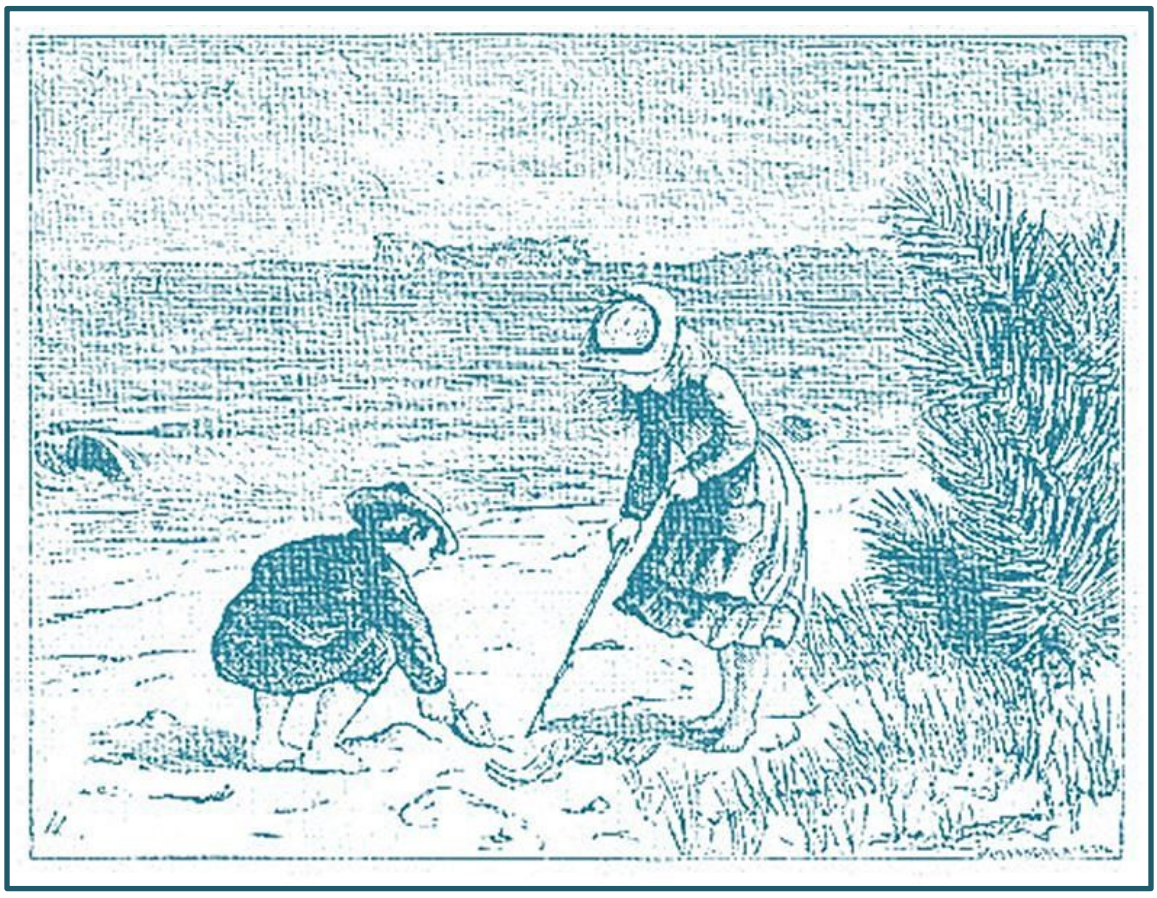
By the Shore & In the Sea



Holiday Shore by Edith Patch and *Pagoo* by Holling C. Hollings are the books upon which this guide is based.

~A Guided Study by Lisa Kelly~

Please read these notes.

Author's Notes

When using this guide, the greatest emphasis should be placed on using it in a manner that is best for the student(s). It is designed to be flexible enough to use with children from ages 7 to 9, but please adapt as needed. This makes it appropriate for young children of varying reading, skill and interest levels as well as helpful for combining younger children together, particularly children in the Foundations level.

The narration suggestions listed in the section under "After the Reading" reflect these variations. Some children will need only the gentlest and lightest of narrations suggestions with little to no writing, while other children will need narration suggestions which include more writing or digging deeper into creative or reflective style narration suggestions.

Multiple suggestions are offered so that the teacher and the student can choose one (or sometimes two) from a variety of suggestions. Please do not expect your students to respond to all of the narration prompts listed under each reading.

