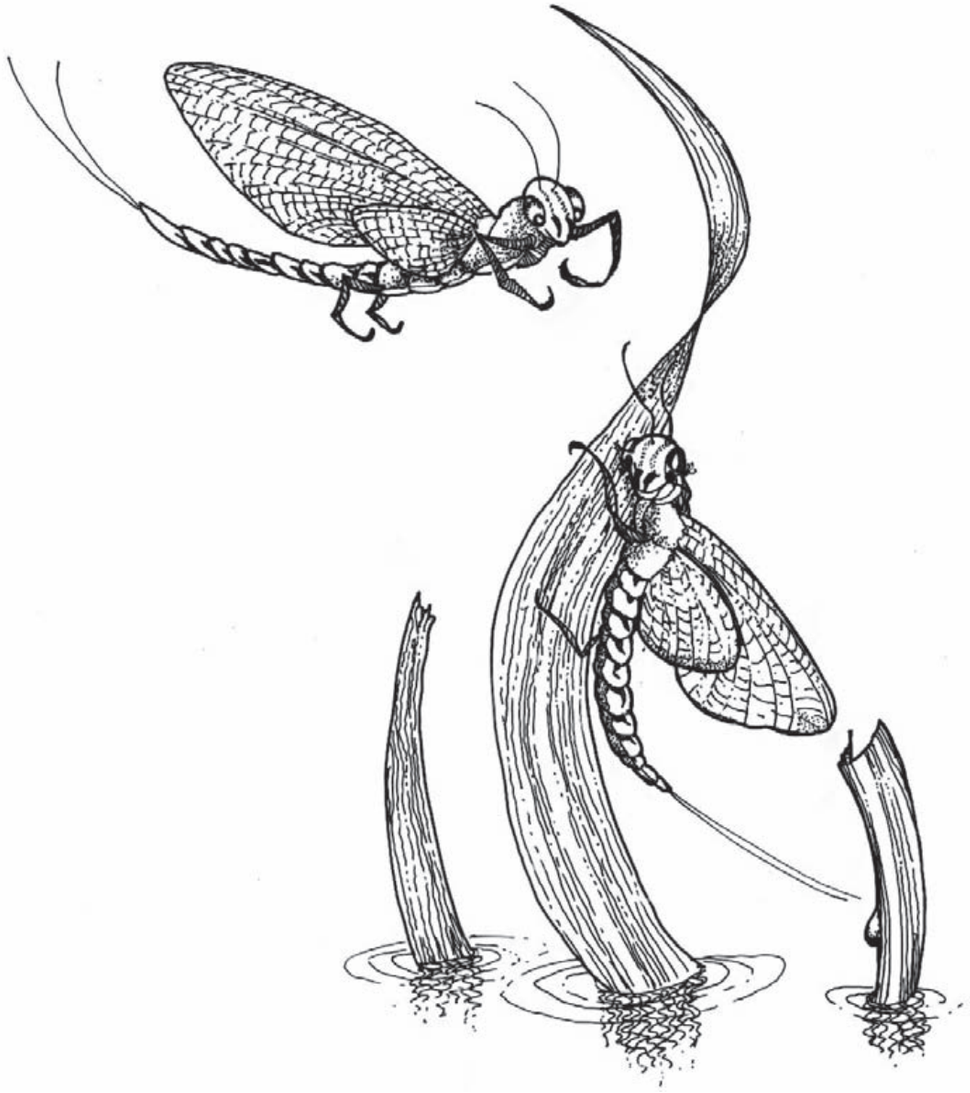
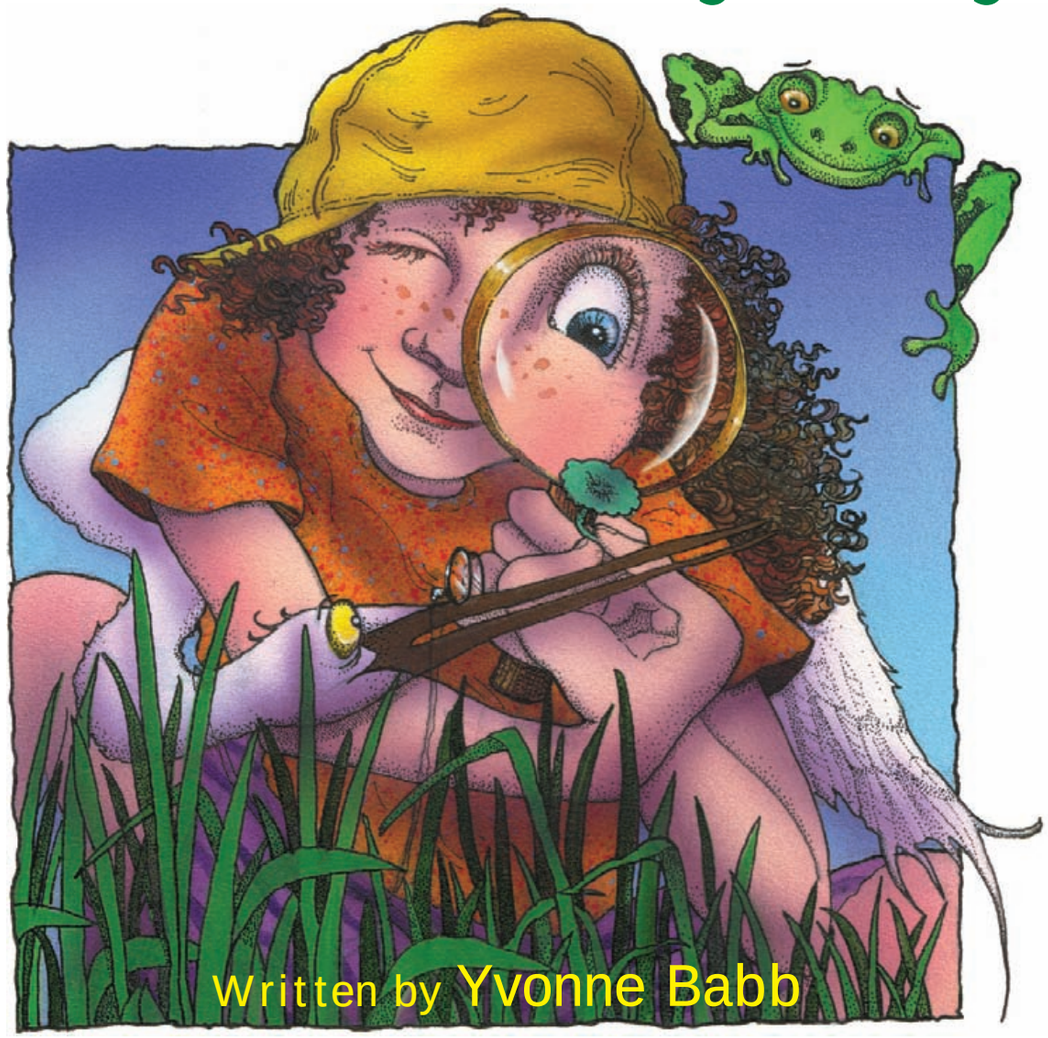


