

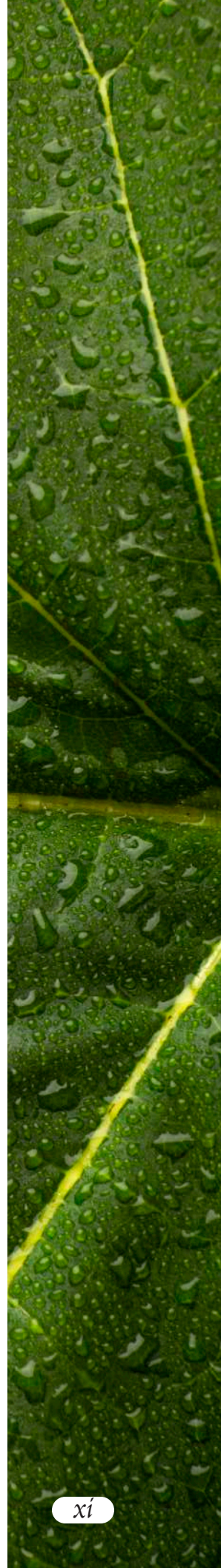
HOW TO USE THIS CURRICULUM

The main goal of elementary and middle-school science is to create joy in God's creation and to prepare for next-level courses. Through reading and activities, students will become familiar with terms and processes that will equip them with skills needed for critical thinking in high school. They will understand the importance of a Christian worldview, observe the outside world through the lens of creation, and gain an understanding of a loving God who cares for us so greatly that He has designed life and the world to make sure all our needs are met and to show us the beauty in which we live.

This curriculum is designed for students in grades 4–8. However, it is easy to adjust expectations and adapt activities for younger or older students or to have siblings learn together. You'll find suggestions for adaptation at the end of this section.

The *Student Reader* contains 32 lessons; each is designed to be completed in about 2–3 hours per week. We recommend splitting each lesson into 4 segments. Of course, this depends on the age and attention span of your students and the number of outside resources you use. If you teach science 4 times a week, plan for about 30–45 minutes each day. You have the freedom to choose what your students should complete in any week, according to your own schedule and plans.

Each chapter contains several components you'll want to explore each week with your students. You'll find a **vocabulary** section with words to define, a **word**





origin section to help students understand the meanings of certain terms, and a **Scripture memory** section. Lessons also include a **Creation Corner** to point your students back to the unique creation designed by God for our care and enjoyment.

The *Lab Manual*

It is imperative that students use the *Lab Manual* with the *Student Reader*. The *Student Reader* contains information, but the *Lab Manual* reviews and reinforces the lesson material and encourages higher-level thinking as your students apply the information learned. The *Lab Manual* contains everything you'll need for recordkeeping; it provides a place for notes, sketches, research, and following the steps of the scientific method. You can easily adapt the *Lab Manual* to the age level and ability of your students.

Sketching: The goal of sketching is recordkeeping. Scientists frequently sketch and document their findings in their studies, and your students will do this throughout their educational journeys. However, if your students would rather find a picture or take a photo and tape or paste it in the *Lab Manual*, that can take the place of sketching. You're free to make a choice for each activity.

Suggested Daily Guide: A planning guide at the beginning of each lesson in the *Lab Manual* breaks down your week into 4–5 days. We recommend 4 shorter segments divided over a week rather than 1 longer session. The more frequently students are exposed to terms, concepts, and ideas, the easier it will be to retain information long-term.

Materials Needed: Students will need to have sketching tools available for almost every lesson. These include a pencil, colored pencils, a charcoal pencil, markers, etc. Students will also do research in almost every lesson. They'll need access to books, a science encyclopedia, and/or the internet (*with parental guidance*).

A complete list of all additional materials needed for the year is provided at the beginning of the *Lab Manual*. In addition, a list of materials is provided in each lesson. Some of the materials are common items you'll have around your house; others will need to be purchased ahead of time from a science supply store or catalog. All experiments are designed to reinforce important lesson concepts and to prepare students for further study in science. It will be beneficial for you to familiarize yourself with the materials before each lesson.

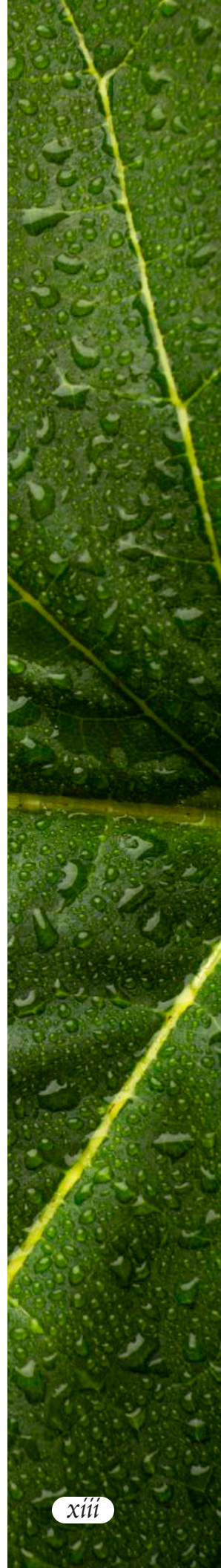
You may notice that all the measurements in this book use the metric system. However, if you live in the U.S., Liberia, or Myanmar, you may only be familiar with the English or Imperial system. If so, this book is a great opportunity to

become familiar with metric measurements! Virtually all scientists use the metric system, and it's important for aspiring scientists to be comfortable working with meters, liters, grams, and degrees Celsius. If your tools at home don't have metric measurements, we've included a conversion table in Appendix A for your convenience.

How to Begin

To begin each new lesson, read the text to your students or have them read it to themselves. For very young students, you might read it on your own and then discuss the information at their level.

- Students should write down information they think is important in the **Student Notes** portion of the *Lab Manual*. Remember that what you think is important might be different from what they think is important; that's completely acceptable at this age.
- Each lesson includes **Scripture Memory** because learning about God's Word is essential to understanding His character and His plan. Scripture memory cards are also included in the back of the book. You can print them to aid in memorization or post them in your school area. They can also be used as flash cards for review throughout the school year.
- The **Define It** section provides a place for students to define the vocabulary words from each lesson.
- The **Write It** section is a guided review of the chapter's key concepts. Students will define words, answer questions, and sketch diagrams. They can compare what they determined was important when they read to the material reviewed in this section and add to their notes if needed.
- The **Apply It** section takes learning to the next level. It includes a variety of activities as well as labs—with an emphasis on following the steps of the scientific method—and a complete, step-by-step guide to writing a lab report (a necessity for high school and college). When students write their conclusions, they can choose which questions to answer; it could be all of the questions provided, some of them, or some of their own. It can be tempting to eliminate these activities to save time; however, we strongly advise using them to prepare for higher-level learning.
- The **Research It** section allows for further study. Students will use books, encyclopedias, and/or the internet (*with parental guidance*) to learn more about a topic. Younger students can write a couple of sentences or sketch a picture about what they learned. Older students can write 2–3 paragraphs about the researched topic.



