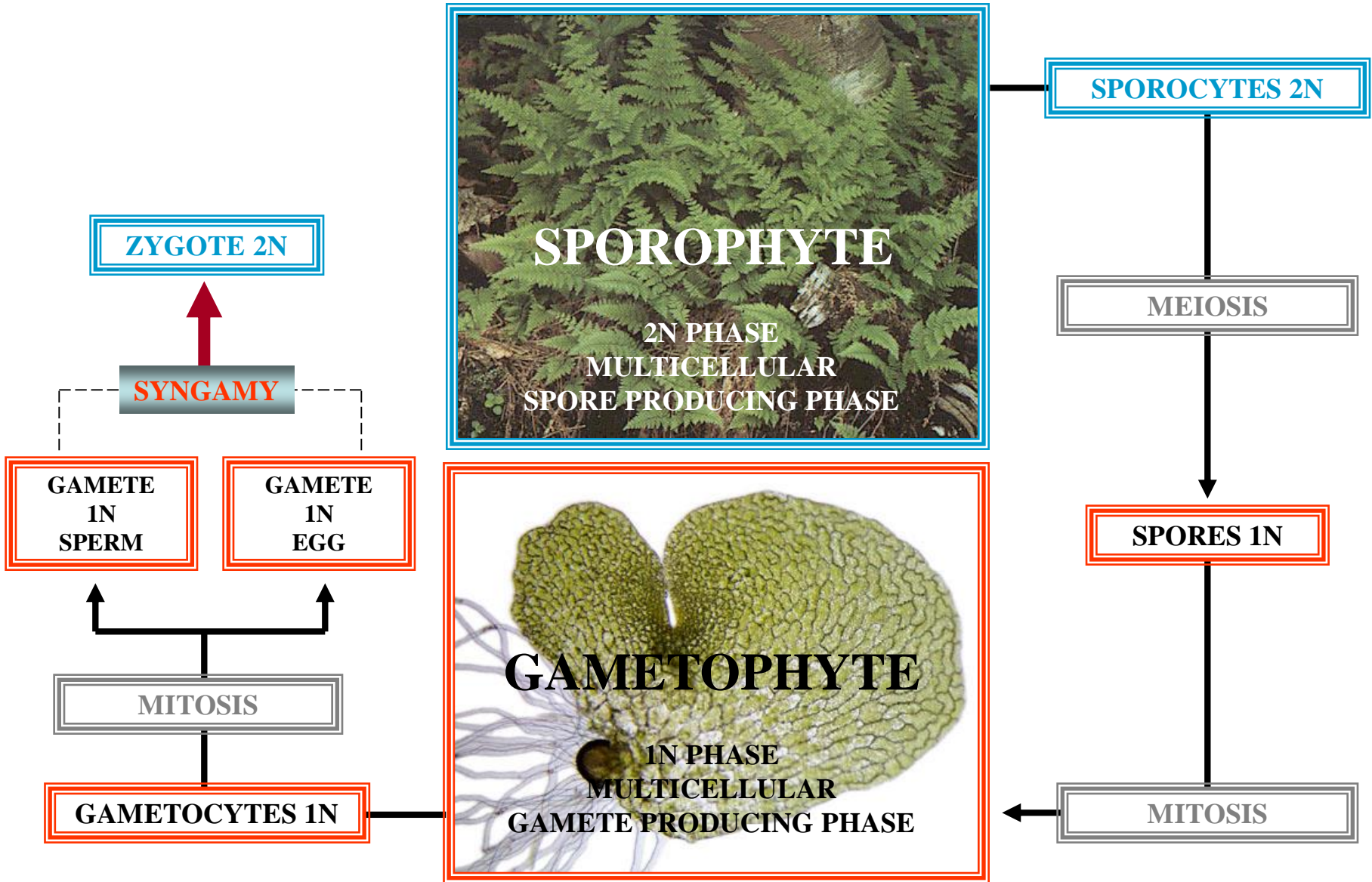
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