Sonia Solves the Food Chain Mystery



Written by Yvonne Babb

Illustrated by Laura Beatty & John Fehling

The Southwest Florida Water Management District is responsible for ensuring that lakes within its boundaries remain healthy. Stormwater runoff is the most serious cause of surface water pollution in Florida. Loose soil and other particles carried by storm water can clog lakes, streams and rivers. Nutrients washed into surface waters from fertilized lawns and other sources cause aquatic plants to grow more rapidly than usual. As these plants complete their life cycles, they decay and consume oxygen needed for fish and other aquatic life.

One common way to protect a water body is to leave native plants and shoreline vegetation along a lake as a buffer zone. Plants and their root systems slow the rate of surface runoff and help prevent erosion. Plants also help filter out pollutants before the stormwater runoff reaches water bodies or has a chance to seep into aquifers.

Children reading this book will follow Sonia as she unravels the food chain mystery. By learning the importance of shoreline plants and their effect on the food chain, students will learn to protect Florida's water quality, as well as the wildlife and people depending upon it.

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would mean more food for all of them.

Great Egret strutted through the new plantings. He snapped up a bluegill darting among the pickerelweeds. Then, before flying off, he cocked his head at Sonia and winked a thank you.

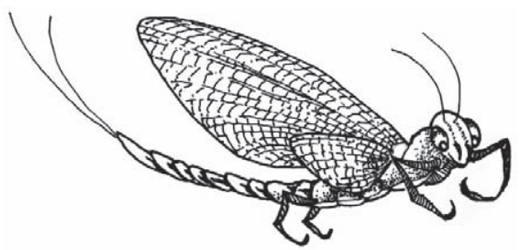
Sonia winked back with a smile. She settled down on the beach and wrote in her journal:

"But how will I be able to swim if we replant Auntie's beach?" asked Sonia.

"Some folks share a swimming beach with their neighbors. Some clear only a narrow strip of plants. That way they can enjoy swimming and fishing and bird watching, too!" Mr. Skimmer replied. "It's a compromise, but we all need to remember — if Great Egret's food chain is healthy, then so is ours."

When their work was finished, they stood back to enjoy the view. Red-winged blackbirds chirped from the cattails. Cricket frogs clicked in unison, and a pair of ducks dove under the water to fish. They all seemed to know that repairing Egret's food chain

Sonia Solves the Food Chain Mystery



Dedicated to Cory and Emory Babb
Written by Yvonne Babb, illustrated by Laura Beatty and John Fehling
Printed by the
Southwest Florida Water Management District
Brooksville, Florida
First printing 2001
Third printing 2006

Florida elementary teachers may use this book to teach the following Sunshine State Standard Science Benchmarks:

SC.F.1.2.2 (knows how all animals depend on plants; i.e. the food chain)
SC.G.1.1.2 (knows that plants and animals are dependent upon each other for survival)
SC.G.2.2.1 (knows that all living things must compete for limited resources)

Credit goes to the following individuals who contributed and assisted in editing this document: Cory, Emory and Geoffrey Babb, Sandra Anderson, Susan Awbrey, Beth Bartos, Barbara and Lena Connor, Pete Colverson, Carlos de la Rosa, Laura Beatty, John Fehling, Caley and Aisha Beatty-Fehling, Emily Rhoads Johnson, Martha Geils-Smith and family, Beth Geils, Sally Knight, Carol Crews, Pat Hall, Mary Lou Helwig, Marty Mann, Bill Marstin, Mary Ellen Miller, Randy Portwood, Sandy Schlichting and Melyssa Stone.

Egret slid into the cattails as he saw Mr. Skimmer approach.

"Hello there, Sonia," he called. "Are you back to catch another fish?"

"No, I'm just wondering about food chains," said Sonia. "Since people eat fish, are they a part of the food chain, too?"

"What do you think?" asked Mr. Skimmer, peering over his glasses.

"Hmm, we better go replant Auntie's beach," said Sonia thoughtfully. "Will you help me?"

Mr. Skimmer's eyes sparkled. He smiled so wide, Sonia thought his teeth would pop out.

Sonia and Mr. Skimmer gathered pickerelweed, duck potato and pennywort plants that had washed ashore from the last storm. Then they carried them over to Auntie's cleared beach.

Mr. Skimmer showed Sonia just where each plant liked to grow. As they worked, he told her how plants provide food, air and shelter for the animals in the lake. He paused, "Sonia, shoreline plants are the best way to keep the food chain healthy and the lake clean."

Chapter 1

At the Beach

Sonia woke up and peered out the cabin window at the lake. She could hardly wait to see the beach Auntie had cleared for swimming.

Sonia decided this vacation was going to be the best one ever!

After breakfast, Sonia went down to the lake to feed the birds, carrying her journal in one hand and a box of Early Bird cereal in the other. Soft, white sand tickled her bare toes as she skipped toward an old weathered bench and sat down. The beach is cleaner than ever, she thought. Without all those pesky weeds in the water, I can swim out to the dock. She opened her journal and drew a picture of herself swimming.