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- The **Review It** section provides a **quiz** on odd-numbered weeks and a **crossword puzzle** on even-numbered weeks. In addition, **semester tests** are included after lessons 16 and 32. You can use these components as tests, as another review, or not at all. Each quiz is worth 10 points, and a grade can be calculated by multiplying the number of correct answers by 10. Semester test grades can be calculated by dividing the number of points earned by the number of points possible, then multiplying that answer by 100.

Suggested grading scale:

A = 90–100

B = 80–89

C = 70–79

D = 60–69

F = 59 and below

- Last, you'll want to allow time for **outside reading**, perusing pictures, and researching topics of interest. We recommend that students keep track of important information in the blank pages in the back of the *Lab Manual*.

The *Lab Manual* will serve as an excellent reminder and record of what your students have accomplished and learned this year in science! It is also a great way to observe growth in their abilities from year to year.

As with the *Student Reader*, teachers may choose to adapt the *Lab Manual* for students of different ages and abilities. Younger students may orally answer the “Write It” sections, while older students may write their answers in complete sentences. Students of all ages will enjoy the “Apply It” experiments; the lab reports can be adapted as needed. A flexible approach to the curriculum will make learning successful for all ages.

Elementary and middle-school science is about discovery, following the model of other scientists, and taking joy in the journey. Have fun with it yourself, and your enthusiasm will carry over to your students!

ABOUT THE AUTHOR

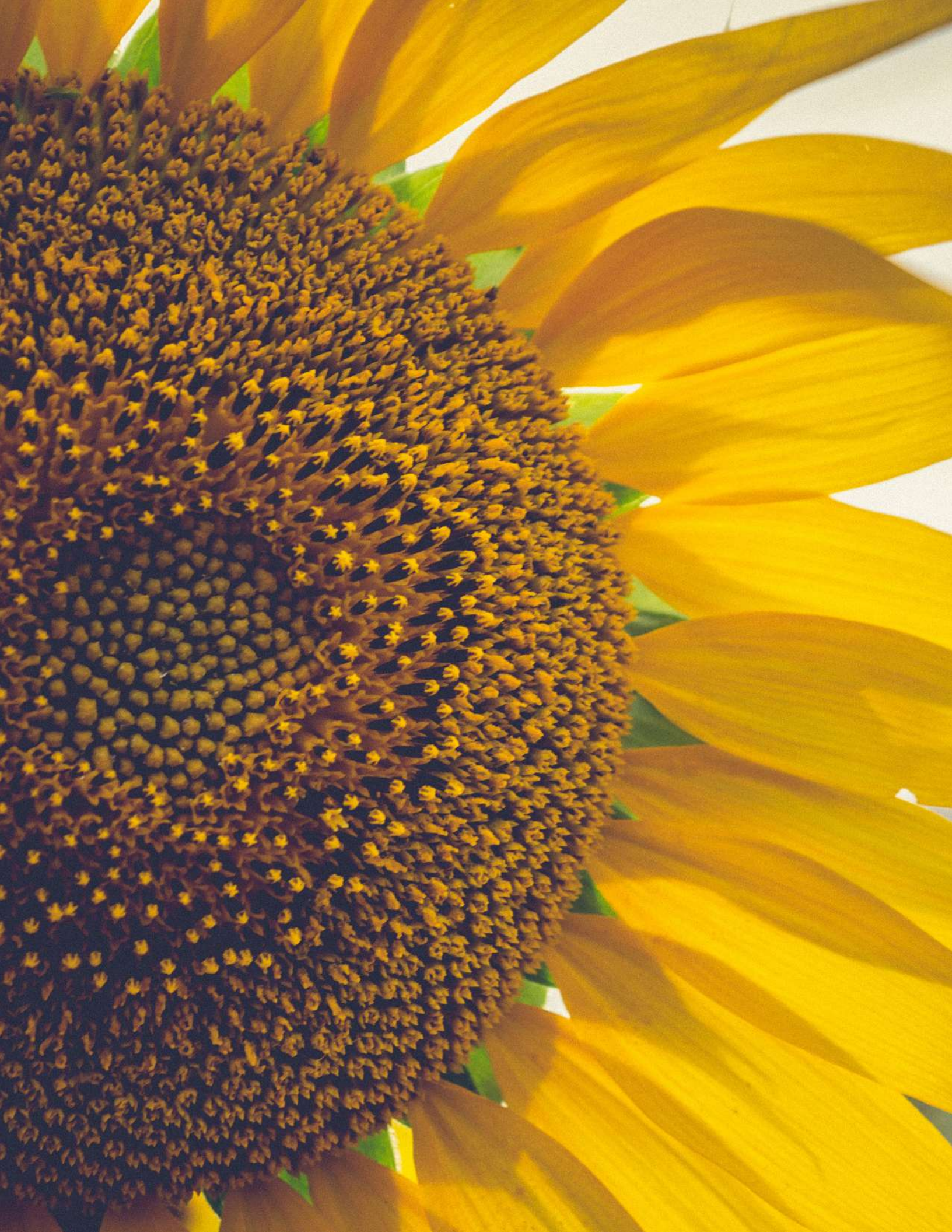
Karri J. Iverson has been a major influence on the lives of many children and families for more than 20 years. She graduated from Western Michigan University *summa cum laude* in elementary education with minors in science/math and English. She has used her diverse education as well as her husband's knowledge and help to homeschool their 5 children.

In 1999 Karri recognized a growing need for homeschooled students to have further instruction in English and science, so she began a local homeschool tutorial. She taught classes in many subjects and managed several teachers as the group grew to meet the needs of local homeschoolers.

Karri has also taught at other homeschool programs and co-ops and has enjoyed teaching Bible studies at her church. She has given direction and guidance to many parents during their homeschooling journeys and has privately tutored several students throughout their high school years. One of her passions is developing curriculum, which she has done for her own children, local homeschooling groups, the local school district's summer and extracurricular camps, and private schools. In addition, she has taught for the Summer Institute for the Gifted and has designed her own science and math curriculum for summer camps.

