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Section 8.1 The Plant Kingdom

What does the Bible say about plants?

We've already learned that the Bible uses the Hebrew term "Nephesh" for all creatures that can think, feel, and suffer, like animals and humans. But it never uses this terms for plants.

Genesis 1:11-13

¹¹ Then God said, "Let the earth bring forth grass, the herb *that* yields seed, *and* the fruit tree *that* yields fruit according to its kind, whose seed *is* in itself, on the earth"; and it was so. ¹² And the earth brought forth grass, the herb *that* yields seed according to its kind, and the tree *that* yields fruit, whose seed *is* in itself according to its kind. And God saw that *it* was good. ¹³ So the evening and the morning were the third day.

Plants are organic (living) machines, designed by God for food, building materials, clothing, beauty, and the production of oxygen through photosynthesis.

Genesis 1:29-31

²⁹ And God said, "See, I have given you every herb *that* yields seed which *is* on the face of all the earth, and every tree whose fruit yields seed; to you it shall be for food. ³⁰ Also, to every beast of the earth, to every bird of the air, and to everything that creeps on the earth, in which *there is* life, *I have given* every green herb for food"; and it was so. ³¹ Then God saw everything that He had made, and indeed *it was* very good. So the evening and the morning were the sixth day.

Only after sin, separation from God, and the globally catastrophic flood did God give permission for man to humanely kill and eat nephesh creatures animals. Yet even then, God commanded man not to eat the blood, because the it represented the creatures "nephesh" life, which can feel, think, and suffer.

Genesis 9:1-4

"¹ So God blessed Noah and his sons, and said to them: "Be fruitful and multiply, and fill the earth.* ² And the fear of you and the dread of you shall be on every beast of the earth, on every bird of the air, on all that move *on* the earth, and on all the fish of the sea. They are given into your hand. ³ Every moving thing that lives shall be food for you. I have given you all things, even as the green herbs. ⁴ But you shall not eat flesh with its life, *that is*, its blood."

When Jesus comes again and recreates a new earth and new heaven, the pain, fear, suffering and death of nephesh creatures will no longer exist. The wolf and lion will "eat grass like the ox", and will lay down peacefully with the lamb. (Isaiah 11 and 65)

Plant Characteristics:

- * All are multicellular, autotrophic eukaryotes.
- * All have cell walls
- * Most live on land, unlike algae which live in water.

Living on land requires a lot of special adaptations to survive:

1. Obtaining Water and Other Materials from the soil
2. Retaining water so it doesn't evaporate out of the plant
 - **Cuticle** = waxy, waterproof layer covering leaves of most plants.
3. Transporting materials (food, water, minerals, etc.) throughout the plant.
 - **Tissues** = groups of similar cells that perform specific functions.
 - **Vascular Tissues** = are special transporting tissues in "vascular" plants.
(They are tubelike structures for moving food and water inside the plant.)
4. Support is needed to keep the plant standing and growing up to reach the sunlight.
 - Vascular tissues in vascular plants give strength and support.
5. Special Reproduction is another adaptation for plants to live on land.

Complex Life Cycles:

- * Plant life cycles are different from most animals.
- * Plants have two different stages or generations in their life cycles.
 - **Sporophyte Stage** is when the plant produces spores.
(Spores are tiny cells that grow into the plants next stage.)
 - **Gametophyte Stage** is when the plant produces two kinds of sex cells.
 - **Gametes** are what the sex cells (sperm and eggs) are called.
- * Reproduction is sexual in all plants, and involves fertilization.
 - **Fertilization** occurs when a sperm cell unites with an egg cell.
 - **Zygote** is the term for the new fertilized egg, which grows into a new plant.

8.2 Mosses, Liverworts, and Hornworts (NONVASCULAR PLANTS)

Nonvascular Plants –

- * No vascular tissue (tubelike transport pipes)
- * Have no roots
- * Without roots or vascular tissue, these plants must grow low to the ground and near moist areas. Water and food flows slowly from cell to cell, and they are not strong enough to grow tall.

Mosses: (Over 10,000 species)

- * **Structure**
 - **rhizoids** are rootlike structures as anchors, which absorb water and nutrients.
 - Gametophyte generation is the common green fuzzy moss
 - Sporophyte generation grows out of the gametophyte, and is a skinny stalk with a capsule full of spores at the top.

Importance of Mosses –

- * Peat Moss containing sphagnum moss is used by gardeners.
- * **Bogs** are where sphagnum moss grows naturally.
 - Bog water is so acidic that no bacteria grows to decompose dead mosses.
 - So the mosses pile up at the bottom in a thick mat call **Peat**.
- * Mosses are pioneer plants like lichens, meaning they are the first to grow in areas where forest burned out or volcanoes erupted. Wind blown soil catches in them and builds up for other plants to grow.

Liverworts (over 8,000 species) are shaped sort of like a human liver.

- * Not mosses
- * Grow flat along the ground, or on moist rocks.

Hornworts (less than 100 species)

- * Not mosses
- * look like liverworts, but have tiny horn shaped sporophytes growing out of them.
- * grow in moist soil

8.3 Ferns, Club Mosses, and Horsetails

What happened to the giant ferns we now see buried in rock as fossils?

- * They were buried rapidly during the global flood of Noah's day.
- * They did not decay because they were covered immediately in sediment.
- * These fossils are not millions of years old as the textbook authors believe.
- * Please see the evidence presented by scientists at www.answersingenesis.org

Fern Characteristics: (Vascular Tissue and Spores to reproduce, so they are **seedless**)

- * **Vascular Tissue:**
 - Solves the need for support and transportation of water and nutrients.
 - Strength is added like bundling a bunch of straws together.
- * **Spores:**
 - These plants release spores that grow into gametophytes, which produce egg cells and sperm cells, which need lots of water for fertilization to occur.

Ferns:

- * **Fossil** records are dated by radiometric methods that are very unreliable.
(See Dr. Russell Humphrey's articles on www.answersingenesis.org)
- * **Structure** – true stems, roots, and leaves (**fronds** are fern leaves)
(roots and stems grow underground to absorb water and nutrients)
(leaves grow above ground to absorb sunlight and carbon dioxide)
(some young leaves are curled and called fiddleheads, until maturity as they uncurl)

* **Reproduction in Ferns:**

Sporophyte stage is the common fern with its fronds (leaves).

Under the fronds are spore cases filled with spores.

Wind and water carry the spores, which develop into the gametophyte stage.

Fern gametophytes are tiny plants that grow low to the ground.

* **Fern Importance:**

- houseplants, some are eaten, some serve symbiotically in rice farmer fields

Club Mosses (not true mosses) and Horsetails: tiny needlelike branches

* (Vascular Tissue and Spores to reproduce, so they are seedless)

* Very small and very few species left today.

* Some club mosses look like tiny pine tree branches growing out of the ground
(ground pine or princess pine)

* **Horsetails** (only 30 species left)

8.4 Feeding the World

People Population = 6 billion today and growing.

In labs, scientists are developing plants resistant to insects, disease, and drought.

Also plants that produce more food per plant.

How? **Genetic engineering**, selective breeding, etc.

On farms, new more efficient “high-tech” machines and practices are used.

How? **Precision Farming** with computers, technology for watering, fertilizing, management.

Hydroponics – is a method to grow plants in solutions of nutrients instead of soil.

* This is useful in areas where the soil is poor or rocky.

* But, hydroponics cost a lot of money to conduct.