Kuurr... kuurr. Sonia looked up and saw an elegant bird. It arched its white wings, then dropped its black legs. SWOOSH — it landed in the shallows. As it stalked the water's edge, it eyed Sonia and then stopped. Sonia set down her journal and grabbed the cereal.

"Here birdie," she called. "Here birdie, birdie. Want some cereal?"

The bird looked at her and scoffed, "Cereal — bah! I'm no duck. I am Great Egret. I'm looking for lean protein, Missy, not dry crunchy stuff. I eat fresh fish — like small bass or bluegills."

"I know where to find fish," said Sonia, trying to be helpful. "There's a catfish restaurant down the road. On Fridays, it's all-you-can-eat!"

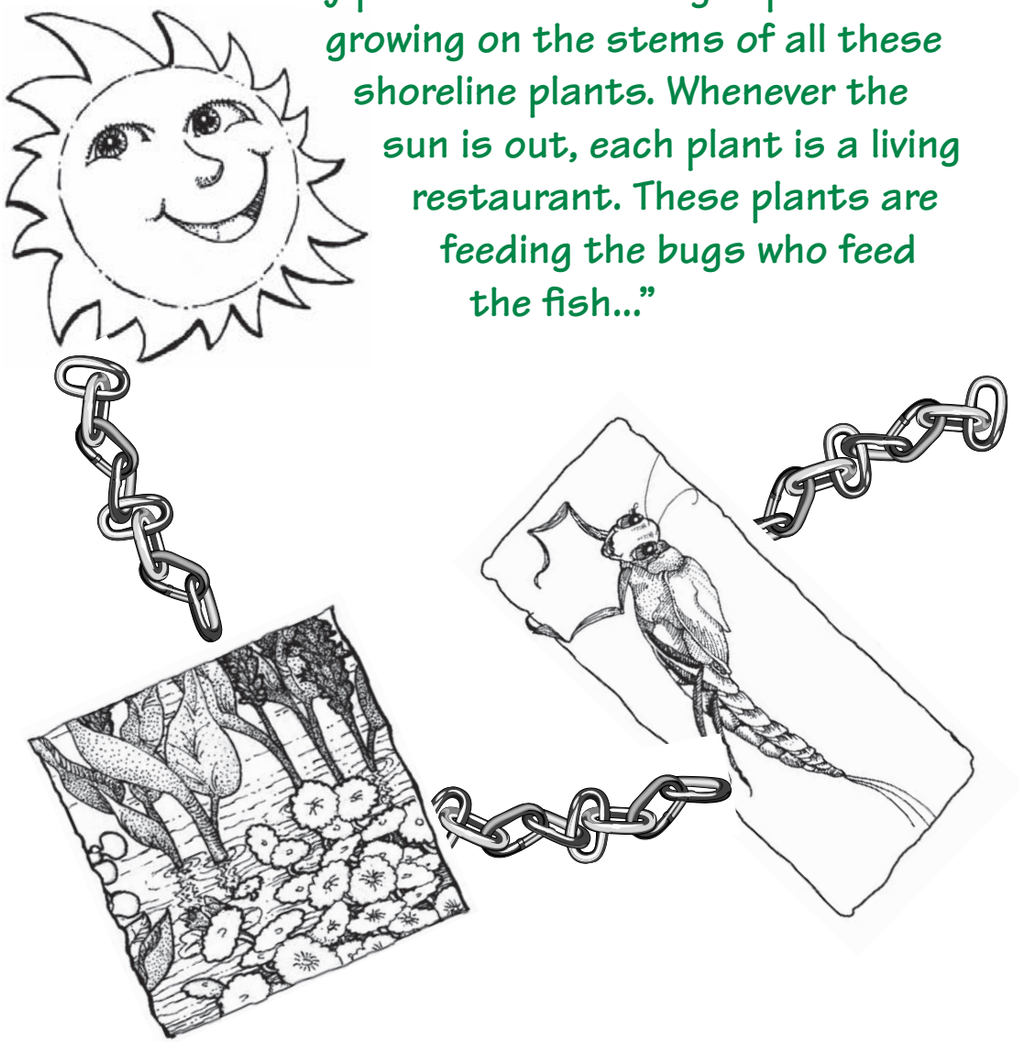
"I said fresh fish, not cooked fish," Egret insisted.

"...who feed you," finished Sonia. She stopped to look around. "It's more like a food relay isn't it, Egret? Plants capture the sun's energy to make food. Plants are food for mayflies, who are food for fish, who are food for birds — like you."

She clapped her hands and jumped for joy. "We don't need pliers to fix your food chain, Egret. We need more plants on Auntie's beach!"

Follow the food chain

Egret just shook his head and sighed as he pointed toward Mr. Skimmer's beach. "This is already an all-you-can-eat buffet! Pennywort and water lily plants are here. Algae plants are growing on the stems of all these shoreline plants. Whenever the sun is out, each plant is a living restaurant. These plants are feeding the bugs who feed the fish..."



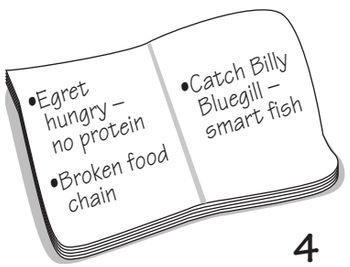
Sonia laughed at her mistake. Egret sniffed. "This is serious, my dear. The fish are gone, and my food chain seems to be broken."

"Poor Egret," said Sonia. "A food chain can't be that hard to fix. I'll find you some pliers."

Egret shook his head in despair. "Pliers won't help, I'm afraid," he said. "If you want to help fix my food chain, you'll have to catch my friend, Billy Bluegill. That fish knows everything about the food chain in this lake. Now, if you'll excuse me, I must hunt my dinner elsewhere."

Because the beach had been cleared, no fish, plants or insects could be seen anywhere.

