

22-2 Bryophytes



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Mosses and their relatives are called **bryophytes**, or nonvascular plants.

They do not have vascular tissues, or specialized tissues that conduct water and nutrients.



What adaptations of bryophytes enable them to live on land?



Bryophytes have life cycles that depend on water for reproduction.

Bryophytes draw up water by osmosis only a few centimeters above the ground.

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During one stage of their life cycle, bryophytes produce sperm that swim through water to reach eggs of other individuals.

Therefore, bryophytes must live where there is rainfall or dew for part of the year.

Groups of Bryophytes

Bryophytes are low-growing plants found in moist, shaded areas.



What are the three groups of bryophytes?



The three groups of bryophytes are:

- **mosses**
- **liverworts**
- **hornworts**

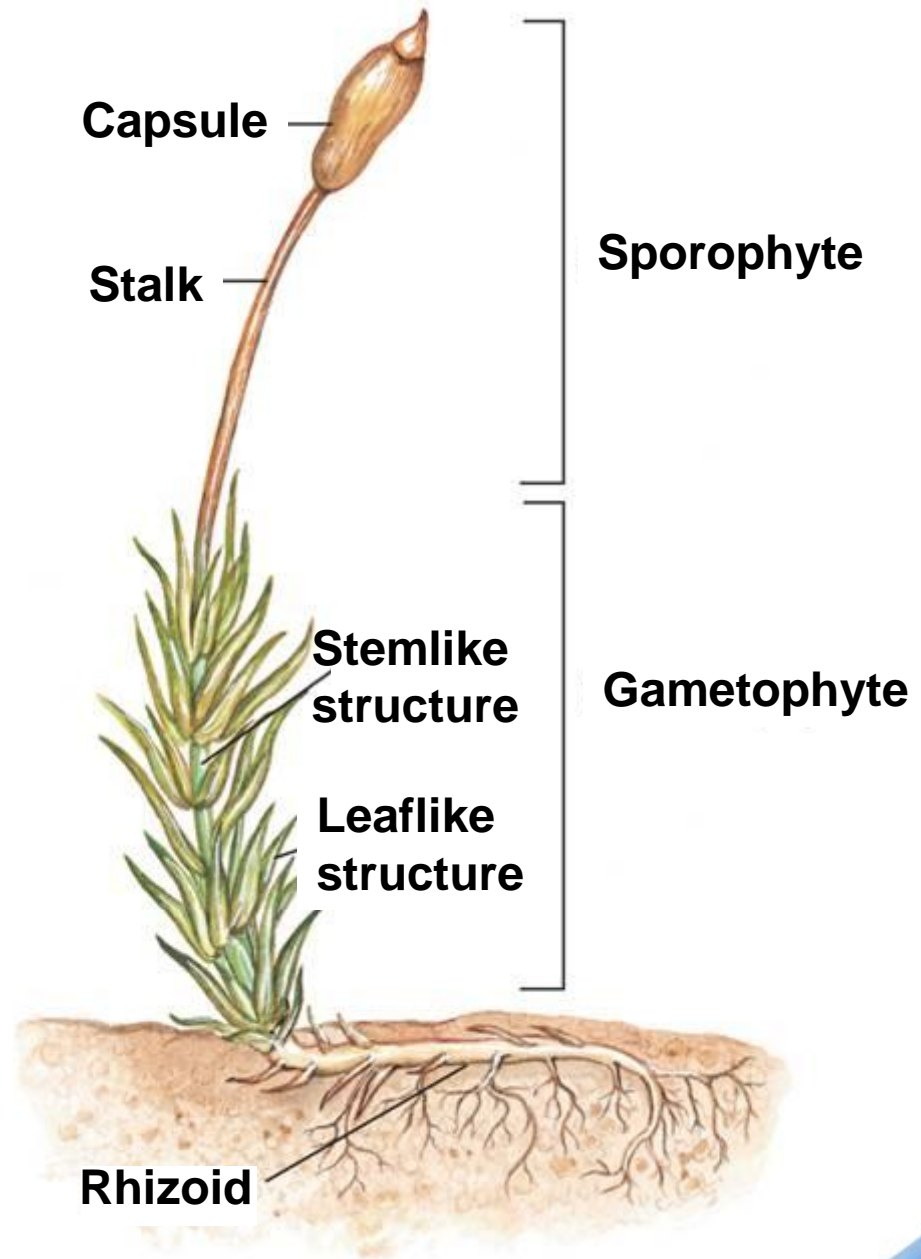
Mosses

The most common bryophytes are mosses.