Oral narrations are the primary method for building attention and composition skills. In general, narrating orally should be the method used on most days and for most subjects, particularly for this level. The narration suggestions included offer a variety of ways for the teacher to allow the students to tell what they know orally as well as offer some ways for alternative approaches-such as written, dramatic/role play, descriptive and creative. These alternative approaches need only be used occasionally –or as children show interest.

Feel free to adapt any narration suggestion as needed. An older student may have an interest in a narration suggestion which can be altered to make it more appropriate, such as turning a suggestion meant to be given orally to one that is written.

If you have any questions, comments or concerns, please feel free to email me though the contact section of the website or send me a message through Instagram.

Thank You,

Lisa Kelly

Teaching Notes

Design & Duration –this guide was designed to be used with students in Lower School B (Years 2-4) or with students within this same year range. This guide is meant to extend over the course of 2 terms or 24 weeks (3 lessons per week). You may, of course, alter this plan to better fit your family. Lower School B students will go on to study another topic lasting for 1 term or 12 weeks.

Flexibility –this guide is meant to be flexible, allowing students from ages 7-9 to work together through it. The pages which are meant to be printed and consumed by the students will be contained in an additional PDF file at the website for your convenience. You may print as many as you need for your family, allowing families to easily use the guide with multiple students. Please adapt the guide as needed to best fit each of your students, keeping expectations in writing and details lower for younger children and adding in optional activities and raising expectations in writing and drawing work for older students.

Living Books, Observations and Demonstrations –this guide is based on living books with additional demonstrations, object lessons and activities. The latter provides the necessary opportunities to learn though observation and demonstration. Feel free to adapt these activities and demonstrations as needed.

Notebooks –you may wish for your students to record their notes and drawings into a notebook. If you wish to do this, then you may omit some of the printable, consumable pages as this may be unnecessarily repetitive. Your student could simply label their drawings rather than the printable page.

Specimen Study –there are several object lessons which revolve around **live or dead** specimens. Please feel free to alter these as needed. I included some objects lesson from various books which led the study of these specimens, but you can certainly change them as they best work for your family. Your family may prefer to study these animals in their natural settings or at an aquarium. If you choose to do it this way, then you may wish to combine some of the studies together into one day, assuming that you may only be able to make a special trip to these locations once or twice. If both options are not possible, then make use of available online resources, books and documentaries. **If you choose to use live specimens, then please be sure that adult supervision is on hand for the experience.**

Nature Experiences and Field Trips –if possible, it would be very beneficial if your family could visit a beach, aquarium or other similar location so that your students can experience marine life personally.

Book List

Holiday Shore by Edith M. Patch [Yesterday's Classics]

Pagoo by Holling C. Holling

Oceans by Seymour Simon

Who Eats What? : Food Chains and Food Webs by Patricia Lauber

Karl, Get Out of the Garden: Carl Linnaeus and the Naming of Everything by Anita Sanchez

Optional Book List

The Burgess Seashore Book for Children by Thornton W. Burgess

Coral Reefs by Seymour Simon

Dolphins by Seymour Simon

Whales by Seymour Simon

One Small Square: Coral Reef by Donald Silver

One Small Square: Seashore by Donald Silver

*Graywing*s by Alice E. Goudey

Life in a Tidal Pool by Alvin and Virginia Silverstein

Along the Seashore by M. Buck

Sylvia Earle: Guardian of the Sea by Beth Baker

Far From Shore: Chronicles of an Open Ocean Voyage by Sophie Webb

Life in the Ocean: The Story of Oceanographer Sylvia Earle by Claire A. Nivola

Interrupted Journey: Saving Endangered Sea Turtles by Kathryn Lasky

Reading & Lesson Schedule

Week #	Day One	Day Two	Day Three
1	L1-Introduction to Classification + *Karl, Get Out of the Garden*	L2-Animal Classification	L3-Photosynthesis
2	L4-Food Chains & Food Webs + *Who Eats What?*	L5-Food Chains I	L6-Food Chains II

Lesson 1/Introduction to Classification

Imagine being transported to a new planet, one in which no one had ever known of before now. Now pretend that people back on Earth want you to describe what you see. How hard would this be if everything you saw did not have a name yet?