Hmm, thought Sonia, what's a food chain? She jotted some clues in her journal.



Make a Journal

1. Find an old file folder or piece of cardboard for a cover.

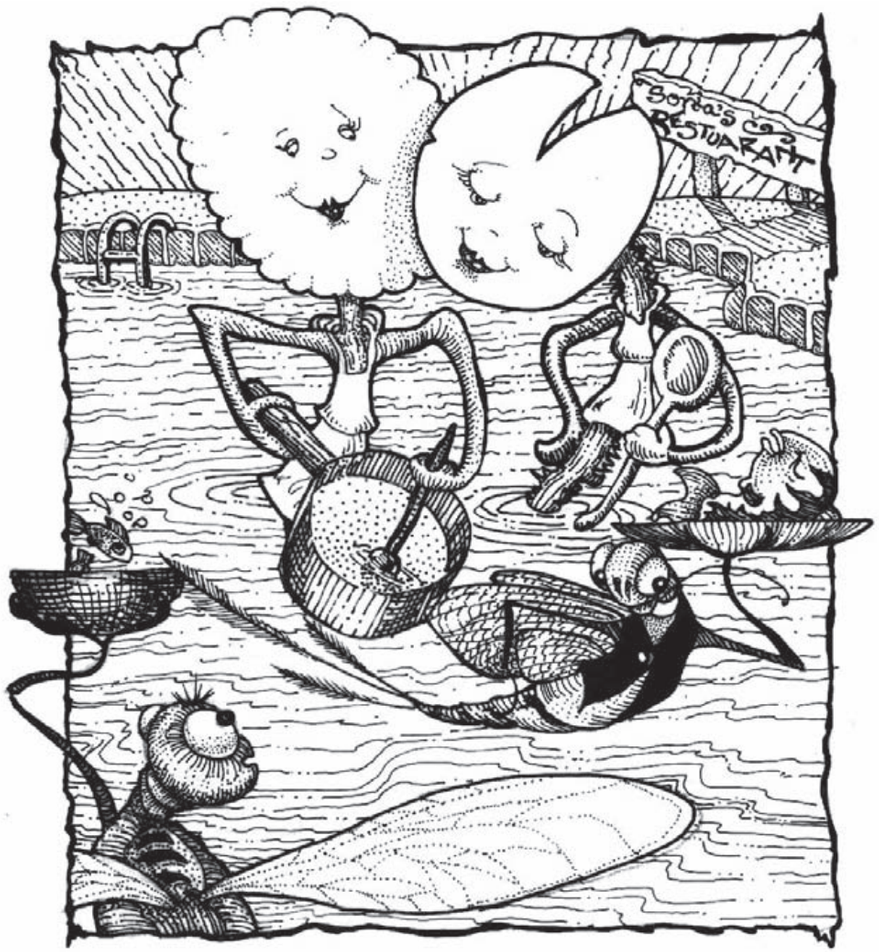
2. Place sheets of paper in the center of the cover. Cut the cover about one-half inch bigger than your paper. Fold the journal in half.

3. Color the cover or decorate it with contact paper or wrapping paper.

4. Staple the pages to the cover along the fold.

5. Put your name and phone number inside.

6. Go outside to draw and write about the things you see and do.



Chapter 5

Sonia's Restaurant

Sonia sat down on Mr. Skimmer's dock to think. If plants like Pennywort can make food from the sun to feed the animals, and it's free —

"That's it!" Sonia squealed, as she jumped from her seat. "We'll start a natural food restaurant — a whole chain of them. Wait till I tell Great Egret. Chains of good fresh food at low, low prices. Egret will be so excited when I tell him."

"Egret, Great Egret," shouted Sonia from the shore. "I have an idea!"

Egret strutted slowly toward Sonia. "Yes, my dear. What is it?"

"I've figured out how to fix your food chain," claimed Sonia. "We'll start a natural food restaurant! We can get plants like Miss Pennywort and her friend Water Lily to cook. We'll hire mayflies and other insects to be waiters. We'll set it up in my swimming pool and make it a family business. That will fix your food chain for sure!"

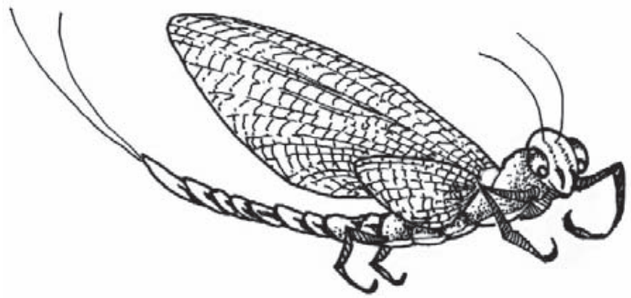
Chapter 2

The Big Catch

Sonia ran back toward the cabin. She found Auntie outside working in her flower bed.

"Auntie Martha!" Sonia called, "Can you help me catch a fish?"

"Oh no, dearie, Mr. Skimmer is the fishing expert," said her aunt. "To find him, take the lakeside trail to the other side of the cove. He lives in a small white cottage under the longleaf pines."



As Sonia walked down the sandy trail, large clumps of wiry grass tickled her elbows. She sniffed the piney smell and crunched over the long brown needles to Mr. Skimmer's house.

"Yoohoo! Mr. Skimmer! Are you home?" she called.

Feathers went flying as a chicken scooted between Mr. Skimmer's legs. He stood in the doorway, smiling down at her.

"Hello, young lady," he said.

"Hello, sir, are you Mr. Skimmer?" she asked. "I'm Sonia. Auntie Martha told me you're the fishing expert. Could you help me catch a fish?"

"Why, there's nothing I'd like better," Mr. Skimmer replied with a chuckle. "We can fish right off my dock. Do you have a fishing pole?"

"No, sir," said Sonia. "Could you show me how to make one?"

"Yes, indeed! All we need is something straight for a pole, something heavy for a sinker, something light for a bobber, and something curved for a hook. If I can't find extra fishing line, we'll use some other kind of string."