Mosses:

- are adapted to life in wet habitats and nutrient-poor soils.
- can tolerate low temperatures.
- are clumps of gametophytes growing together.

The Structure of a Moss



Each moss plant has a shoot that looks like a stem with leaves. These are not true stems or leaves, because they do not contain vascular tissue.

When mosses reproduce, they produce thin stalks, each containing a capsule.

This is the sporophyte stage.

The “leaves” of mosses are one cell thick, so they lose water quickly if the surrounding air is dry.

Mosses have **rhizoids**, which are long cells that anchor them in the ground and absorb water and minerals from the soil.

Water moves through rhizoids and into the rest of the plant.

Liverworts

Liverworts' gametophytes form broad, thin structures that draw up moisture from the soil surface.

Mature gametophytes produce structures that look like tiny green umbrellas.

These carry the structures that produce eggs and sperm.

Some liverworts can reproduce asexually by means of gemmae.

Gemmae are small multicellular reproductive structures.

In some species, gemmae form in gemma cups.

When washed out of the cup, the gemmae can divide by mitosis to produce a new individual.

Hornworts

Hornworts are found only in soil that is damp nearly year-round.

Their gametophytes look like those of liverworts.

The hornwort sporophyte looks like a tiny green horn.



How do bryophytes reproduce?

Life Cycle of Bryophytes

Bryophytes reproduce and develop by alternation of generations.