In addition, Karri trains and encourages teachers and evaluates programs to make sure they meet scientific objectives. She also loves helping students learn about their awesome Creator!





The background of the entire page is a photograph of a sunflower field. In the foreground on the left, a large, bright yellow sunflower petal is partially visible, slightly out of focus. The middle ground is filled with many sunflowers, their yellow petals and dark brown centers creating a pattern of light and dark. The background shows a soft, hazy landscape with more sunflowers and a pale, overcast sky with wispy clouds. The overall tone is warm and natural.

UNIT 1

OUR DESIGNED LIFE

A RECIPE FOR SUCCESS

Goal: To learn the steps of the scientific method and apply them to an experiment.

Welcome to *The Mystery of Science: Biology*! **Biology** is the study of living organisms, which includes plants, animals, bacteria, fungi, and microscopic creatures. We'll be focusing on God's unique creation of living organisms, how they work together in a beautiful relationship to sustain each other, and how God provided the precise conditions that living things need to grow and thrive. Most of all you will see that God's hand is in everything; no living thing came about by chance.

The Scientific Method

When you walk into the kitchen to create a meal, do you use a recipe? You can either follow a recipe or create as you go along. The results can be fantastic, lacking in flavor, or even chaotic! Even if you are successful in your culinary masterpiece once, if you did not write down the

SCIENTIFIC METHOD

OBSERVATION
AND QUESTION



HYPOTHESIS



EXPERIMENT



DATA AND ANALYSIS



CONCLUSION



steps you completed, it is unlikely that you can recreate that same delicious dish. The same is true of scientists and their experiments.

Scientists need a way to ensure that every scientist follows the same steps when completing an experiment. This is important so that work is not duplicated, results are not questioned, and other scientists can easily replicate the experiment. Following the same steps in the same order is critical to scientific investigation in the same way that following a recipe consists of an ordered plan with specific, detailed results.



Step 1: Observation and Question

You constantly process information from the world around you. From the time you were an infant, you have been learning about how the world works. For instance, you may have learned that when you touch a stove burner, it is hot; when you get soap in your eyes, your eyes sting; and when you stay out in the sun too long, your skin gets burned. Noticing and processing these things are parts of the first step in the scientific method.

The first step that scientists take when they follow the scientific method is to observe what is going on around them. They will likely think of a question they don't know the answer to, eventually leading them to design an experiment to come up with that answer. For instance, they observe their environment and ask why a shampoo does not work very well or how far away the closest star is. Establishing the answers to these questions becomes the goal.

Example:

You know that when plants grow, several factors are significant. You have observed that sunlight is a necessary component to a green plant's health. But how significant is it? Can a plant grow without sunlight? Scientists take the information they



VOCABULARY

biology
hypothesis
variable
independent variable
dependent variable
theory
scientific law



WORD ORIGIN

Creation comes from the Latin word *creātiō*, meaning "something brought into existence."



SCRIPTURE MEMORY

Ephesians 2:4–5: "But God, being rich in mercy, because of His great love with which He loved us, even when we were dead in our wrongdoings, made us alive together with Christ (by grace you have been saved)."

have already processed from the world around them and use it to determine what questions they might ask. In our sample experiment, we will ask, “Does a plant absolutely need sunlight to grow?”

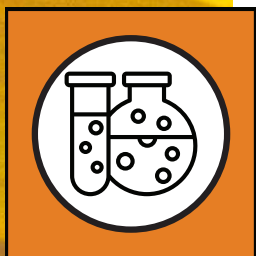


Step 2: Hypothesis

The next step in the scientific method is to create a prediction, also known as a hypothesis. A **hypothesis** is an educated guess based on existing knowledge. There is not a right or wrong hypothesis; it is just your guess based on what you know. Scientists often research an idea to form an educated guess. During this step, you will try to make a specific educated guess about the outcome of your experiment.

Example:

Even though you might not know exactly how significant sunlight is to the life of a plant, you likely are able to make a prediction. Let’s say that you think that without sunlight, a plant will die within 2 weeks. This is your educated guess based on what you already know about plant life.



Step 3: Experiment

Next, scientists will design an experiment to answer the question asked. Experiments are designed to test a hypothesis by looking at 2 different types of variables. A **variable** is any factor, trait, or condition that can change or vary in amounts or types. Simply, a variable is anything that can change an experiment.

One type of variable is the **independent variable**. This is the one that doesn’t change. In our example, we believe that sunlight is important for plant growth. So, in our experiment, we will make sunlight the independent variable. It won’t change because we will expose our plants to the same amount of sunlight (or lack of sunlight) every day. If we had more than one independent variable, it would be difficult or impossible to determine which variable affected the plant growth. For example, if we made both sunlight and water independent variables, we wouldn’t know for sure which one affected plant growth.

The variable that we think will change is the amount a plant grows. This is called a **dependent variable** because its value depends on that of another variable. In our hypothesis, we think that plant growth depends on

the amount of sunlight it receives. Dependent variables are what you will analyze and measure in order to determine whether your hypothesis is correct. You might have more than one dependent variable in your experiment. For example, you might measure how green the plants are. That is one dependent variable. You might want to measure the height of the plants. That would be another dependent variable. A third one might be how fast a plant grows. All these measurements are the variables that depend on the independent variable.

The following are some variables you should keep the same so that the outcome of your experiment will be accurate:

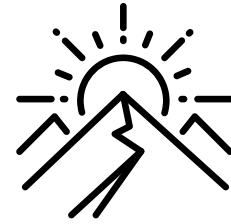
- the size and health of the 2 plants at the start of your experiment
- the amount of water you give your plants
- the richness of the soil used
- the amount of time you wait before you check your plants

Remember to record all the steps used to perform your experiment. This will allow another scientist to repeat the experiment in order to verify your results.

Example:

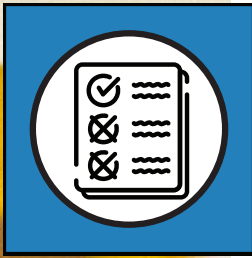
Start your experiment with 2 healthy tomato plants of the same size. Each of the plants should be planted in the same type of soil. Water each plant the same amount and at the same time each day. Place one of the plants on your deck where there is a great amount of daily sunshine. Keep the other plant in a place where there is no direct sunlight. Each day for 14 days, water each plant with 120 mL of water. During those 2 weeks, make observations regarding the health of the plant.

