



# Nature Explorer

GET OUTSIDE,  
OBSERVE,  
AND DISCOVER  
THE NATURAL  
WORLD

Jenny deFouw Geuder



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## ABOUT THE AUTHOR

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### Dedication

To Evan and Henry:  
I love you to the  
moon and back...now  
go outside.

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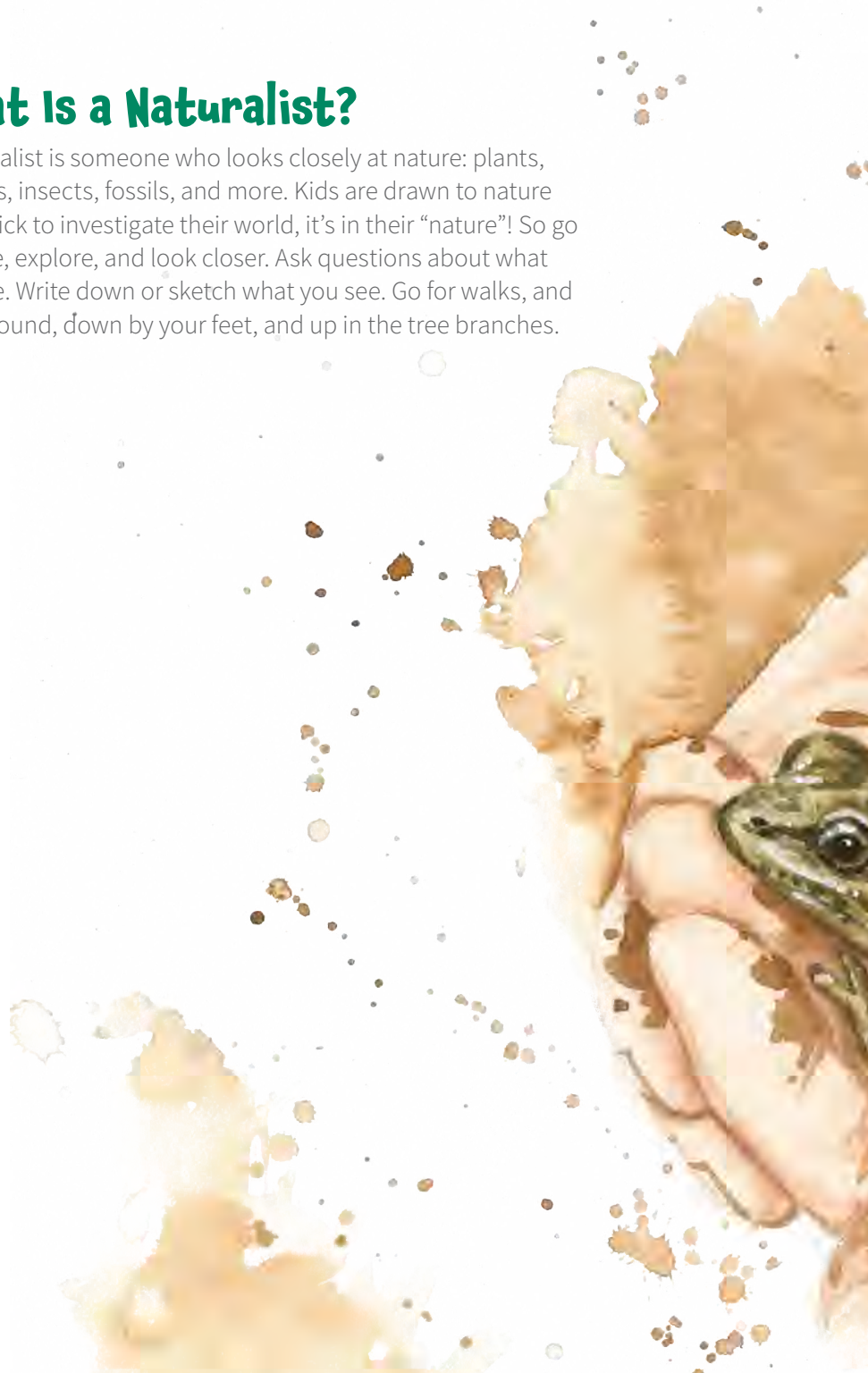
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# What Is a Naturalist?

A naturalist is someone who looks closely at nature: plants, animals, insects, fossils, and more. Kids are drawn to nature and quick to investigate their world, it's in their "nature"! So go outside, explore, and look closer. Ask questions about what you see. Write down or sketch what you see. Go for walks, and look around, down by your feet, and up in the tree branches.