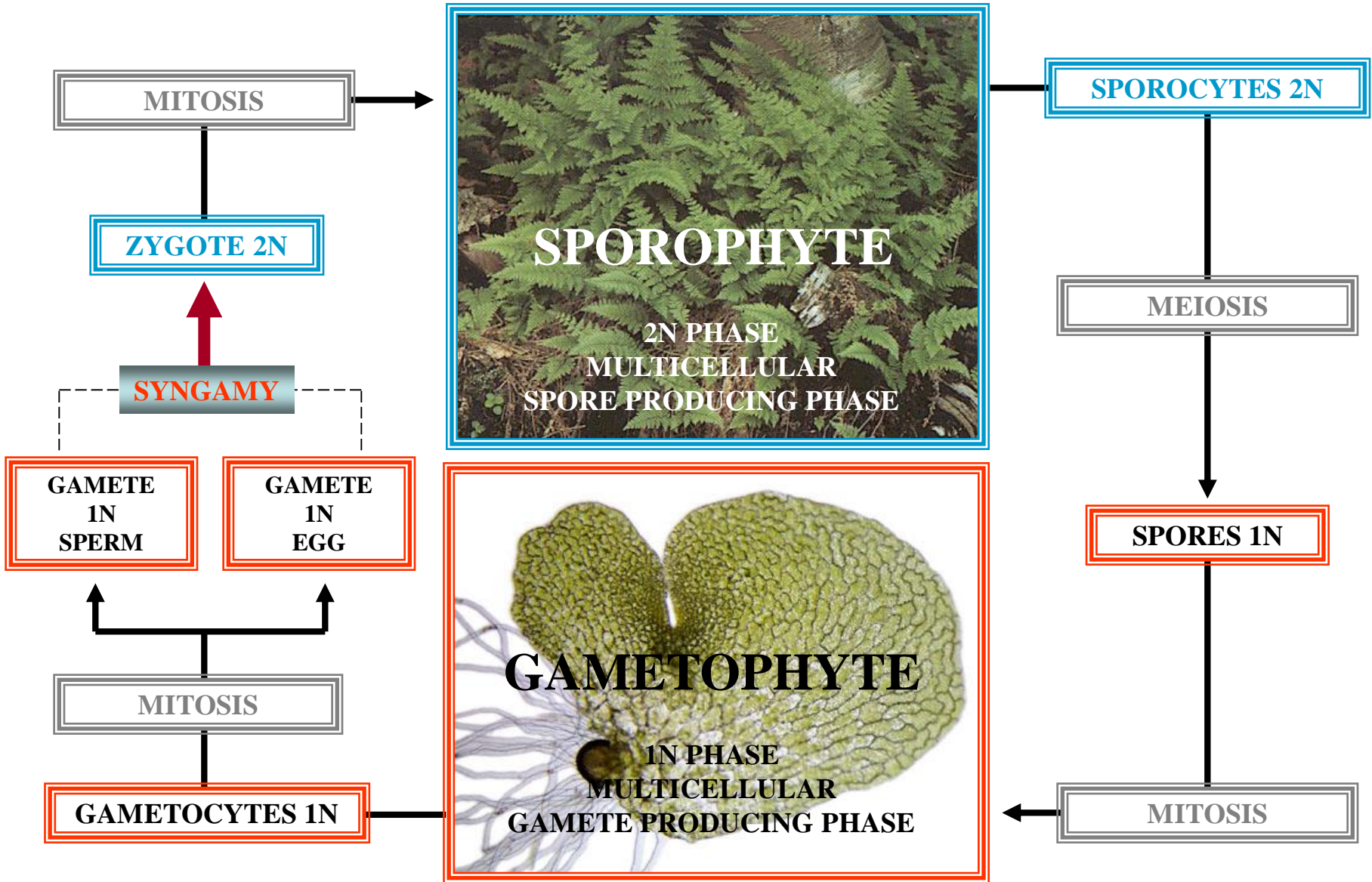
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