Using the data you collected, compare the growth of the 2 plants. Which plant was the tallest? Did the plant that didn't receive sunlight grow at all? You will analyze this data to draw a conclusion.



CREATION CORNER

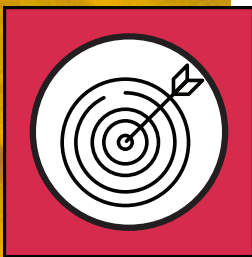
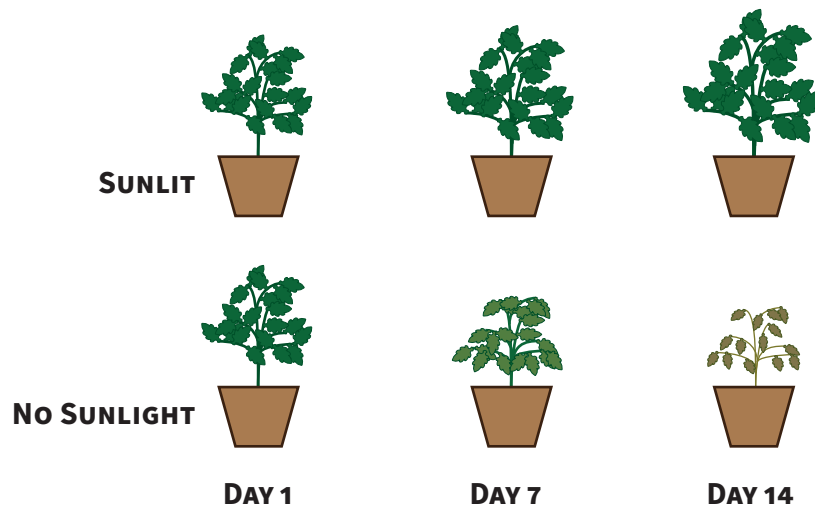
One of our Creator's most important recipes is His perfect recipe for life here on Earth. Out of all the other planets and in every solar system, the only one we know of that can support life is Earth. First, God created our planet exactly the right distance from the sun. If Earth were closer to the sun, creatures would burn up, and if it were farther away, creatures would freeze! Second, Earth has an abundant supply of water. Not only is water available, but unlike most liquids, it freezes on the *top* of oceans, lakes, and rivers first, which allows creatures under that ice to live. Can you imagine if that layer of ice sank? All of marine life could be crushed! Last, our planet needs energy. That energy is supplied in abundance by the sun. Our sun is a star that provides solar energy and heat, and it plays a significant role in photosynthesis, which you'll learn more about later. God knew what He was doing when He created life on Earth!



Step 4: Data and Analysis

A key component of a good experiment is a measurable result. You need something to show for your efforts! The result is proof that you followed every step of the experiment and serves as a visual reminder of your success. This data* shows that you followed your recipe. Scientists document the steps of an experiment by writing descriptions, sketching results, and taking pictures. Charts and graphs are a solid way to provide evidence of your data.*

Example:



Step 5: Conclusion

At the conclusion of your experiment, ask yourself, “Did I follow the recipe and think of an answer to my question? Was my hypothesis correct or incorrect? Is there something I need to do differently next time? Does the experiment need to be repeated?” Even with a failed experiment, a scientist always learns and moves forward. A scientist with a successful experiment takes his information and applies it to the world. How is it helpful? What improvements can be made because of it?

Example:

I was correct in my finding that sunlight is important for plants to live. By day 5 the plant in the closet was droopy, and by day 13 it was brown and shriveled. My original hypothesis was that a plant would die after 2 weeks without sunlight. The result was that although the plant was not dead after 14 days, its health had greatly suffered. This tells me it is important that certain plants

* *Data* is a noun that means “information.” It was originally the plural of *datum*, but both singular and plural constructions are now standard.

not go longer than 5 days without sunlight, or they will suffer severe effects.

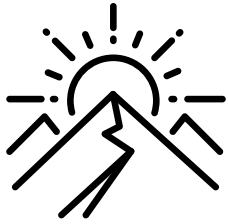
If a hypothesis is repeatedly confirmed through observing and experimenting, the results are called a **theory**. A theory is not a guess but a reliable account of what is happening in the world. This means that each time this experiment is performed, its results are the same. Although science cannot prove anything, repeated experiments with similar results give evidence. A theory that has amassed evidence over a long period of time is called a law, or principle. A **scientific law** has little wiggle room; it is a theory proven over and over throughout many, many years and in a variety of situations. Here are some examples of scientific theories:

- theory of plate tectonics
- theory of relativity
- theory of creation or evolution
- cell theory
- Newton's laws of motion

To sum up, following the steps of the scientific method is important for any scientist. Recording your data makes it easier for the next scientist to verify your results, make small changes, and see the exact steps of the recipe you've followed. It gives scientists a standard process to follow for experimentation, which can lead to theories, laws, and conclusions about the world around us.



A possible conclusion as a result of this experiment would be that plants need sunlight to thrive.



CREATION CORNER

Did you know you have a built-in system for keeping your eyes clean and clear? Your lacrimal glands, found in the corners of your eyes, work to keep your vision clear. Just like a camera or your eyeglasses, the lens of your eye needs protection and care. Your lacrimal glands produce tears, a salty mixture containing electrolytes, water, mucus, and other substances, for several reasons. First, our tears keep our eyes moist, which is necessary for good vision. Second, tears wash our eyes when they are exposed to irritants such as smoke, dirt, or even bright light. Third, our body produces tears when we are emotional. Normally our body makes a small amount of tears—about 2.5 ml. This is enough to keep our eyes healthy. However, when we are emotional, our bodies produce more tears than our eyes need, and they overflow! Every time we blink, our lacrimal glands are at work to keep our eyes healthy.