Now imagine someone emptying a box of an assortment of many toys on a table. Pretend this person has asked you to organize the toys so that each of 6 children could have a set in which its components were similar in some way. How would you begin? (Maybe one group contains only toys which move, while another contains only action figures.)What would you do next? Do any problems arise? What do you do now? These are the types of questions a scientist must ask and answer as they try to solve a problem, answer a question or find a method which fulfills a request.

Note: If your students need more scaffolding with this concept, then consider having them actually sort an assortment of small toys. Let them experience the need to reorganize because a chosen category label presented too many problems to complete the task. However, don't let this become too stressful. Your students should enjoy this!

1. Have your students help you write a list of some very different animals and plants. Remember: Plants include trees, flowers, mosses, etc. and animals include birds, fish, insects, reptiles, etc. Let them notice that the list was created by speaking and writing the names of these plants and animals. (Even you, as the teacher, wouldn't know what to write unless it had a name and the students wouldn't know what to call it without a name.) How did we come by these names?

2. Refer back to the list of plants and animals you've just created. Ask your students, which are plants and which are animals? How are plants and animals different?

Answers may vary: most plants can make their own food; animals must obtain food for energy; animals can move around; plants generally cannot move around, etc.

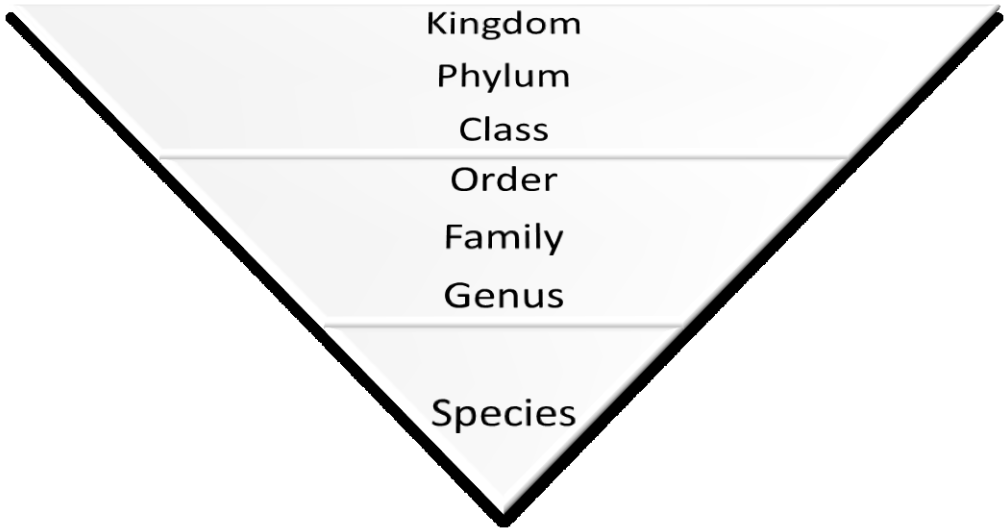
3. How are they alike?

Answers may vary: both need water; both grow; both are living organisms; both depend on the sun's energy, etc.

3a. <u>Optional:</u> Use the questions from #2 and #3 and their answers to create a Venn diagram which illustrates the differences and similarities between plants and animals. One circle would be labeled "Plants" and the other circle would be labeled "Animals". Be sure there is an overlap or intersection of the two circles. An older student can create their own Venn diagram for their notebook. They can use a lid or bowl as a template to trace around with a pencil to create quality circles. A compass might also be helpful. Be sure they fill in their diagram and give it a title.

Answer Key for Venn Diagram: Plants-most plants make their own food; plants generally cannot move around; Animals-animals must obtain food for energy; animals can move around, Intersection-both need water; both grow; both are living organisms and both depend on the sun's energy

Science Words to Know



- Read *Karl, Get Out of the Garden: Carl Linnaeus and the Naming of Everything* by Anita Sanchez

Before the Reading

- Is it easier to find a missing toy when your room is messy and chaotic or clean and organized? Creating order through arrangement makes identification easier –especially in science.
- Locate: Sweden and Lapland.
- Be sure to read pp. 42-end as they serve as good teaching notes, but you may also wish to read them aloud as well.
- Anita Sanchez, the author of this book, suggests this mnemonic for remembering the degrees of classification: "Kangaroos Play Cellos, Orangutans Fiddle, Gorillas Sing".