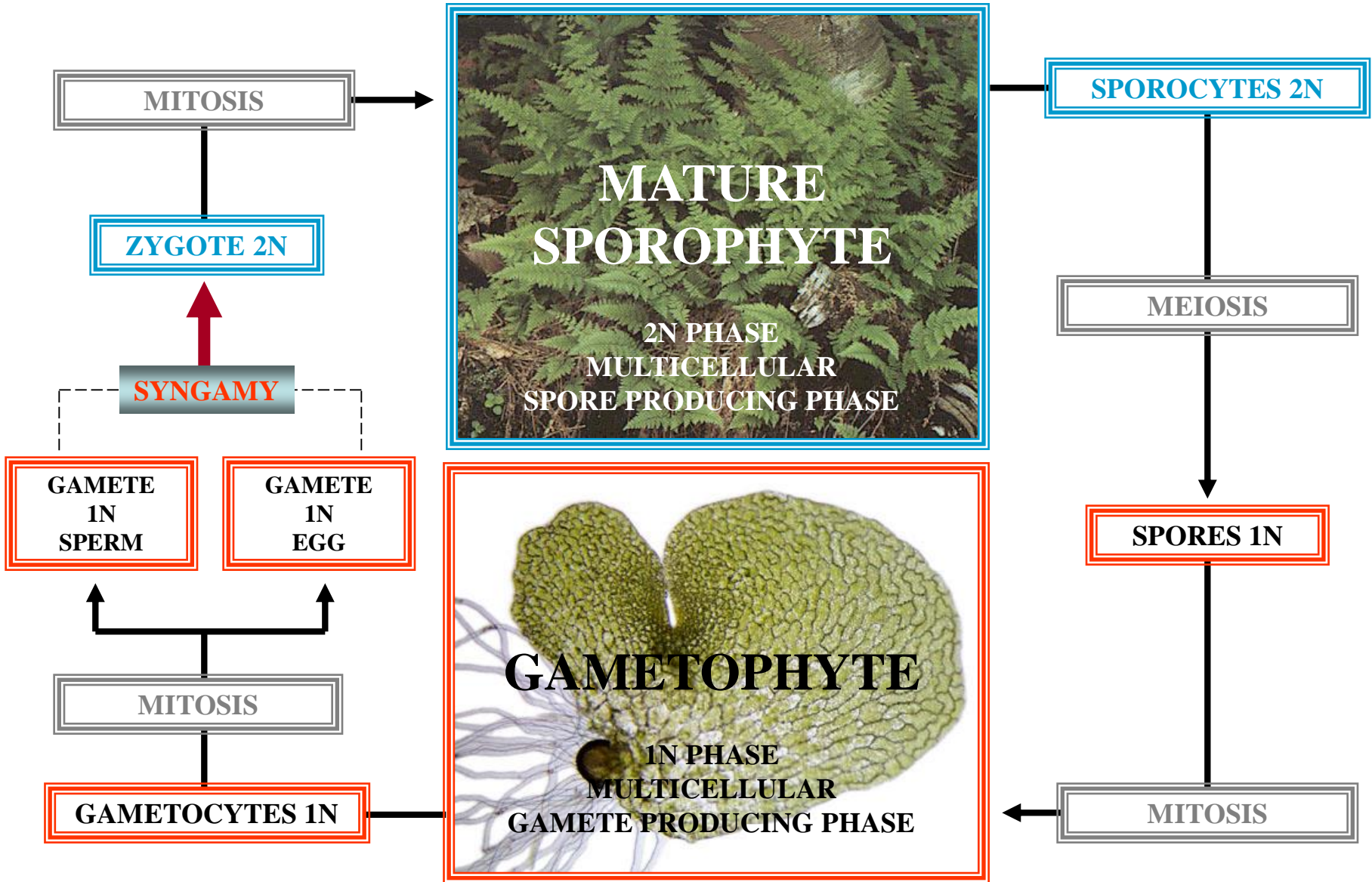
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EMBRYOPHYTE