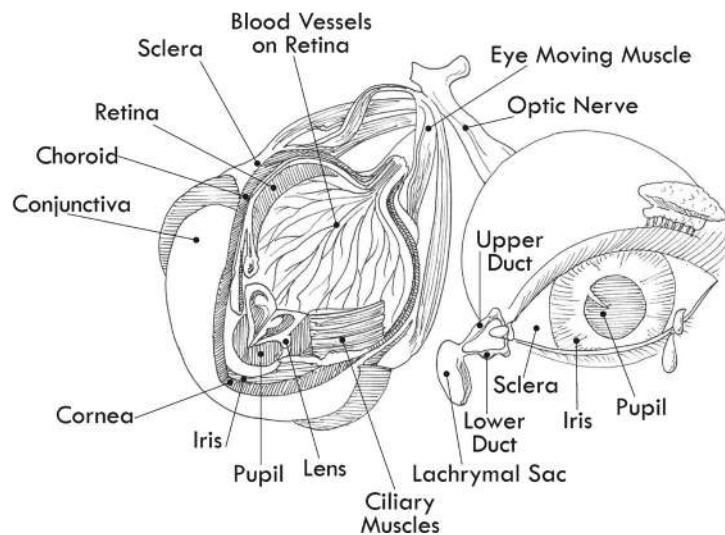


Sight

The fourth sense to explore is sight. A person can live without being able to see, but it makes life more difficult. Humans rely heavily on our ability to see. Our eyes, which are our sight organs, absorb large amounts of information that are then processed by our brains. The part of the eye called the **retina** contains sensors, which are able to detect light. The **lens** and **cornea** help to focus the light. The **iris** controls the amount of light that enters the eye. The **optic nerve** sends the messages to the brain.



Our eyes send images to our brain, which tells us what we are seeing.



Unlike many other animals, humans are able to see color. That tells us that God put all of this beautiful color in the world especially for us!

Hearing

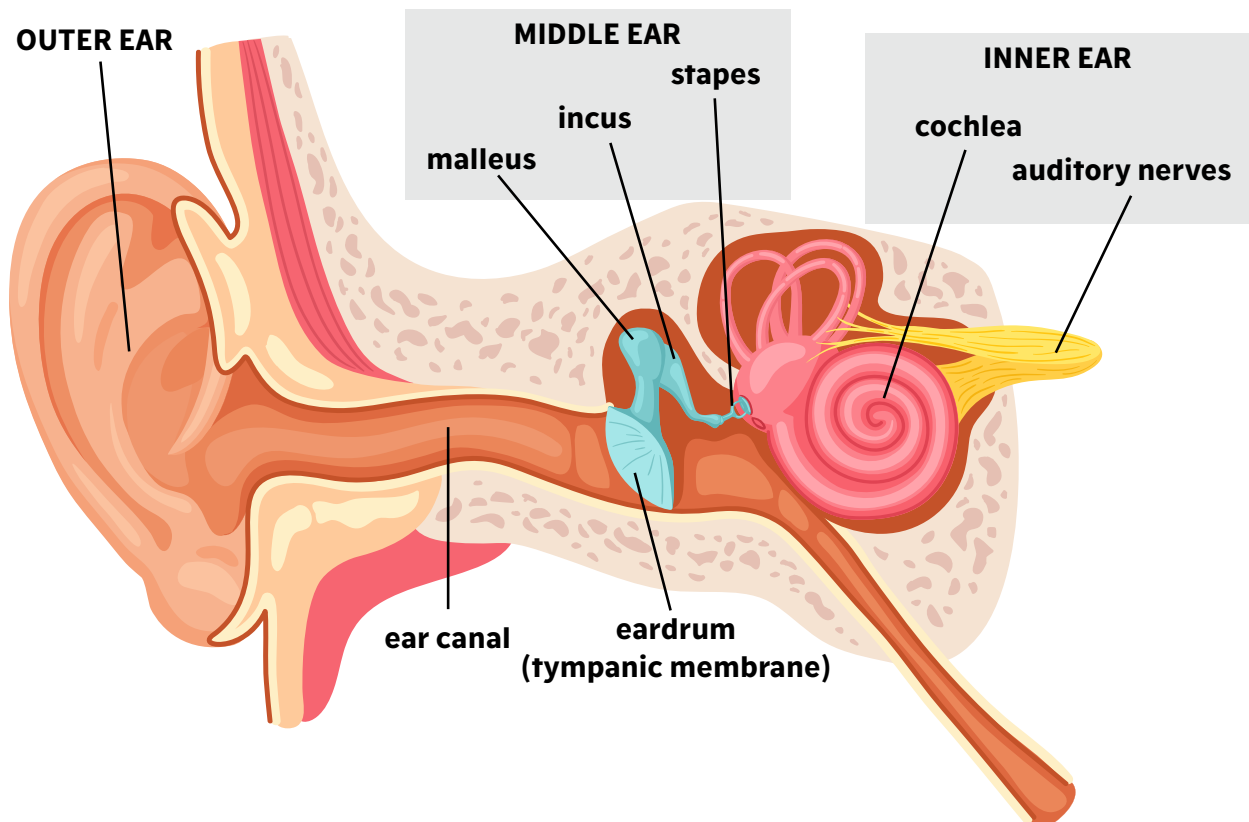
Last, we will look at our sense of hearing. This process is quite amazing. The 3 main sections of the ear include the **outer ear**, the **middle ear**, and the **inner ear**. When we hear a sound, what we actually hear is a series

of **pulses** or vibrations. The ear is designed to receive these vibrations through the opening in the outer ear, pass them through a canal, and then vibrate the **eardrum**, which is a membrane between the outer ear and the middle ear. The eardrum then causes 3 small bones—the malleus, incus, and stapes—to vibrate. This then vibrates the fluid in the inner ear. The **cochlea**—a small, spiral-shaped part of the inner ear—detects these movements and sends the information to the brain through the **auditory nerve**. The brain interprets the sound and tells us what we heard. Considering how fast all of this happens, it is amazing and is more evidence of a master designer!

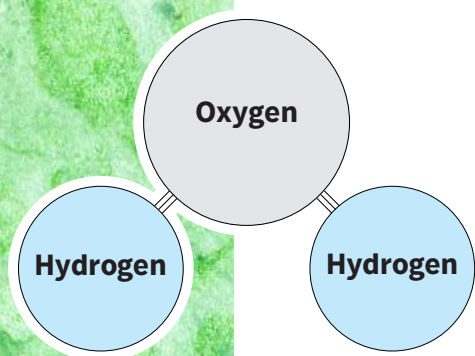


You can see how our outer ears are shaped to catch sounds as they travel by our heads.

ANATOMY OF THE HUMAN EAR



The 5 senses work together to protect us, but they can also add a great deal of pleasure, and sometimes pain, to our lives. They help us to understand all that is going on around us, so it is imperative that we take care of our senses. Using our 5 senses allows us to experience God's creation and enjoy His handiwork. When we do this, we worship Him!