After the Reading

- What problem did Karl identify? Explain why it was a problem and what Karl hoped to do to solve it.
- Tell about Karl (Carolus Linnaeus) and his life.
- "Truth ought to be confirmed by observation," Karl said. Explain what is meant by this. How does Karl devise his system of classification? How does he try to ensure that it is correct?
- How do scientists initially respond to Karl's new ideas? How did they respond later?
- Give an account of the significance of Karl's classification system.

Alternate Book Suggestion

Benny's Animals: And How He Put Them in Order by Millicent E. Selsam

Additional Activities

* The Linnean Society of London offers teaching resources, including a free poster of Carl Linnaeus, which is linked at the website.

RY3, Science and Nature Study: Marine Biology

Teaching Notes

Scientists use the classification system as a process to sort and identify known living organisms as well as for organizing new ones as they are discovered. This system is helpful as a structure for making comparisons between species, showing how they are similar and different from each other. It also allows relationships between species to be seen. The science of classification is **taxonomy** and is usually used in biology and paleontology.

Carl Linnaeus is often thought of as the "father of modern taxonomy", since it is he who developed this **hierarchical** system. It is hierarchical because it moves a specific organism from its broadest and largest group down to its most specific group –its genus and species.

It was important to Linnaeus for each organism to have its own scientific name, since common names varied from location to location and sometimes an organism had more than one common name. It was often very confusing. An organism with its own specific, scientific name allowed for scientists all over the world to better communicate about it.

Lesson 2/Animal Classification

~Discussion~

1. Write a new list of just animals-many, different animals. Teacher: Be sure you help your students think of animals which are invertebrates to include in this list.

Kingdoms are divided into groups called phyla. The Animal Kingdom has many different phyla and often these are organized as vertebrates (animals with a backbone) or invertebrates (animals without a backbone). The Plant Kingdom is also divided into phyla, but this will not be studied in this guide.

2. Which animals from your list do you think are vertebrates? Which are invertebrates? Go through the list and mark the vertebrates with a "V" and the invertebrates with an "I".

3. Write the vertebrates in their own new list. Study this list. How might we arrange these animals into even smaller groups?

Phyla are divided into groups called classes. The Vertebrates can be divided into 5 main classes: Mammals, Bird, Fish, Reptiles and Amphibians.

What distinctions can be made about these classes?

4. Complete the printable table "Characteristics of the Vertebrates" with these 5 classes as divisions. Arrange your list of vertebrate animals into these categories.

Answer Key: Mammals give live birth to their young and nurse them with milk, are warm-blooded, have lungs and often have hair or fur. Birds have feathers, have lungs, their young are hatched from eggs and are warm-blooded. Fish are cold-blooded, have scales, have gills and their young are hatched from eggs. Reptiles have shells or scales, are cold-blooded, have lungs and hatch their young from eggs. Amphibians are cold-blooded, have gills or lungs, have smooth body coverings and their young are hatched from eggs.

5. Create a new list by selecting all of those previously marked with an "I" from your initial list (See #2). Label this list "Examples of Invertebrates".

There are many different classes which would fit under the grouping of Invertebrate such as, Mollusks, Echinoderms, Crustaceans, Arachnids, Insects, etc. We will be discussing several of these classes in more depth over the course of this guide.

6. Let's go back to the Kingdoms again! How many different Kingdoms are there? Write their names on the board. We will spend most of our time studying the Animal Kingdom with our study of Marine Biology.

The Kingdoms are often divided into 5, 6 or 7 different groups, depending on who is teaching, using or studying it. I use the 6 category system, but please adjust as you wish.

The Six Kingdoms include: Plants, Animals, Protists, Fungi, Archaebacteria and Eubacteria, with the latter two sometimes joined into one group (Monera) and leading it to the 5 division group.

~Activities~

Activity 1

Have your student use the following cards: "Animal Classification Sorting Cards" to classify animals. These cards can be reused throughout the two terms of Marine Biology, as needed. After cutting the cards out, use the heading labels to set up the categories and the animal picture cards can then be sorted according to the headings.

Activity 2

Print "Characteristics of the Vertebrates" for your students to complete. This printable corresponds to #4 under Discussion [See previous page].

Activity 3

Read the following from *Chatty Readings in Elementary Science*:

Note: Be sure to read this after the lessons from the previous pages have been completed first. This approach allows for the students to arrive at some of the classification structures by themselves. This excerpt will serve as reinforcement.

The Scale of Animal Life

1. We now begin to see that there is a scale of animal life, starting with the highest animal, man, and coming down gradually to the lowest forms of animal life.