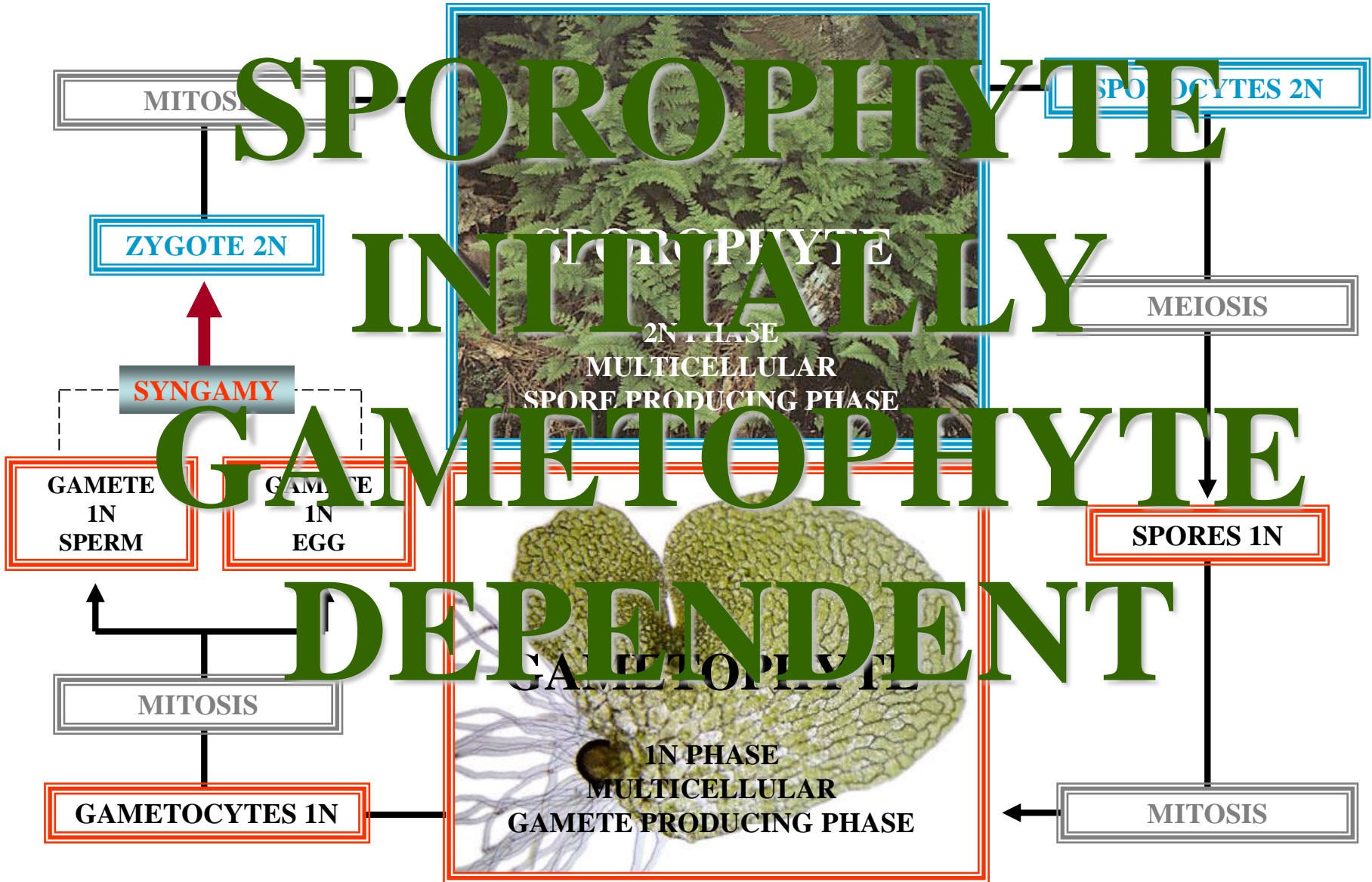
HETEROMORPHIC SPORIC LIFE CYCLE



EMBRYOPHYTE



HETEROMORPHIC SPORIC LIFE CYCLE