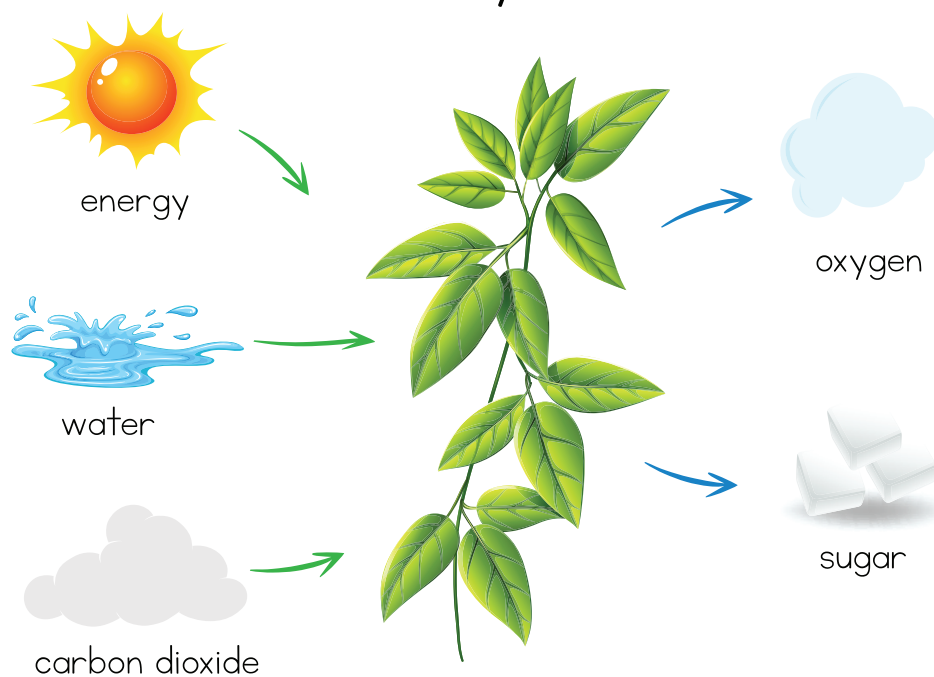
Water is made up of 1 oxygen molecule and 2 hydrogen molecules.

consists of 2 parts hydrogen and 1 part oxygen (H₂O). Plants break down the water and release the oxygen, which other living things use to breathe.

The third ingredient of plant food may surprise you. It is a gas called **carbon dioxide**. *Di* means “two,” and *oxide* means “oxygen.” This means that for every 2 parts of oxygen in a carbon dioxide molecule, there is 1 part carbon. Scientists call carbon dioxide CO₂, which is its chemical formula. CO₂ is the gas that humans and animals breathe out.

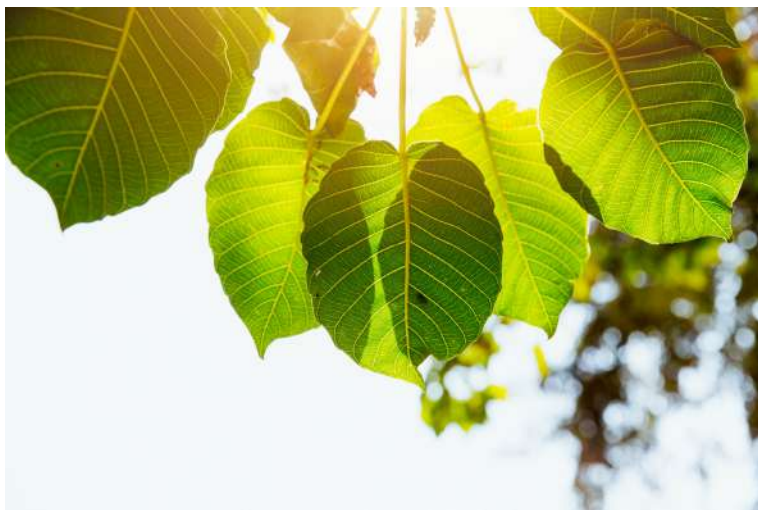
You likely remember that chlorophyll plays a significant role in this process as well. This is the final ingredient. In a plant cell, chloroplasts store the chlorophyll. Chlorophyll is also a **catalyst**. In this case, a catalyst is something that forces something else into motion, causing a reaction to begin. Chlorophyll’s job is to capture energy from the sun to be used in photosynthesis.

Photosynthesis



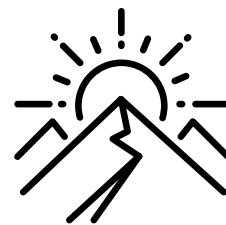
You can see by the arrows that energy, water, and carbon dioxide are needed for photosynthesis.

Two actions occur when chlorophyll puts everything else into motion. First, oxygen is produced from the breakdown of water. As humans, we should be very interested in this process since we need oxygen to breathe. Second, a type of sugar called **glucose** is produced from combining CO_2 into long chains. Glucose becomes the plant's food, and it gives plants the necessary fuel to grow.



Without light, a plant cannot make its own food.

Summing it up, God designed photosynthesis for plants, but this process also benefits humans and animals as it provides oxygen to breathe. When humans and animals breathe, they exhale carbon dioxide, which is what plants need for photosynthesis! It is a beautiful circle and another example of God's care and design for His living creatures.



CREATION CORNER

God created the corpse flower with a smelly way to attract pollinators. This unusually tall plant can grow up to 4.5 m with a bloom of up to 3 m. When the flower finally does bloom every 7–20 years, the bloom lasts for only 2–3 days. Scientists and other observers get very excited when one is about to bloom since it happens so rarely. So how is it pollinated so quickly? The bloom itself emits a strong stench that smells like a rotting corpse! This stinky odor attracts insects like the dung beetle or other meat-eating insects. By the time the insects realize the corpse flower is not decaying food, they have already pollinated the flower.





BUILT LIKE A BIRD

Goal: To recognize the ways that birds' physical differences help them in their environment.

Birds are fascinating creatures. They range in mass from 2 g in the case of certain hummingbirds up to 125 kg for the larger ostriches. Most birds can fly, and, as you have already learned, some can dive into water, and some can even glide in the air for hours at a time. There are more than 8,500 species of birds.