## HOW TO BE A NATURALIST

One of the most important parts about being a naturalist is the simplest: Record your observations. By writing down **what**, **when** and **where** you observe something, you're creating a record for your area, and that's useful to scientists today—and in the future.

### Journaling Tips:

- Keep a notebook! Write down the things you see, and when.
- Try to identify things you find (there are lots of websites and apps for that; see page 133). If you can't figure exactly what is, that's fine, but try to narrow it down as much as you can.
- Sketch the things you like the most.
- Look close! What do you notice? Look, then look again. Notice textures, angles. Simplify things to basic shapes and add details later.
- Ask questions, and write down what you find out later.

### A Recommended Gear List (Not Necessary, but Nice!):

- sketchbook
- pencils/pens
- camera
- watercolor/colored pencils
- binoculars
- magnifying glass
- water
- backpack
- compass



## STAY SAFE!

When you head outside, don't go alone, and make sure a parent/guardian knows where you are and when you left. Better yet, have an adult go with you, and bring a cell phone for emergencies.

Check the weather before you go for a hike, and be prepared for a change in the weather. And don't forget sunscreen and bug spray!

Let wild plants and animals stay wild. Don't eat anything you find, and keep your distance from animals when observing them.



Know the potentially dangerous plants and critters in your area.

For example, Poison Ivy is really common throughout much of the country and gives a bad rash! You might know the phrase "Leaves of three, leave them be," so watch out for plants with compound leaves with three leaflets (the middle one the longest). If you accidentally touch a "problem plant," wash the area really well right away with soap and water.

Use bug spray, wear long pants, and do a good wood tick check when you get home. If you find a tick attached to your body, have a parent help you remove it as soon as possible, and follow up with a doctor if need be. Ticks can be really small!





## LOOK CLOSE, WAIT, AND BE QUIET

The first step in being a naturalist is simple: slow down and watch nature. Take your time! Let nature “come awake” around you. Try staying very still for a few minutes and see what you see and hear. Look closer at things: Be curious! Notice things and be patient.

“In every walk with Nature  
one receives far more than  
they seek.” John Muir, *Mormon Lilies*, 1870







## Use Your Senses to Experience Your World!

One of the best ways to learn about the nature near you is simple: Use your senses! By focusing on specific senses—hearing, smell, and touch—you can focus your attention and discover things you might have otherwise missed!



## HEARING

Close your eyes and sit quietly. Try to identify what you hear. Is it a bird? A frog? A cricket? Write down what you hear, and then close your eyes again and sit a little longer. What else do you hear? Do you hear the wind rustling the leaves, birds chirping, or something else? Can you hear more than one type of bird call?



### Did You Know?

Human ears include three tiny muscles and the three smallest bones in our bodies, but compared to ours, animal ears are really impressive. For example, cats have far more muscles than we do—and they can move theirs toward sound, birds can pinpoint sounds from long distances away, and bats can even hear ultrasound—sounds human ears can't even detect!









## SMELL

Close your eyes and this time focus on what you *smell*. Depending on where you are, you might smell many different things! Can you smell rain? Wet dirt? Hot pavement? A pine tree? Maybe you can smell cut grass or flowers. Explore your space and use your sense of smell—pinch a leaf of a plant you know is safe, and smell it. Some smell great (sassafras, pine needles), but some smell bitter. What smells are your favorite? Your sense of smell is often linked to your memories: Do the things you smell remind you of anything or a memory you have?

### Did You Know?

Humans have a pretty good sense of smell, but some animals have one that's much better. Dogs are famous for their good sense of smell, and some kinds of dogs—bloodhounds, for example—have a sense of smell hundreds of times better than ours. But bears probably have the best sense of smell of all. They can smell food from huge distances away!