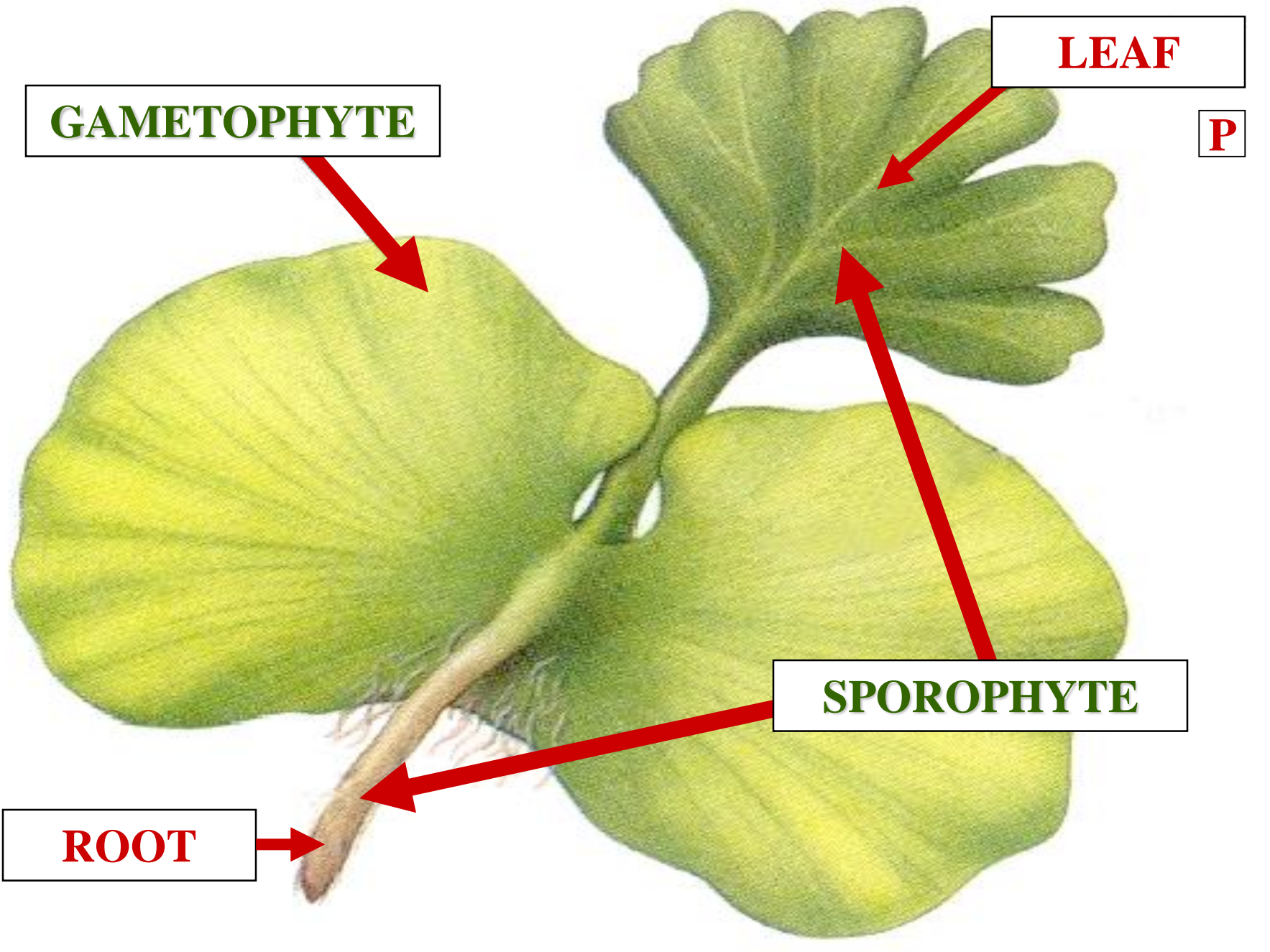
GAMETOPHYTE

LEAF

P

SPOROPHYTE

ROOT



GAMETOPHYTE