That morning, Mr. Skimmer and Sonia made a simple fishing pole. They took their poles, a bucket, some rope and a small container with holes out to the dock.

"What about algae?" asked Sonia. "How do they eat?"

"Algae are very small plants," said Miss Pennywort, "but they use the same ingredients to make food that I do. All green plants use water, sunlight and carbon dioxide gas to make their food. Plants are factories that make sugar."

"No one gives us plants any credit," continued Miss Pennywort. "We plants not only feed the animals, but we give them oxygen to breathe and shelter them from enemies. Plants are also the lake's natural filter system. Our roots absorb harmful chemicals that drain into the lake and they hold back the soil that can clog fish gills."

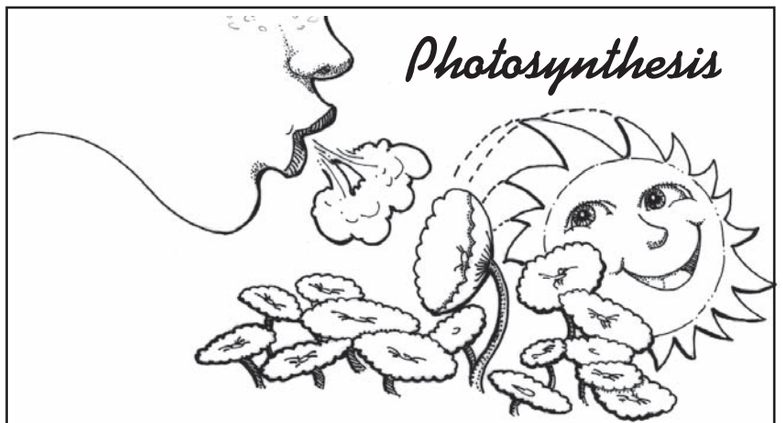
"Wow!" said Sonia, "I didn't realize plants were so important to the lake."

"Yes," replied Miss Pennywort. "Plants are very important for the health and well-being of a lake."

"OK, let's start!" exclaimed Sonia.

"Just try breathing out, while I open up the stomata (STO-MA-TA) on my leaves," continued Miss Pennywort. "A plant's stomata are like your nose and mouth. They let gases in and out to breathe. When you blow out carbon dioxide gas, I can make my secret recipe.

"My roots and stems pipe water in from the soil. The green colors in my leaves capture the sun's energy. The sunlight mixes the water and carbon dioxide gas together. Then, presto! I've made sugar — the food I need to grow. I store the extra sugar to use at night when the sun is gone."



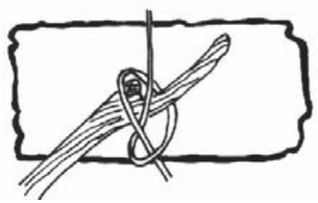
Plants use sunlight (photo) to make (synthesize) gas and water into sugar. When plants make sugar, it is called photosynthesis (pho-to-syn-the-sis).

Chicken feathers are made into bait that looks like real water insects.

Make Your Own Pole

1. First, ask a parent if it's OK to make a pole. Then, find a green stick, a curtain rod or a wooden dowel rod about 3 to 4 feet long.

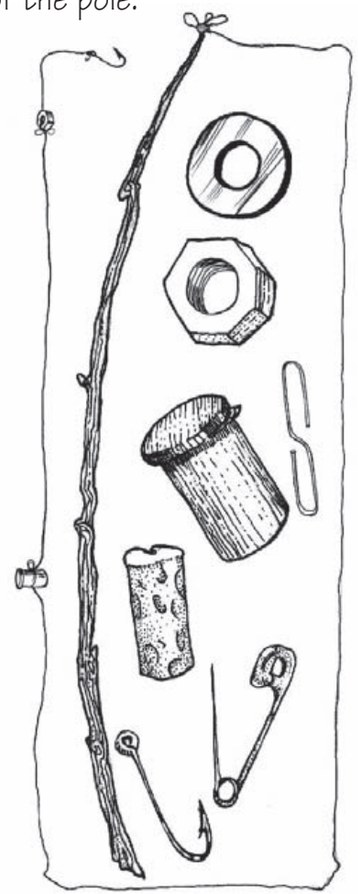
2. Cut a piece of string or fishing line about 8 feet long. Sometimes you can find a fishing line along the shore where people who fish might have left one. Tie the line to the end of the pole. Tie a square knot like this:



3. To make a bobber, tie a cork or empty film canister about 2 feet from the free end of the line. When a fish bites, the bobber will go under water and you will pull in your line.

4. Ask if you can look in the family tool box for an old washer or large screw. Use it for a weight. Tie it about a foot from the end of the line.

5. For a hook, try bending a paper clip or attaching a safety pin to the end of the string.



Sonia grew drowsy in the warm air and leaned back against Auntie's boat.

"Excuse me, excuse me," a meek voice called. "We're in our peak growing hours. You're blocking our sunlight."

"Who are you?" asked Sonia, startled.

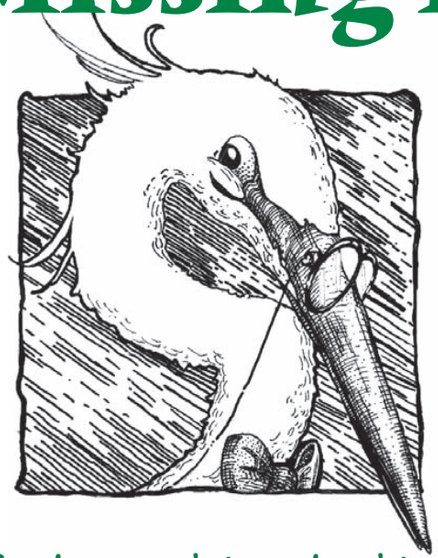
"My name is Miss Pennywort. If you'll move aside you can help me make a batch of sugar. All we need is water and your gas."

"What do you mean 'my gas'?" snapped Sonia.