2. The Animal Kingdom is divided first into two parts. The higher half includes those animals which have skulls and backbones. The lower division takes in all those creatures without backbones.

3. In the higher division there are five classes of animals. First, the mammals, which are warm-blooded, and seem to be more or less covered with hair or fur. Secondly, the birds, which are also warm-blooded, but are produced from eggs and are covered with feathers.

4. Thirdly, the reptiles, which are produced from eggs, but are cold-blooded; they breathe by lungs and are sometimes covered with scales or plates. Fourthly, the double-lived creatures, such as frogs

and toads, which live both on land and in, water; these are produced from eggs and are cold-blooded; they breathe by gills when young and by lungs when mature. The fifth and last class of the higher animals is that of the fishes, which are cold-blooded and breathe by gills.

5. Of the second division of the Animal Kingdom are those creatures without backbones. There are two kinds of well-known creatures which have no backbone. First there are the "jointed animals," and secondly the "soft-bodied animals."

6. We know that soft-bodied animals have to be protected by shells, and that these outside shells give the shape to their bodies, quite as much as an inside skeleton of bone work might do. Their bodies, having no skeleton, are so soft that they have to be protected by an outside shell. Some have two shells, or two valves, and hence are called "bivalves," such as the oyster, the scallop and the mussel. Some have but one shell in a single piece, and are therefore known as "univalves," as the periwinkle and the whelk.

7. We have also learned something of the jointed animals, as the spiders, insects, crabs and worms. Of jointed animals there are five great classes: the worms and leeches with bodies made up of rings without limbs; the centipedes made up of rings with many pairs of legs; the crusted animals; the spiders with four pairs of legs; and the insects with three pairs of legs. All of them have bodies made up of rings jointed together. In many cases these rings may be easily seen with the naked eye.

8. Among the jointed creatures has been named the class of "crusted animals." To this family belong such creatures as crabs, lobsters and shrimps. Instead of a shell, these animals have a kind of crust or armor to protect their soft bodies; they are all water-breathers.

9. Then there is another group; these are the rayed animals, or those that spread out in rays from a center, as the starfish does. Jellyfishes and zoophytes belong to this group of rayed animals.

10. Zoophyte is simply a hard-looking word which stands for "plant-animal," a name which reminds us that once they were supposed to fill the place between animals on the one hand and plants on the other. They really do look very much like growing plants, and yet they have a mouth and a stomach, and feed as animals do.

11. Those boys and girls who are fortunate enough to have a trip to the seaside in the summer holidays may take a stroll along the seashore to pick up seaweed, and to search for pretty shells. If they come to any rock pools, they may hunt for some of those wonderful animals which we know by the name of sea anemones.

~Adapted from *Chatty Readings in Elementary Science* by Longmans, Green and Co.

Lesson 3/Photosynthesis

Photosynthesis is a long word to describe the process by which plants use carbon dioxide, water and light energy from the sun to make their own food. "Photo" means light and "synthesis" means to put together, so plants put together the energy from light with the other ingredients they need and make food.

Science Words to Know

- carbon dioxide
- oxygen
- photosynthesis
- veins
- chlorophyll

What is **carbon dioxide**? It is a compound made up of the elements carbon and oxygen. It is found in the air and is an invisible gas which cannot be seen. We and other animals breathe carbon dioxide out when we exhale. It can be seen in bubbly sodas or soft drinks which are carbonated.

What is **oxygen**? It is an element we and other living things need to live. Plants give out oxygen as a byproduct of the process of photosynthesis and it goes into the air, giving us the oxygen we need to breathe.

Read the following excerpt from *Botany* by John and Dorothy Paull:

What Plants Need

Plants, like all living things, need air, water, warmth and light. You can prove that plants need light by growing garden peas in small plastic pots, some in sunlight and some in dark, lightproof cupboards or boxes. All the peas will grow at first, and the peas in the dark will grow taller than those in the sunshine because they are searching for light. If the cupboard is lightproof, then the peas will die. The other peas carry on growing because their leaves trap the energy of the sunlight use it to make food. Can you think of other experiments that prove plants need *water* to live? Can you think of other experiments that prove plants need *air* to live?

One of the miracles of life is the way green plants use energy from the sun to make food. Green plants make food in their leaves by a process called **photosynthesis**.

Plants need **light**, **carbon dioxide** from the air, and **water** and salts from the earth. Each leaf works like a tiny factory. Each one contains special cells which change the carbon dioxide and water into a form of sugar, using sunshine energy. At night, plants do not manufacture food. They keep alive by getting energy back from some of their own sugars, which were made during the daytime.