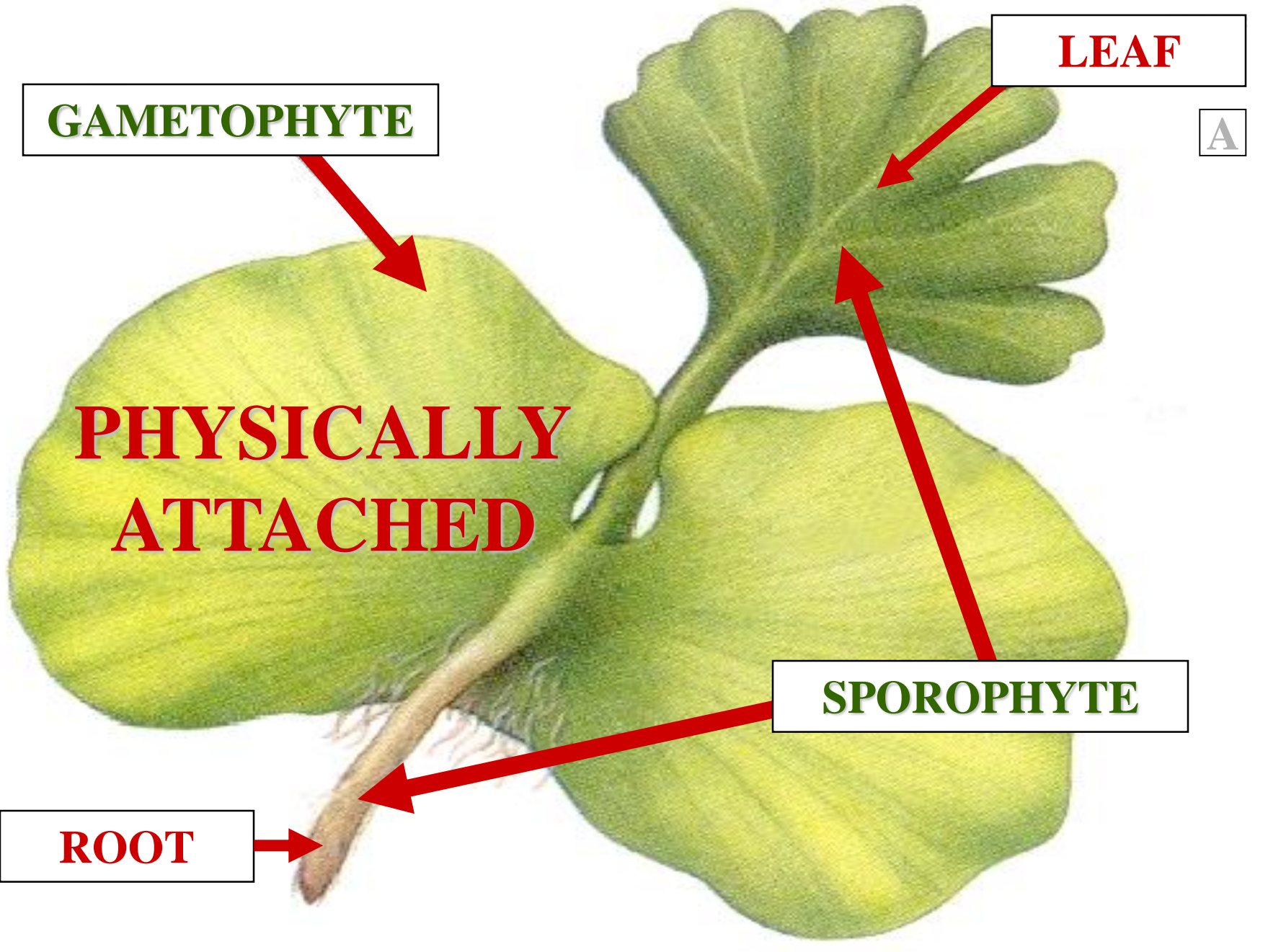
LEAF

A

**PHYSICALLY
ATTACHED**

SPOROPHYTE

ROOT



LEAF