When God created birds, He made sure that they had all the equipment they would need. One special piece of equipment He gave birds is hollow bones. Not all of their bones are hollow, but many are. Can you think of a reason why birds would need hollow



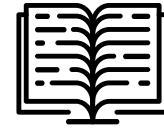
Compared to a human bone (bottom), the bones of birds (top) are much less dense. Lighter bones contribute to a bird's ability to fly.

bones? Well, the main reason is that they help them stay light enough to fly. Even though hollow bones are beneficial, they could make the skeleton weak. For added strength, God designed birds with tiny, crisscrossing, tube-like structures throughout their skeleton. These tubes add great support to the skeletal system and contain air. As a result, a bird's frame is both lightweight and very sturdy. A bird's lightweight bones are called **pneumatic** bones.

God also designed birds with a variety of feather types to help some birds fly. The unique shapes of the feathers as well as of the wings are significant for flight. Some birds even have silent wings; when they flap their wings, virtually no sound is heard. Predatory birds, of course, need this feature because it allows them to swoop in on their prey and catch it unaware. Noisy wings would not help an owl catch a mouse, for example.



Bird feathers have barbs—tiny hooks that keep their feathers from separating.



VOCABULARY

pneumatic
keen
cambered



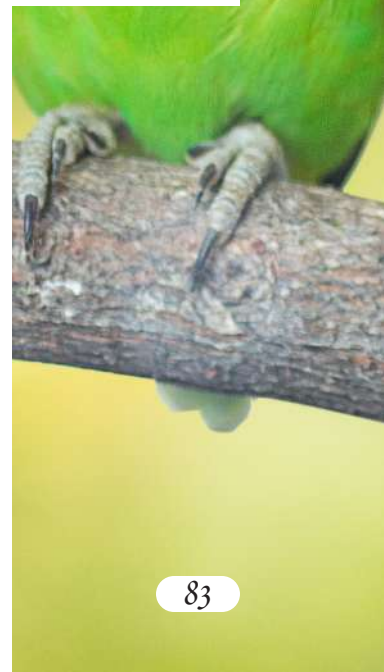
WORD ORIGIN

The word *pneumatic* comes from the Greek word *pneuma*, which means “breath.”



SCRIPTURE MEMORY

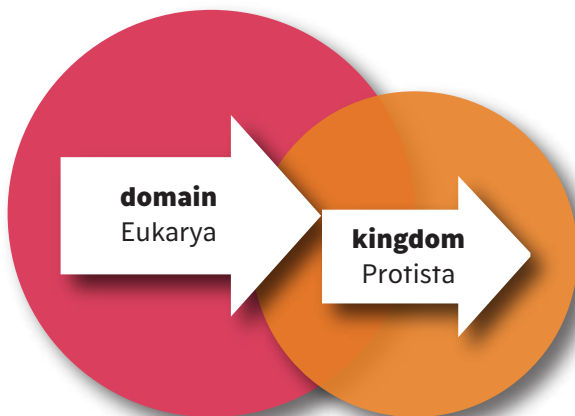
Genesis 1:20: “Then God said, ‘Let the waters teem with swarms of living creatures, and let birds fly above the earth in the open expanse of the heavens.’”



MICROSCOPIC CREATURES

Goal: To learn the contrasting characteristics of the members of the kingdom Protista.

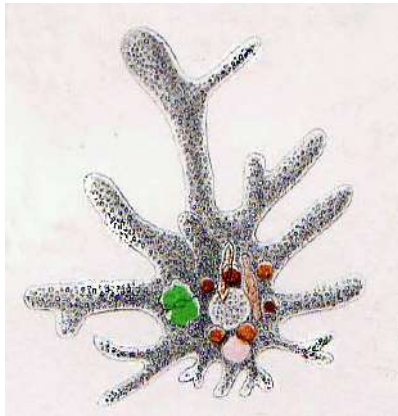
Most people have a junk drawer where they keep items that do not have a regular place. That drawer might include batteries, paper clips, medicine, or nail clippers. Did you know that there are living creatures that do not fall into any of the 4 categories already discussed? These living creatures are not fungi or animals, and they are not plants or bacteria. Some scientists call the kingdom Protista the junk drawer of living creatures because its creatures are very diverse, like the contents of a junk drawer!



One thing members of the kingdom Protista, called protists, have in common is that they are all eukaryotic. That is where the similarities end. Some protists are multicelled, and some have only one cell. Some live on the land, and some live in the water. Some digest their food internally, while others are either parasites or create their own food through photosynthesis. You can see how diverse this kingdom is!

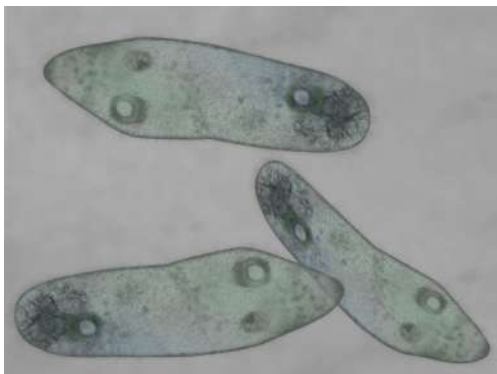
Scientists have divided protists into 2 main categories: protozoans and algae.

Protozoans are one-celled creatures that are often classified by how they move. Because they can move and don't produce their own food, they are known as animal-like protists. One type of protozoan is the **amoeba**, which moves with a **pseudopod**, or a false foot. It uses its pseudopod to reach out ahead of itself and then waits for the rest of its cell to catch up. Amoebas engulf their food to digest it. The cell membrane simply wraps around food and brings it into the cell.

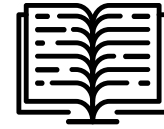


The amoeba moves by extending part of its body out with a false foot.

A **paramecium** moves with **cilia**—tiny hairs that surround it. As the hairs move back and forth, the paramecium moves forward. Paramecia also use their cilia to help them sweep their food into their oral groove, which is like a very simple mouth.



Look closely to see the cilia that enable a paramecium to move.



VOCABULARY

protozoans
amoeba
pseudopod
paramecium
cilia
euglena
algae
symbiosis



WORD ORIGIN

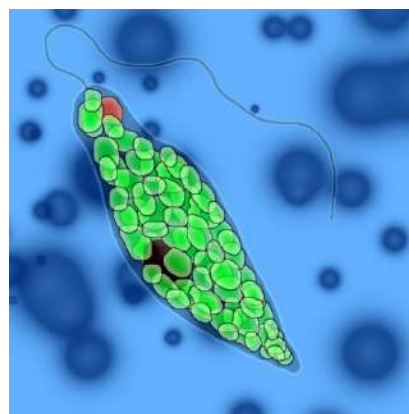
The word *flagellum* is of Latin origin and means “whip-like.”