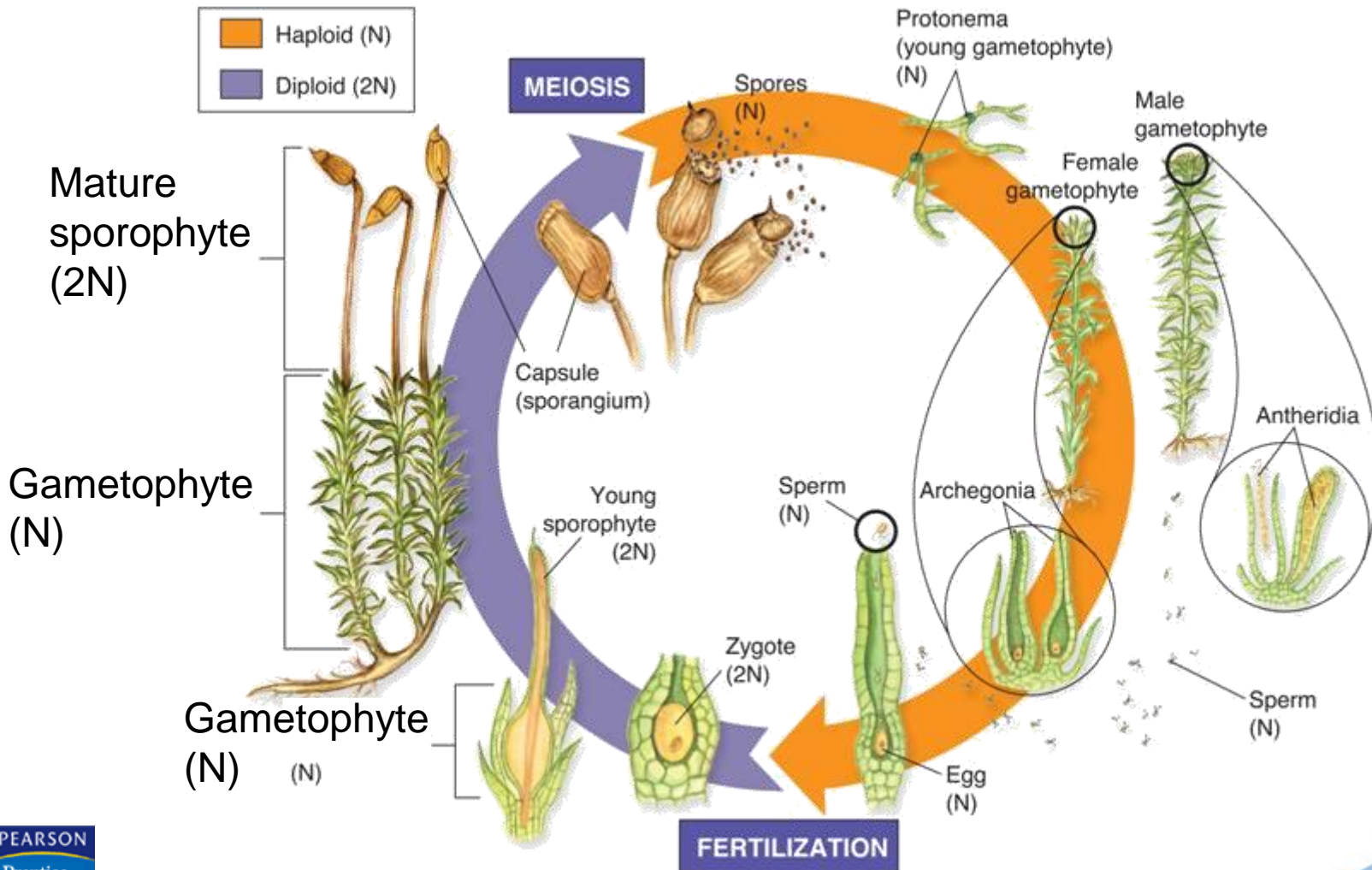


The gametophyte is the dominant stage of the life cycle and is the stage that carries out most of the plant's photosynthesis.

Life Cycle of a Moss

The life cycle of a moss illustrates how bryophytes reproduce and develop.

Life Cycle of a Bryophyte



When a spore lands in a moist place, it germinates and grows into a mass of tangled green filaments called a **protonema**.

As the protonema grows, rhizoids grow into the ground and shoots grow into the air.

These shoots grow into green moss plants, which are the gametophyte stage of its life cycle.

