

Chapter 22

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of the diversity of plants.

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Plant Diversity



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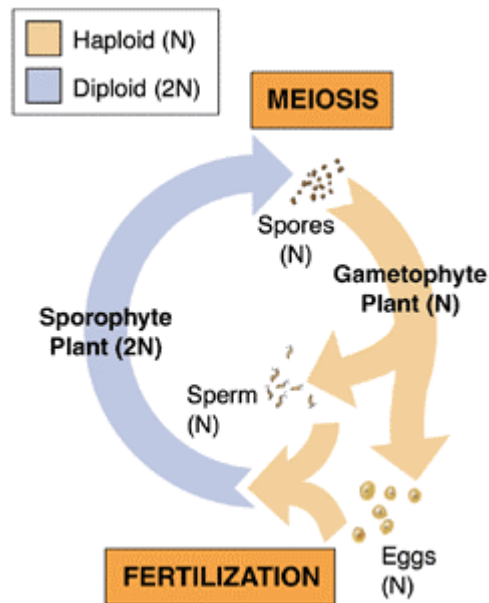
22–1 Introduction to Plants

What Is a Plant?

- Plants are members of the kingdom _____
- Plants are multicellular eukaryotes that have cell walls made of cellulose. They develop from multicellular embryos and carry out photosynthesis using the green pigments chlorophyll *a* and *b*

The Plant Life Cycle

- Plants have life cycles that are characterized by alternation of generations
- the two generations are the haploid (N) gametophyte, or gamete-producing plant, and the diploid (2N) sporophyte, or spore-producing plant.



What Plants Need to Survive

- The lives of plants revolve around the need for:
 - 1.
 - 2.
 - 3.
 - 4.

Early Plants

- The first plants evolved from an organism much like the multicellular green algae living today.

The First Plants

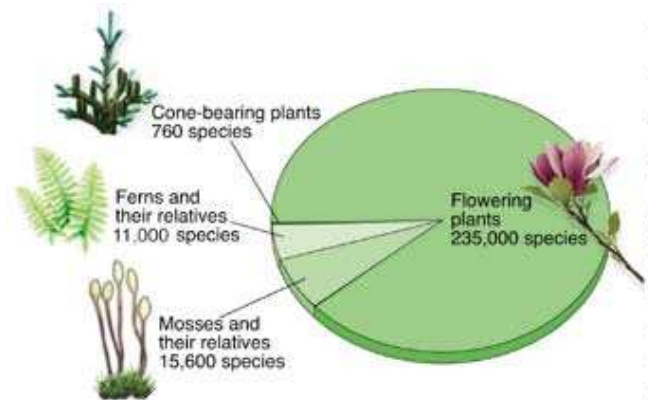
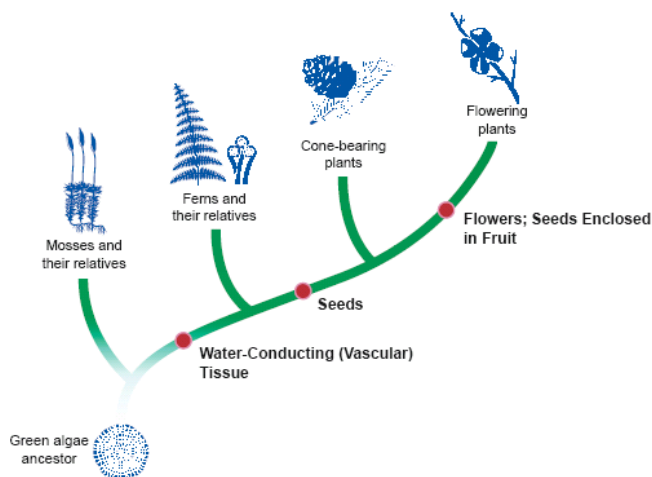
- The first true plants were still dependent on water to complete their life cycles, similar to today's mosses in that they were simple in structure and grew close to the ground.
- From these plant pioneers, several major groups of plants evolved.
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Overview of the Plant Kingdom

- Botanists divide the plant kingdom into four groups based on three important features:

- 1.
- 2.
- 3.