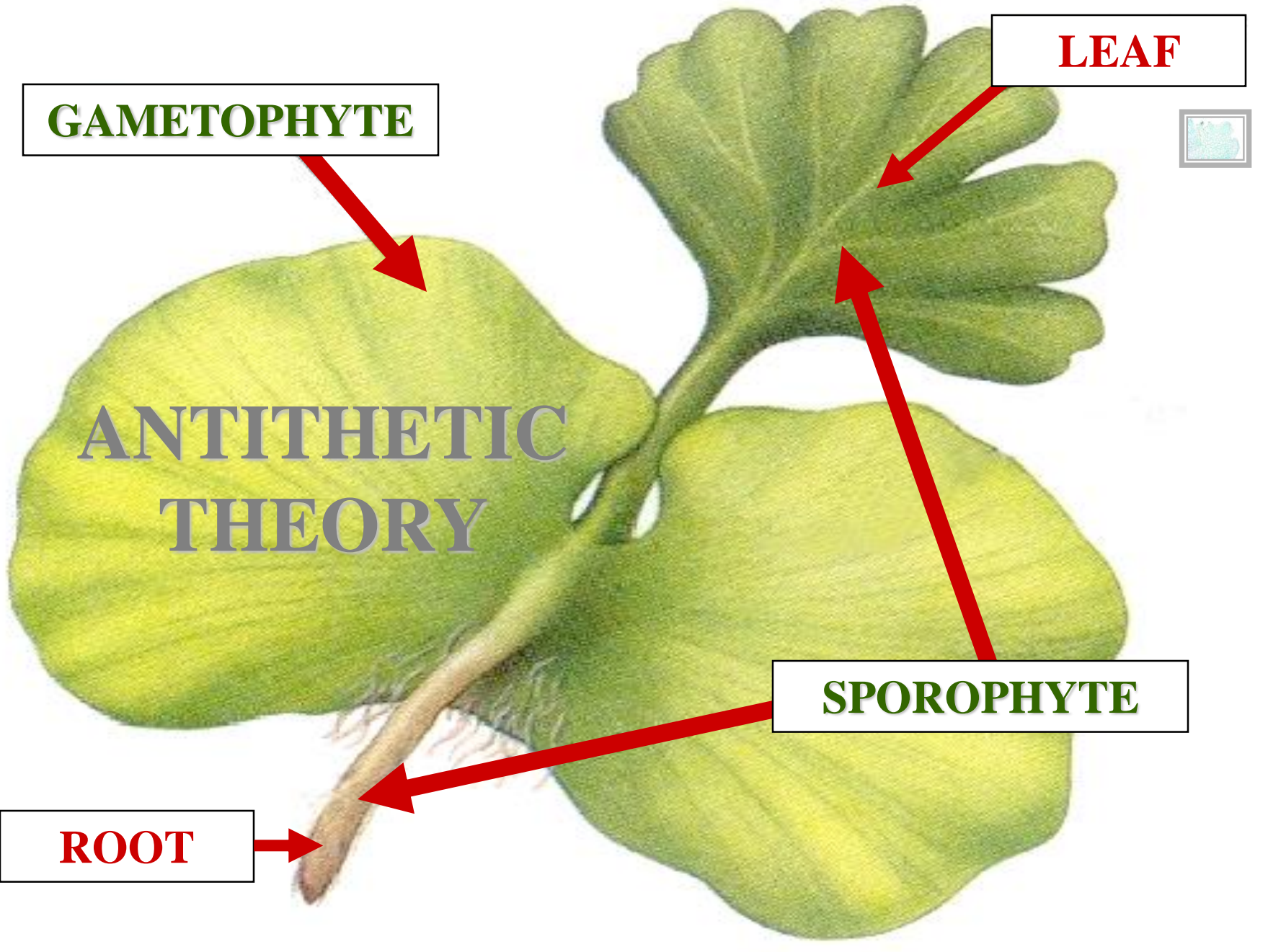
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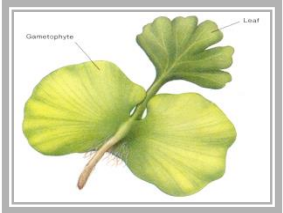