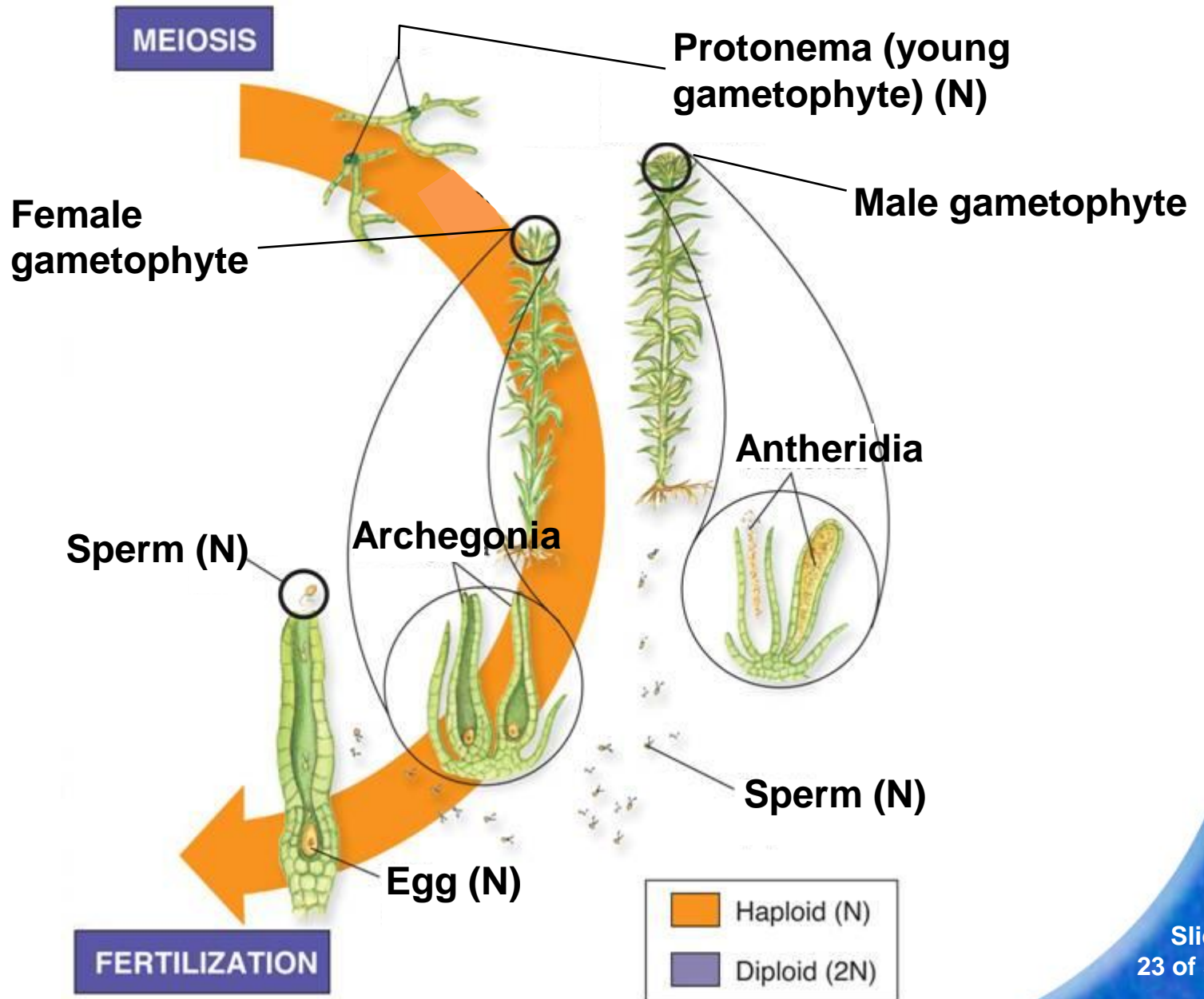
Gametes form in structures at the tips of the gametophytes.

Sperm are produced in **antheridia**, the male reproductive structure.

Eggs are produced in **archegonia**, the female reproductive structure.

Some species produce both sperm and eggs on the same plant.