Name _____ Date _____ Per _____

22 – 1 Section Review

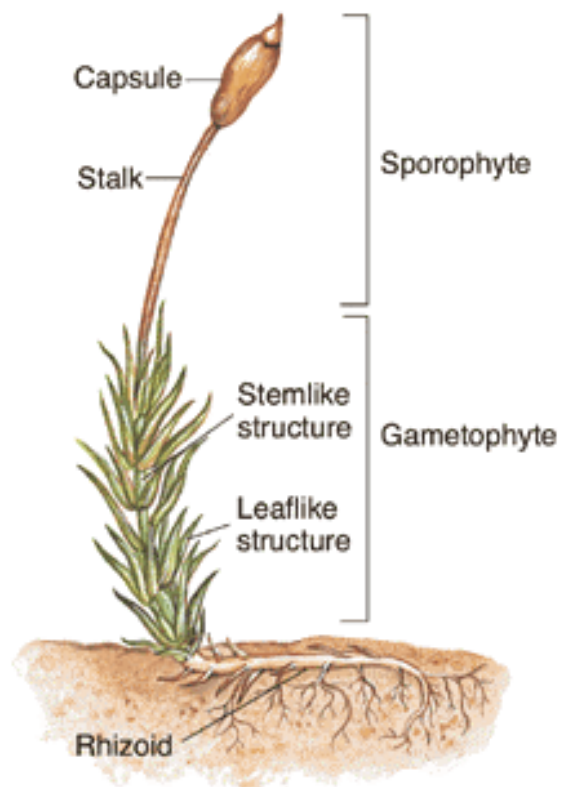
1. What features distinguish plants from other organisms?
2. To live successfully on land, what substances must plants obtain from their environment?
3. From which group of protists did the first plants evolve? How are plants similar to these protists?
4. Compare the gametophyte and sporophyte stages of the plant life cycle. Which is haploid? Which is diploid?

22–2 Bryophytes

bryophytes - _____

ex.)

During at least one stage of their life cycle, bryophytes produce sperm that must swim through water to reach the eggs of other individuals. Therefore, they must live in places where there is rainfall or dew for at least part of the year.



22–3 Seedless Vascular Plants

- In just a few million years, plants grew to a whole new scale on the landscape.

Q: What caused this increase in size?

A:

Vascular tissue - _____

Evolution of Vascular Tissue

- Both forms of vascular tissue—xylem and phloem—can move fluids throughout the plant body, even against the force of gravity.

Xylem - _____

Phloem - _____

- Vascular plants also evolved the ability to produce _____, a substance that makes cell walls rigid.
- The presence of lignin allows vascular plants to grow _____

Ferns and Their Relatives

- Seedless vascular plants include club mosses, horsetails, and ferns.
- Like other vascular plants, ferns and their relatives have true roots, leaves, and stems.

Roots - _____

Leaves - _____

Veins - _____

Stems - _____

Club Mosses

- Today, club mosses are small plants that live in moist woodlands and near streambeds and marshes. *Lycopodium*, a common club moss, looks like a miniature pine tree. For this reason it is also called “ground pine.”

Horsetails

- The only living genus of ArthropHYta (ahr-THROH-fy-tuh) is *Equisetum*, which is a plant that grows about a meter tall. Like the club mosses, *Equisetum* has true leaves, stems, and roots. Its leaves are arranged in distinctive whorls at joints along the stem. *Equisetum* is called horsetail, or scouring rush, because its stems look similar to horses’ tails and contain crystals of abrasive silica. During Colonial times, horsetails were commonly used to scour pots and pans.

Ferns

Ferns, members of phylum Pterophyta (tehr-OH-fy-tuh), probably evolved about 350 million years ago, when great club moss forests covered the ancient Earth. Ferns have survived during the Earth's long history in numbers greater than any other group of spore-bearing vascular plants. More than 11,000 species of ferns are living today.



Name _____ Date _____ Per _____

22 – 2 and 22 – 3 Section Review

1. What are the two types of vascular tissue? Describe the function of each.
2. What are the three phyla of seedless vascular plants? Give an example of each.
3. What is the dominant stage of the fern life cycle? What is the relationship of the fern gametophyte and sporophyte?
4. The size of plants increased dramatically with the evolution of vascular tissue. How might these two events be related?
5. How is water essential in the life cycle of a bryophyte?