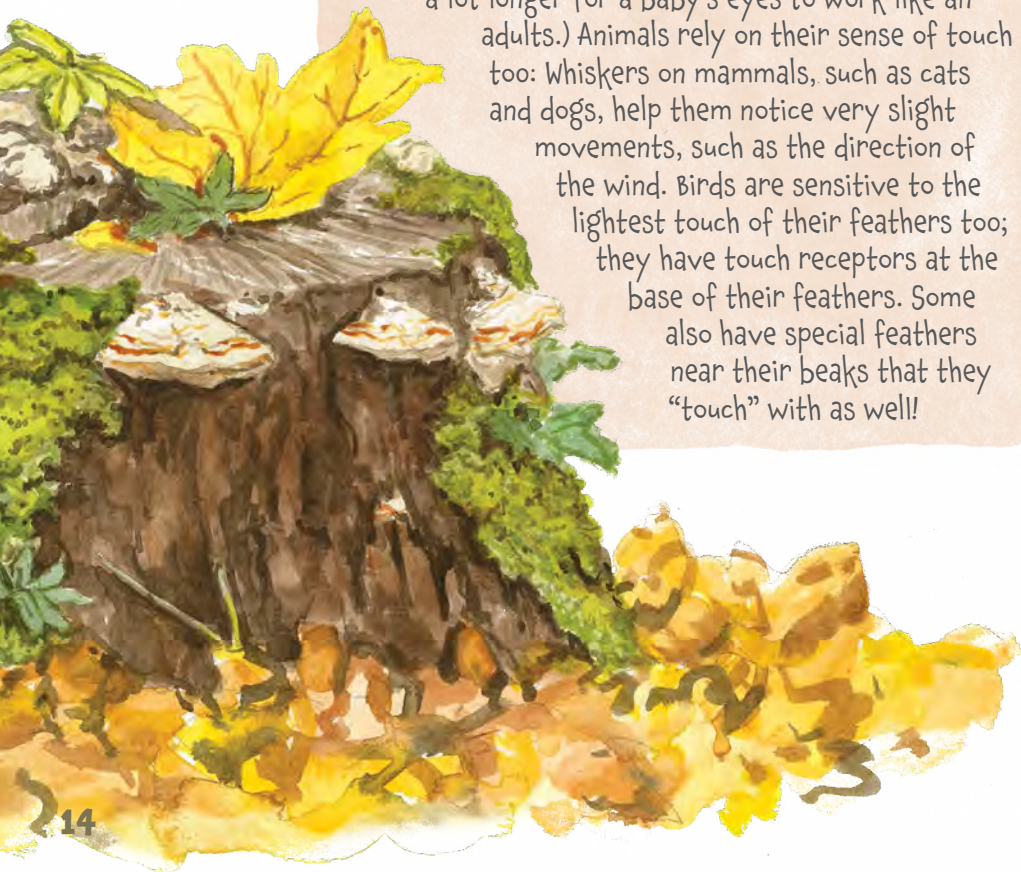


## TOUCH

Sit quietly with your eyes closed, and reach out with your fingers: What do you feel? Crunchy grass? Soft moss? Warm pavement or rocks? Maybe the soft velvet of sand? Explore your space with your fingers—but stick to plants and animals you know are safe to touch. Touch tree bark and notice which bark is rough, and which is smooth. Touch the soft moss, and the crackly dry leaves. Feel a hard rock or a fuzzy dandelion. Write down your observations. What things feel “nice” or comforting, and which don’t you like?

### Did You Know?

Your sense of touch is one of the first senses you use. From birth, babies instinctively wrap their hands around their parents’ fingers. (It takes a lot longer for a baby’s eyes to work like an adults.) Animals rely on their sense of touch too: Whiskers on mammals, such as cats and dogs, help them notice very slight movements, such as the direction of the wind. Birds are sensitive to the lightest touch of their feathers too; they have touch receptors at the base of their feathers. Some also have special feathers near their beaks that they “touch” with as well!



“Humankind has not woven  
the web of life. We are but one  
thread within it. Whatever we do  
to the web, we do to ourselves.  
All things are bound together.  
All things connect.” Chief Seattle, 1854







## SIGHT: LOOKING CLOSER

Sit quietly and let yourself relax. Watch nature around you and write down what you see. But most importantly, stay there awhile—we tend to notice big movements first, but when we give ourselves time to sit and look, we start to notice the smaller stuff! And nature starts to relax around us and comes out to play. So look down by your feet. Lean in and look, there's a whole world happening! Look for ants, mushrooms, tiny bugs, spiders, and more. Then lean back and look up into the tops of the branches: Some birds prefer to stay up in the canopy. What colors do you see? Textures? New things you didn't see before?

### Did you Know?

Some birds, such as eagles and falcons, have eyes that are much larger than ours (proportionally speaking), and they see clearly from a great distance, maybe even a mile away. They can also focus their vision on more than one thing at one time, which is helpful as they hunt.







## Sun Prints

Use the sun to capture cool plant silhouettes! Also known as cyanotypes (sigh-an-oh-types), they have been around for two hundred years, and they are really fun to do. When sunlight interacts with a special paper, it changes the color of the visible paper and leaves the silhouette of any objects on the paper behind.