The green color in the leaves is a substance called **chlorophyll**. It is this which captures the energy from sunlight which is needed to make the sugars. Photosynthesis also makes **oxygen** as well as sugars for the plant. This oxygen goes back into the air and replaces the oxygen which animals breathe in. Without it we would not be able to stay alive.

The green leaves manufacture food for the whole plant. Any surplus sugar is changed into starch which is stored, usually in the leaves. During the night the starch changes back to sugar and is carried by the **veins** away from the leaves. Extra food that is not used immediately by the growing and working parts of the plant is stored for future use in the stem or roots. Some is also kept in the leaves, the fruits and the seeds.

Illustration of Photosynthesis

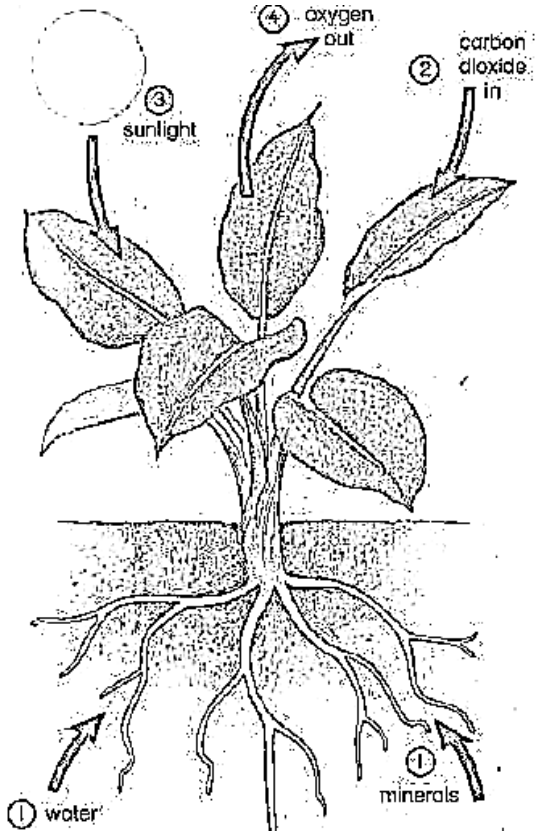
1. The plant roots take up water and minerals from the soil.

2. Animals breathe out carbon dioxide, which plants use to make food. The leaves take in carbon dioxide from the air.

3. The chlorophyll in the leaves uses sunlight to turn the water, minerals and carbon dioxide into sugary food.

4. As they make food, plants give out oxygen, which all other living things need.

~From *Plants* by Anita Ganeri



~Activity~

Have your student complete the following page which illustrates photosynthesis.

Lesson 10/*Holiday Shore*

- Read Chapter 1: "Welcome to the Shore"

Before the Reading

- Have you ever been to shore? A beach? Tell about this.
- Distinguish between a cove and a bay.
- Advise children to always check with parents first before handling plants or animals.
- The tide will be studied in later lessons.

After the Reading

- Tell about some of the animals you might meet at Holiday Shore.
- Draw a picture of what you think Holiday Shore might look like. Give your picture a title or caption and share it with someone, telling about it.
- Write or dictate to you teacher a list of all the plants and animals you might see at Holiday Shore. Put a check by those which you have already met. Tell about 1-2 of them. Put a star by one that you would really like to learn more about. What would you like to know about it?

Lesson 14/*Pagoo*

- Read Chapter 1: "Pagoo *Might* be a Hermit Crab"

Before the Reading

- What do you know of plankton?
- Words to Know: diatom, algae, plankton –zooplankton and phytoplankton
- Distinguish between copepod and zooplankton.

After the Reading

- Locate the following list of animals using page 10 as a reference: baby crab; spiny lobster; baby squid; young shrimp and young barnacle.
- Tell how Pagoo can survive even without his parents around to show him what to do to live.
- Draw a picture of young Pagoo using pages 8-9 as a guide.
- Create your own underwater scene on thick or watercolor heavy paper. Draw pictures of diatoms and copepods using this chapter as a guide. Color your pictures in completely in bright crayon colors, leaving the water portion alone. Now paint over your entire picture using watercolor paints in blues and greens. The pictures colored in crayon will resist the color of the watercolor paint, leaving a beautiful underwater scene.