22 – 4 Seed Plants

- Over millions of years, plants with a single trait—the ability to form seeds—became the most dominant group of photosynthetic organisms on land.
- Seed plants are divided into two groups:

Gymnosperms - _____

-

Ex.)

Angiosperms - _____

-

Ex.)

Reproduction Free From Water

- Unlike mosses and ferns, however, seed plants do not require water for fertilization of gametes.

Q: Why was this an advantage?

A:

- Adaptations that allow seed plants to reproduce without water include flowers or cones, the transfer of sperm by pollination, and the protection of embryos in seeds.

Cones and Flowers

Cones - _____

Flowers - _____

- The gametophyte generations of seed plants live inside these reproductive structures

Pollen

Pollen grain - _____

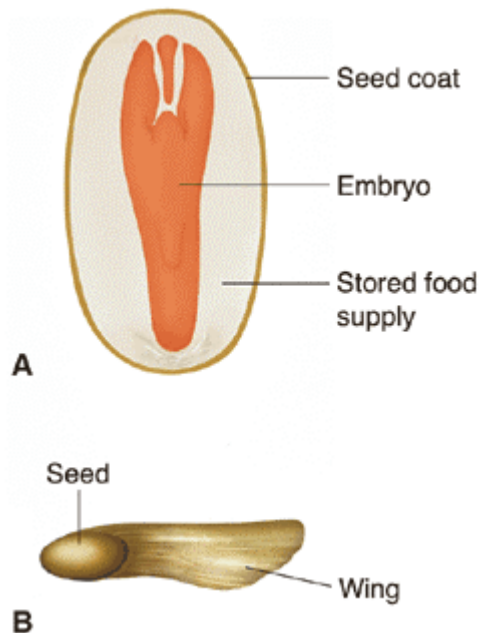
Pollination - _____

Seeds

seed - _____

embryo - _____

seed coat - _____



Evolution of Seed Plants

- Over a period of millions of years, continents became much drier, making it harder for seedless plants to survive and reproduce.
- For that reason, many moss and fern species became extinct. They were replaced by seed plants with adaptations that equipped them to deal with drier conditions.

Gymnosperms—Cone Bearers

- The most ancient surviving seed plants are the gymnosperms.

Gymnosperms include:

- 1.
- 2.
- 3.
- 4.

22–5 Angiosperms—Flowering Plants

- Flowering plants originated on land and quickly came to dominate Earth’s plant life.
- The vast majority of living plant species reproduce with flowers.

Flowers and Fruits

- Angiosperms have unique reproductive organs known as flowers.

Q: Why are flowers evolutionary adaptations?

A:

- Flowers contain ovaries, which surround and protect the seeds
- After pollination, the ovary develops into a fruit, which protects the seed and aids in its dispersal.











Fruit - _____

Diversity of Angiosperms

The angiosperms are an incredibly diverse group. Not surprisingly, there are many different ways of categorizing these plants.

Monocots and Dicots

Monocots and dicots are named for the number of seed leaves, or cotyledons, in the plant embryo. Monocots have _____, and dicots _____.

Characteristics of Monocots and Dicots		
	Monocots	Dicots
Seeds	Single cotyledon 	Two cotyledons 
Leaves	Parallel veins 	Branched veins 
Flowers	Floral parts often in multiples of 3 	Floral parts often in multiples of 4 or 5 
Stems	Vascular bundles scattered throughout stem 	Vascular bundles arranged in a ring 
Roots	Fibrous roots 	Taproot 

Woody and Herbaceous Plants

Woody plants – Have woody stems

Ex.)

Herbaceous Plants - _____

Ex.)

Annuals, Biennials, and Perennials

Annuals - _____

Biennials - _____

- In the first year, biennials germinate and grow _____
- During their second year, biennials grow _____

Perennials - _____

Name _____ Date _____ Per _____

22 – 5 Section Review

1. What reproductive structures are unique to angiosperms? Briefly describe the function of each.
2. What are monocots and dicots?
3. How do annuals, biennials, and perennials differ?
4. Compare the growth forms of plants with woody stems and those with herbaceous stems.
5. Which are more likely to be dispersed by animals—the seeds of an angiosperm or the spores of a fern? Explain your reasoning.