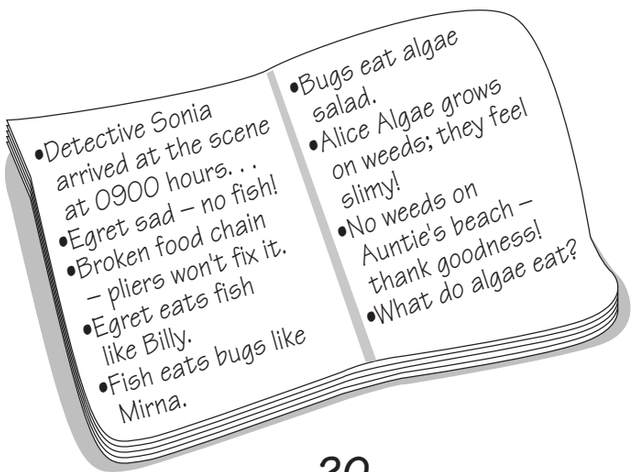
"I'm speaking of the gas you breathe out, called carbon dioxide (DI-OX-IDE)," said Miss Pennywort.

Chapter 4

The Missing Link



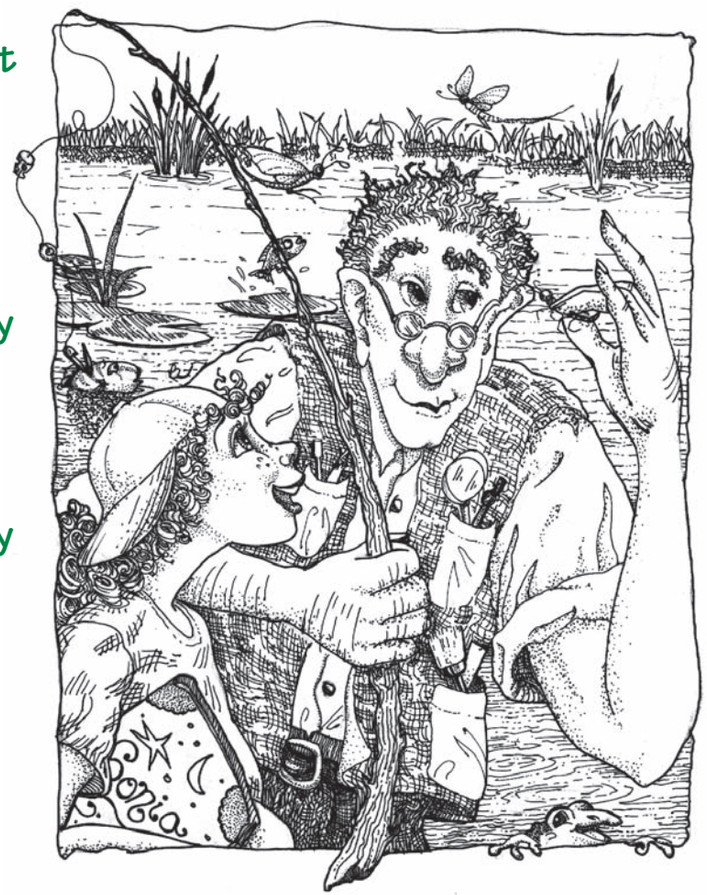
The next day, Sonia was determined to solve Great Egret's food chain mystery. Grabbing her journal, she walked down to the water's edge and made some more notes.

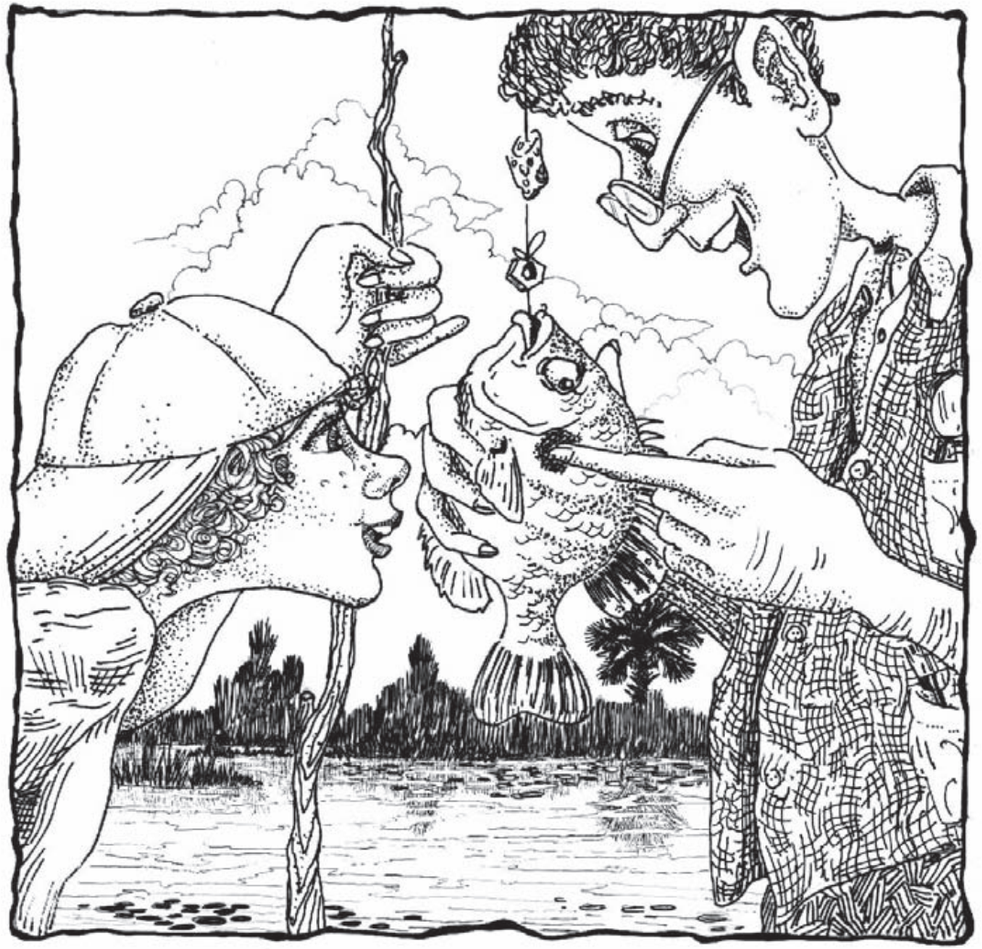


For a moment, Sonia stood gazing at the lake shore. It looked like a patchwork of plants, poking out every which way. The plants help to keep the quality of water in a lake healthy.