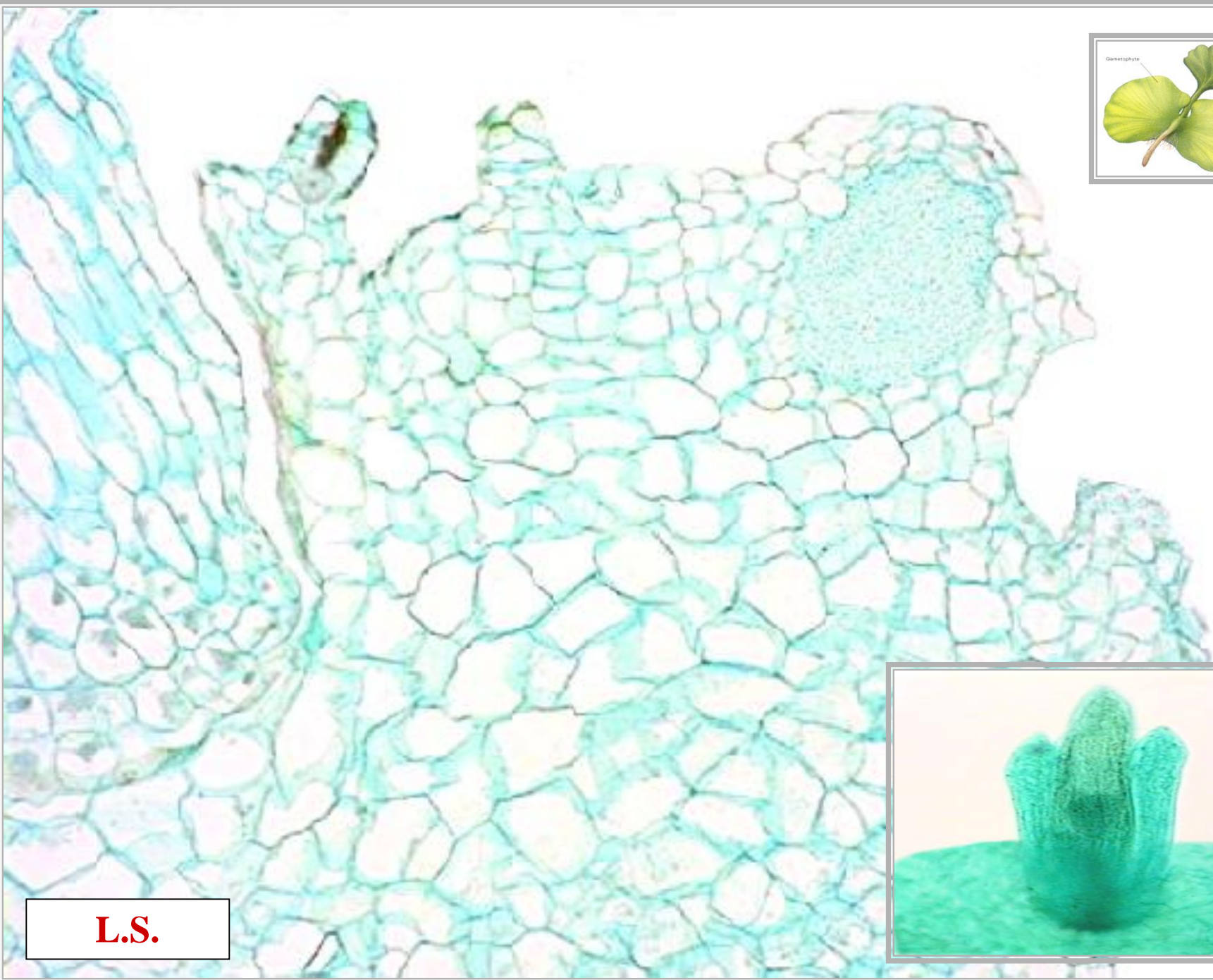


**ANTITHETIC
THEORY**

SPOROPHYTE

ROOT





G

L.S.