22-2 Bryophytes → Life Cycle of Bryophytes



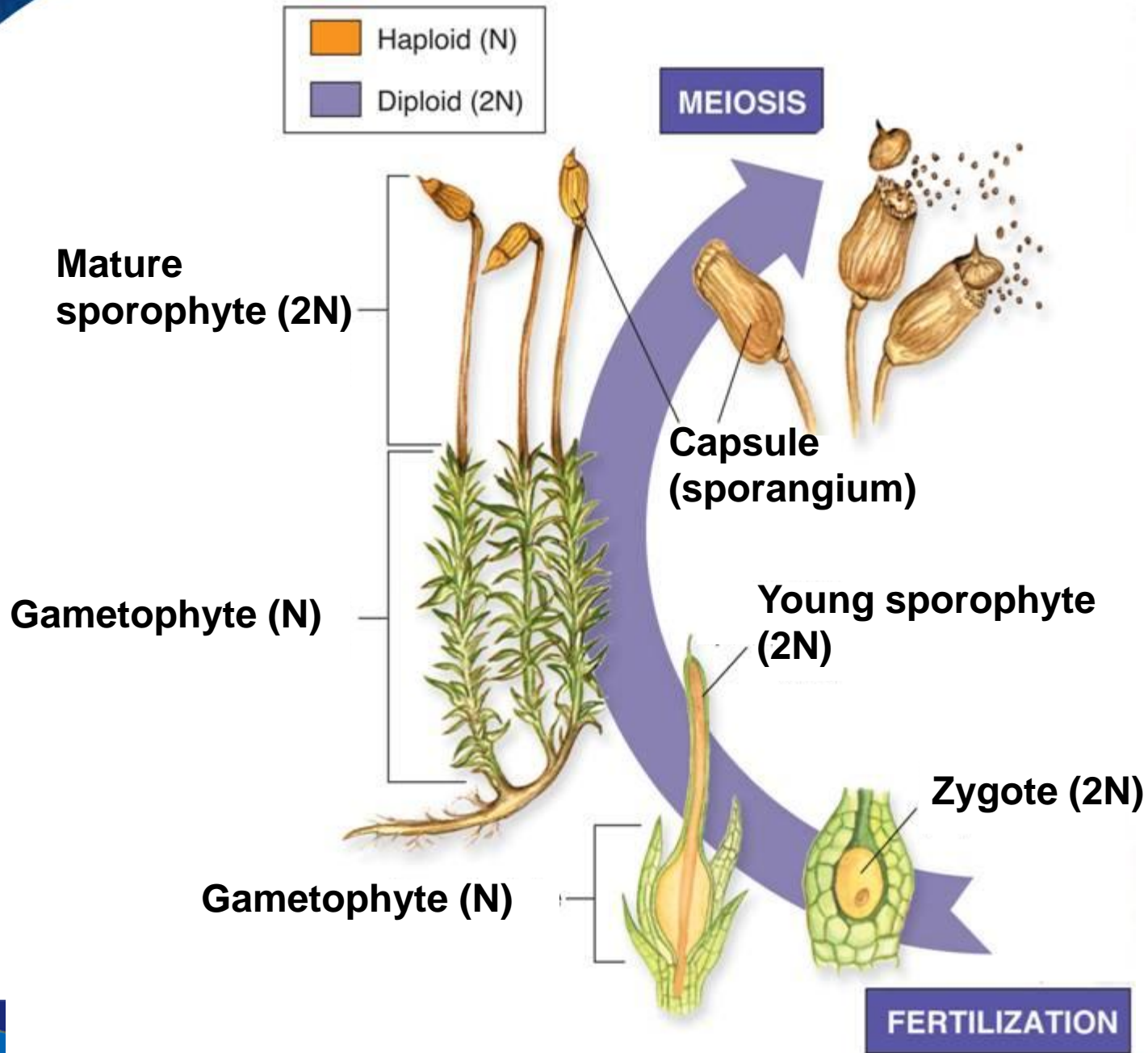
Fertilization produces a diploid zygote.

The zygote grows directly from the gametophyte and depends on it for water and nutrients.

The mature sporophyte is a long stalk ending in a capsule. Inside the capsule, haploid spores are produced by meiosis.

When the capsule ripens, it opens and spores are scattered.

22-2 Bryophytes → Life Cycle of Bryophytes



Human Use of Mosses

Sphagnum mosses thrive in the acidic water of bogs.

Dried sphagnum acts as a natural sponge. It can accumulate to form peat deposits.

Peat can be cut from the ground and used as fuel.

Peat can be used to improve the soil's ability to retain water and to increase soil acidity.

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1 Unlike all other plants, bryophytes do NOT have

A a. vascular tissue.

b. chlorophyll.

c. gemmae.

d. cell walls.

22-2 Section QUIZ

2 Water moves from the soil into the stemlike and leaflike structures of bryophytes by

- A**
- a. osmosis.
 - b. active transport.
 - c. specialized conducting structures.
 - d. vascular tissue.

- 3** The most abundant bryophytes are the
- a. liverworts.
 - A** b. mosses.
 - c. hornworts.
 - d. ferns.

4 Fertilization in bryophytes is dependent upon the presence of

A a. water.

b. sunlight.

c. nutrients.

d. wind.

22-2 Section QUIZ

5 The stage of a moss plant that carries out most photosynthesis is the green

A a. gametophyte.

b. sporophyte.

c. protonema.

d. zygote.

END OF SECTION