When Mr. Skimmer and Sonia peered into the water, some small insects flew up at them. One landed on Mr. Skimmer's furry brow. He pulled it off and held it up for Sonia to see.

"Aha! Just what the fishy ordered," he said. "A mayfly! The fish are trying to eat the adult mayflies before they all fly away. Now, Sonia, let's see if you can catch a fish. Put this mayfly on your hook and drop it slowly into the water."





"Something's tugging my line!" she cried a moment later. "It's a fish!"

"Now, slowly and steadily, pull in your line, Sonia," instructed Mr. Skimmer.

Up, up, up came Sonia's line. She could see a small fish flapping at the end of it.

"But what does algae eat?" asked Sonia. "How does a plant capture its food? It doesn't have arms or legs!"

"Talk to Miss Pennywort," said Mirna. "She's the spokesplant for Alice Algae and all the shoreline plants. Pennywort is a short plant that grows along the edges of lakes and other wet places. You'll find her if you look for a wobbly green umbrella."

Sonia waded out toward Mr. Skimmer to ask him about Alice Algae. He pulled up one of the water lily stems so she could feel the slimy algae growing along the stalk.

"Ooh! That feels like old lettuce," exclaimed Sonia. "I guess it's like a bug's salad."

"Let's throw these bugs back in the water and get cleaned up," said Mr. Skimmer.

Sonia made a few more sketches in her journal, then she and Mr. Skimmer walked home. She couldn't wait to tell Auntie about her day.

"Wow, my first fish!" she cried. "It has stripes like a zebra."

Mr. Skimmer grabbed the fish and held it in his hand. "See the dark spot on its gill?" he asked. "That means it's a bluegill." Then he dropped it into a bucket of lake water.

"Watch it while I fetch my bug-collecting tools, so I can show you what fish eat. While I'm gone, splash water in the bucket now and then to add a little oxygen. Fish have to breathe," he reminded her.

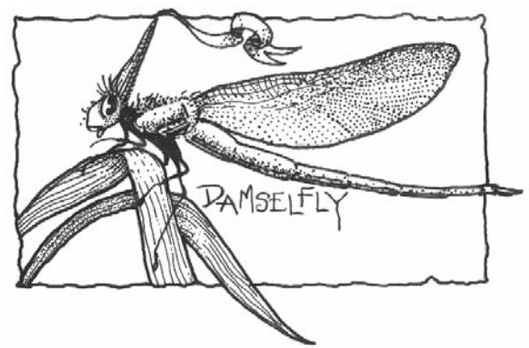
Sonia's Safety Tips

1. Always ask a parent for permission to go to a lake.

2. Always go to the lake with a friend. If one of you gets into trouble, the other could get help.

3. Learn to swim. I can swim, can you?

4. Look around your fishing spot before you sit down. Wild critters might have gotten there first. Alligators like to sun themselves on the banks. Never feed or bother a gator. Instead, move to a new fishing hole.



Sonia leaned over the bucket and whispered, "Hi, you must be Billy Bluegill. Great Egret said I should ask you about food chains. He's upset because he can't find any fish along Auntie's cleared beach. He says his food chain is broken. What does he mean?"

The fish splashed her with its tail. "I'll tell you all about our food chain," he replied, "but only if you promise to let me go!"

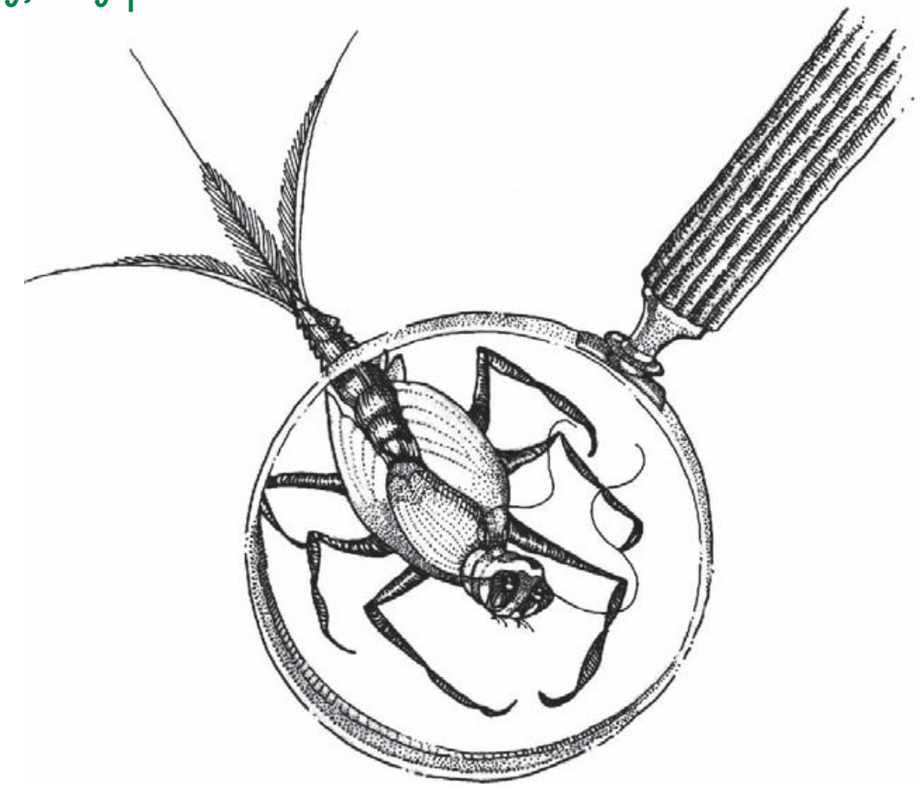
"I promise, I promise!" Sonia assured him.