SCRIPTURE MEMORY

Hebrews 11:3: “By faith we understand that the world has been created by the word of God so that what is seen has not been made out of things that are visible.”

The third type of protozoan is the **euglena**. It moves with a whip-like tail called a flagellum. A euglena has chloroplasts and makes its own food through photosynthesis.



The euglena moves with a whip-like tail.

Algae are also members of the protist kingdom. They are autotrophic, which you will remember means they make their own food through photosynthesis, like plants. Because of this characteristic, they are known as plant-like protists. Unlike plants, however, algae don't have roots, stems, or flowers. They are usually found in water but also can be found on land. An interesting fact about algae is that they often form a symbiotic relationship with other living things. **Symbiosis** is a partnership between living organisms. In most cases of a symbiotic relationship with algae, the partner receives a benefit from the algae. For example, algae produce calcium carbonate that give coral their stiff shape in coral reefs. In return, the algae are often protected.

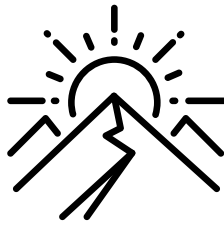


Algae can be green, brown, or red.

If you have ever held a turtle, you have likely touched a type of green algae in the slippery substance on its shell. Algae are often characterized by their color and are not always green. Chlorophyll gives green algae its color,

but some algae are brown or red, depending upon their pigment. Red algae are found in tide pools and coral reefs around the world. Humans even eat red algae in sushi! Red algae are also used in agars, which make up gelatin. Marine creatures feast on brown algae, and some communities harvest it for humans to eat. God created even algae for a reason!

Scientists continue to learn about the creatures that make up this diverse kingdom. It contains organisms with so many different characteristics: some that make their own food, some that eat other creatures, and some that are even parasites. Kingdom Protista is a good reminder of God's amazing creativity. Our God has considered everything needed to sustain life in our wide world, from the largest creatures to microscopic organisms. They work together to maintain a balance in the food chain, in their own habitats, and in our lives.



CREATION CORNER

One interesting type of algae is pink snow algae that thrives in moist, freezing weather. You might think that this is a type of red algae, but it is actually a type of green algae that makes snow appear red or pink. This green algae has chlorophyll *and* a type of red pigment that helps it absorb light from the sun and protects the chloroplasts from too much light. If you shoveled into a pile of pink snow algae, you'd see green algae. Pink snow algae is also called watermelon snow and is even reported to have a slightly watermelon taste.



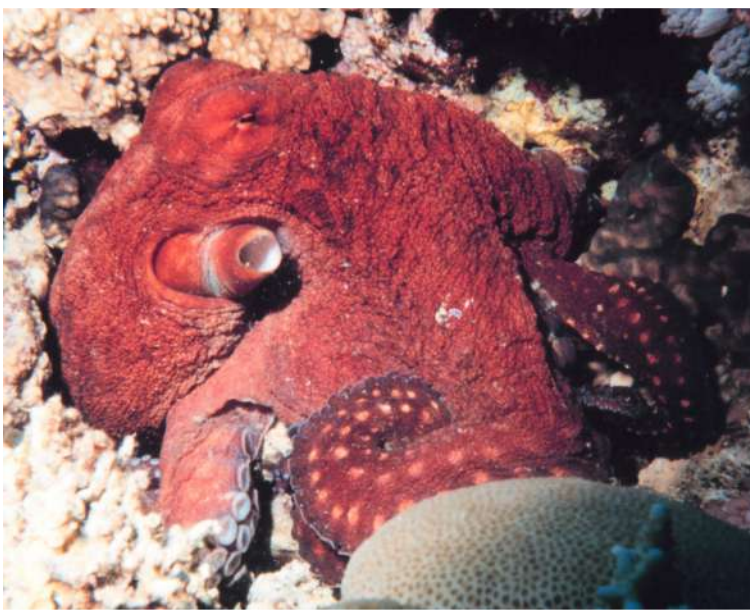


Many people like to eat clams—without their shells, of course.

The second largest class of mollusks is the **bivalves**. These creatures are called bivalves because *bi* means “two.” Bivalves have 2 shells that are usually hinged on 1 side. Oysters and clams are both in this class.

Tooth shells, which are sometimes called tusk shells, are the third largest class in phylum Mollusca. The reason they are sometimes called tusk shells is that they resemble elephant tusks in appearance. They feed on smaller organisms like bivalves, and they can use their tusks to open a bivalve’s shell.

Chitons and cephalopods are the last 2 classes of mollusks. Chiton shells have 8 movable parts and resemble a knight’s armor. **Cephalopods**, on the other hand, may or may not have shells. The shells can be on the outside (as in the chambered nautilus) or on the inside (as in squid). Octopuses are cephalopods that do not have shells.



Octopuses do not have shells for protection.

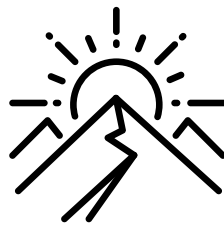
Two well-known members of the cephalopod class are the octopus and the squid. The giant squid is the largest of all invertebrates and can weigh over 862 kg. This is quite a bit larger than the smallest mollusk that weighs less than 30 g! Perhaps the most intriguing cephalopod is the **chambered nautilus**. Humans rarely see this mysterious creature because it lives in very deep waters. God created the chambered nautilus with the ability to rest on the ocean floor during the day and then rise at night for feeding. It is called chambered because the inside of the shell is sectioned off like the rooms of a house.



The nautilus is a cephalopod with a spiral-shaped shell.

A tube connects these rooms and forces water out of the shell, which makes the shell **buoyant** (able to float).

God's designs truly are remarkable. Even though oysters, clams, and the chambered nautilus may seem unimportant to us, God has taken care of them down to the smallest details.



CREATION CORNER

Scientists know relatively little about the giant squid that live deep in the ocean, making them difficult to study. Almost all data comes from giant squid that have washed up on shore. However, we do know that the word ***giant*** is not an exaggeration. This creature has 8 arms and 2 feeding tentacles, and it can stretch to over 12 m! Its main body part is called a mantle, and under the mantle are the eyes and beak. A giant squid's eyes can be as large as a dinner plate. This feature allows it to see fish and other prey in deep, dark water. Its arms are lined with strong suckers, and its feeding tentacles can shoot out up to 9 m. God created the giant squid with a funnel under its mantle to pump water, lay eggs, and squirt ink at its predators!