### WHAT YOU'LL NEED

Plants, flowers, leaves

Cyanotype paper (available online or at craft stores, look for a Sun Art kit)

Clear acrylic/plexiglass sheet (if you get a kit, it is usually included)

A tub of water or a sink

Lemon juice (optional)



- 1 Go explore! Find fun, flat objects out in nature. Consider choosing flowers of different shapes, leaves with neat edges, and so on.
- 2 In the shade, arrange your plants and flowers on the paper. Only the silhouettes will be visible! You might find it helpful to put the special paper on a piece of cardboard to keep it steady.
- 3 Carefully set the clear sheet on top. This isn't necessary, but it keeps things from blowing away or shifting as you carry your paper. If things aren't close to the paper, the image will turn out more "ghostly" or soft edged.
- 4 Then, place the paper in direct sunlight for 5–10 minutes (see directions on package). It should turn very pale or white in color.
- 5 Set the paper into the tub of water and rinse it for about one minute. If you'd like a deeper shade of blue, add some drops of lemon juice. The colors on your page should shift and invert; the silhouettes should be bright white and the background deep cyan blue!
- 6 Set your paper out on a towel flat to dry or hang from a string somewhere dark or out of the sun.

Experiment with different shapes! Try feathers, flowers, leaves, grass. What if you arrange them like a wreath, or more like a bouquet? Which plants' silhouettes are the most interesting?

Sun prints work on fabric too!







## Make Your Own Prism

Use a mirror and water to break white light into all the colors of the rainbow! Visible light is white, and it contains all the other colors. The different wavelengths of light correspond to individual colors. In everyday life, we see objects as specific colors because they absorb some wavelengths of light and reflect others back to us. (A red apple, for example, reflects red light back to our eyes.)

The longest wavelengths create what we see as red, while the shortest ones create what we see as violet. There are also wavelengths of light our eyes can't see—for example, ultraviolet and infrared!

Try this experiment to break white light into the full spectrum of colors (a rainbow).



## WHAT YOU'LL NEED

A clear water glass

Water

A small mirror

White paper

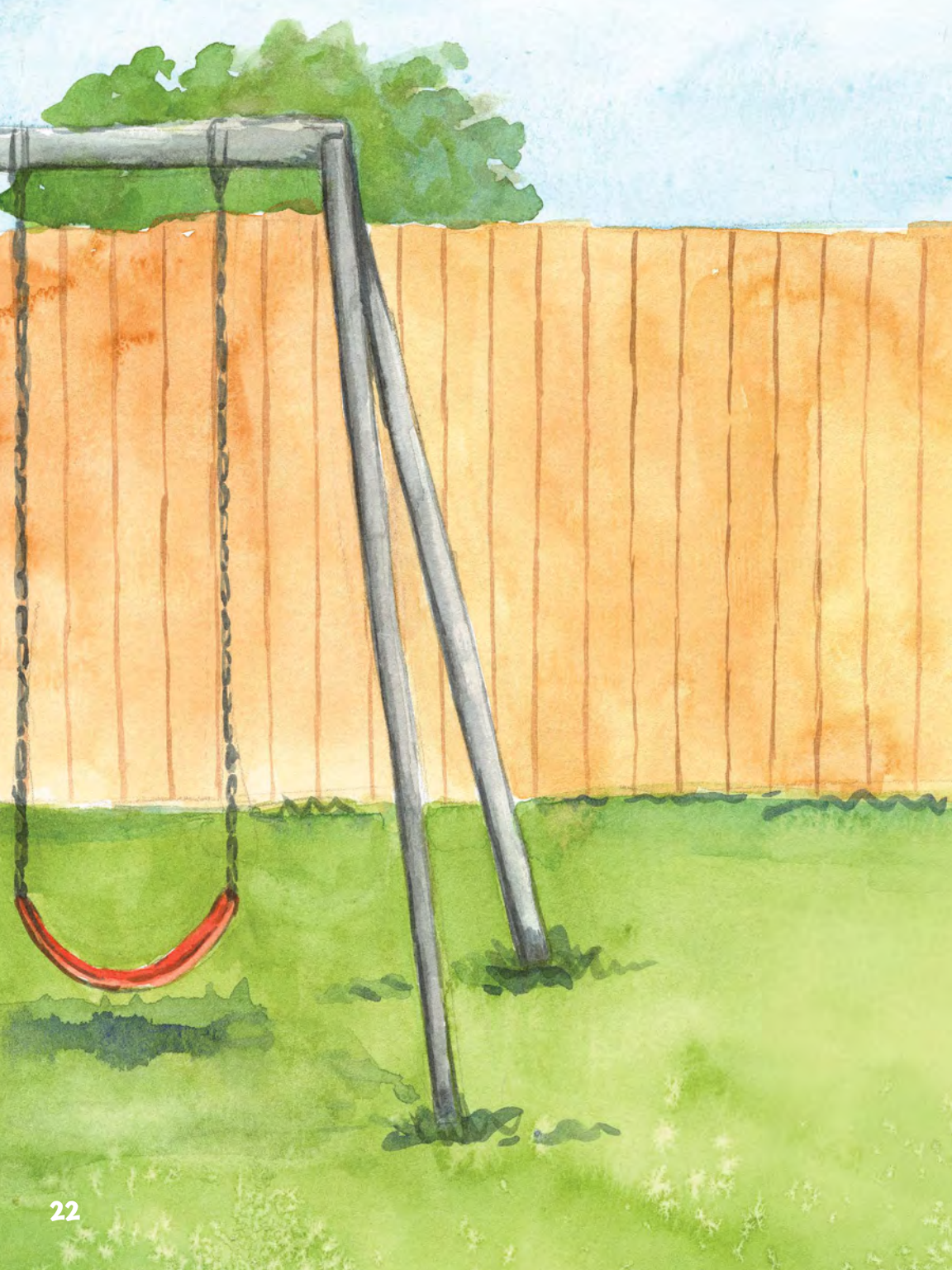
- 1 Fill a glass with water, and then set it by a window with bright sunlight.
- 2 Hold the mirror in your hand and catch the sunlight with it, and then direct through the glass. You should see a rainbow. (This might take a little trial and error if it doesn't work right way.)
- 3 Place your piece of paper where the rainbow just was, then hold the mirror the same way again. The rainbow should be easy to see on the paper!