Sonia peered through the magnifying glass. "Pssst... Mirna Mayfly, what do you eat?" she asked the tiny insect.

"I eat algae," said a little voice.

"You eat allergies?" asked Sonia.

"No, no, not allergies," said Mirna Mayfly. "Algae – pronounced AL-GEE. Rub your hand along the stem of this water lily. The slimy stuff you feel are algae. They are tiny, tiny plants."



"Yikes!" squealed Sonia, looking into the washtub, "I swim in this lake!"

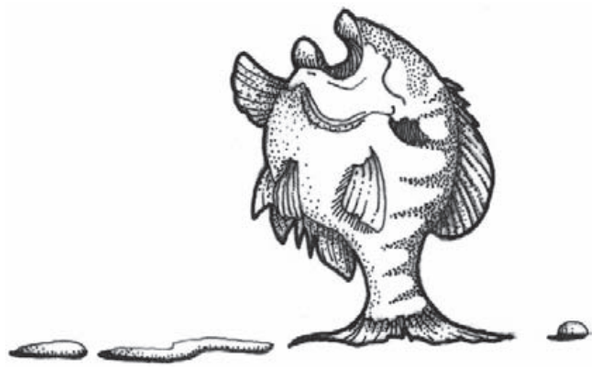
Mr. Skimmer smiled, "These animals won't harm you. Use the paintbrush and tweezers to sort them into these ice cube trays and egg cartons. The large eyedropper can be used like a vacuum to suck in small animals for a closer look. Place a single bug in each section of the ice cube tray or egg carton."

Sonia caught a small bug with the eyedropper and put it into the egg carton.

"It's the young mayfly you were looking for," said Mr. Skimmer. "Young mayflies are called larvae. They spend most of their time eating and growing. They don't have wings like the adults. Once they've finished growing, they climb out of the water and fly away to find a mate."

"OK" said Billy. "Here's how it works. Egrets eat fish. Fish eat mayflies and other insects. We each get our energy from the food we eat. Each animal becomes a link in the food chain."

"I eat sausage links," added Sonia. "But what do mayflies eat?"



"You'll have to ask Mirna Mayfly," said Billy. "You'll find her clinging to a plant stem somewhere in the water." His gills were flapping hard now. "Say, could you pour me out of here? It's getting hard to breathe in this warm water."

"Sure thing," said Sonia, pouring him back into the lake.

"Goodbye, Billy," she called after him. "Thanks for the clues!"

Off he swam into the shade of the underwater jungle.

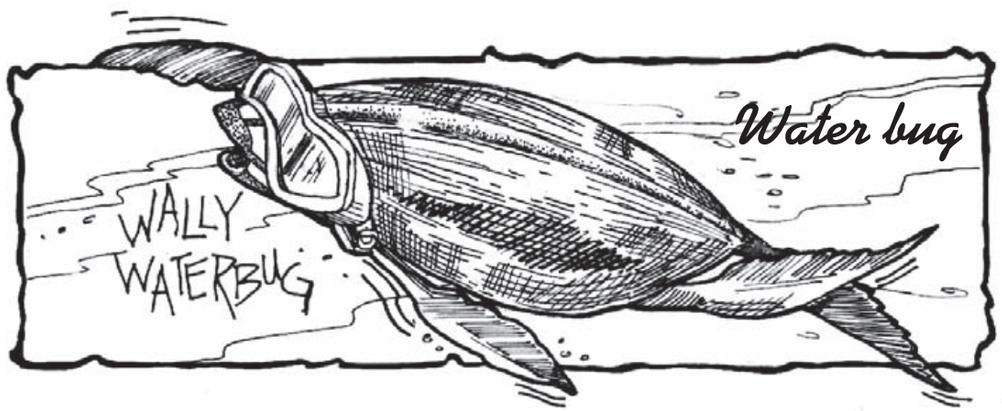
Chapter 3

Catching Bugs

Mr. Skimmer returned with a wheelbarrow full of white washtubs, old plastic jugs, foam egg cartons, white ice cube trays, nylon nets, tweezers, paintbrushes, eyedroppers, magnifying viewers and aquarium nets.

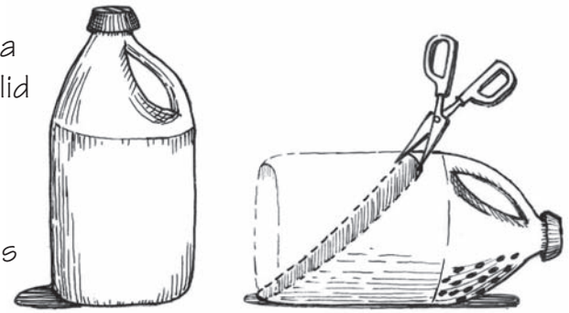
"We'll use these tools to find bugs," he said as he grabbed an old plastic jug. "This jug can be made into a scoop by cutting off the bottom and poking holes in it for drainage."

He cut the plastic jug with scissors and used a nail to poke holes in the bottom. Then he handed it to Sonia.



Make A Scoop

1. Find a thick plastic jug with a lid. Wash it out and put the lid back on.
2. Cut off the base at an angle to make a scoop.
3. Use a nail to poke small holes in it so the scoop will drain.



"Use this to scrape muck from the edge of the lake," said Mr. Skimmer. "Catch some worms and insects there that feed on dying plants and animals. Shake a few plants into your scoop. I'll catch bugs with my net and bucket."

Sonia scooped up muck from the edge of the lake and poured it into a net to drain. After flushing the dead plants and soil with clear lake water, she poured it into a white tub of clear water to settle.

Sonia spent the rest of the morning helping Mr. Skimmer gather bugs in the weeds growing along his shore. She hoped she would find some mayflies. Once the dirt and plants settled, bugs began to crawl, swim and paddle through the water in the washtub.