### Fun Fact:

Most humans can distinguish about a million different colors.











## Habitats

Another way to get to know the nature near you is to learn about all the various types of habitats that exist. From a backyard and local green spaces to something as simple as an empty lot, nature is everywhere! Of course, you should be familiar with the potentially dangerous critters in your area before you go out exploring.

### BACKYARDS

A backyard is a great place to start exploring nature! Grab your binoculars and spend some time learning about what creatures call your backyard home. You might see goldfinches, Mourning Doves, Blue Jays, robins, or hummingbirds, especially if you put up bird feeders. Squirrels, chipmunks, and even skunks and raccoons don't mind living near homes. But look closer to see the butterflies and bees coming to your flowers, the tiny beetles, pillbugs, and snails living in a little world right outside your door.



## WETLANDS, RIVERS, AND LAKES



Many different animals are drawn to water. Herons, plover, loons, ducks, eagles, and kingfishers can be found living near the water's edge. You might be lucky enough to see a watersnake, a turtle, a newt or salamander, a beaver or muskrat, or even an alligator if you're in the southern U.S. Look for the unique water-loving insects too: dragonflies, whirligigs, and water skaters.

## EMPTY LOTS

At first glance, you might not think to find nature in that empty lot near your home, but look again! Wild things can live in all sorts of places, even in heavily developed urban areas. Pigeons, Blue Jays, raccoons, rabbits, and squirrels are everywhere, but also look for butterflies and bees, beetles, and ants. Many major cities are now home to Peregrine Falcons as well! Weeds and wildflowers are also quick to grow wherever there is space too!





## PARKS

Parks contain a lot of biodiversity (that means a wide range of animals, plants, and other life)! Spend some time walking around the trails at your local park and see who lives there. You might see Red-Shouldered Hawks, woodpeckers, Barred Owls, herons, deer, skunk, and bats! Turtles, snakes, and a whole bunch of other creatures and bugs can sometimes be found at your local park.

## FORESTS

Woodland creatures like the shelter and safety that trees provide, and they often tend to be skittish and run away when spooked. Spend some time sitting quietly to see more! Animals such as porcupines, opossums, White-Tailed Deer, foxes, rabbits, chipmunks and squirrels all call the forest their home. Some birds that love the forest are woodpeckers, owls, nuthatches, flickers, and chickadees. You also might see pine, maple, beech, and oak trees, as well as neat plants like bracken ferns.





## DESERTS AND DRY AREAS

Finding and using water is the top priority in desert areas. Many of the plants and animals have specific adaptations that help them survive. That's why you'll find unique plants like cacti, the yucca, sagebrush, saltbush, and wildflowers such as penstemon, a hummingbird favorite. Animals that you might spot include prairie dogs, Bighorn Sheep, jackrabbits, roadrunners, and even critters such as rattlesnakes, scorpions, Gila Monsters, and Javelinas. To stay safe, avoid putting your hands where you can't see, keep your distance from potentially dangerous critters, and don't pick up wild animals. Instead, enjoy a sighting, from a distance!









## Make a Fairy Garden or a Toad House

Fairy gardens are a fun way to turn natural objects into art. Make your own fantasy house for a forest friend! If fairies aren't your thing, you can also make a toad house, also known as a "toad abode." (Abode's another word for house.) The materials you'll need for both are the same.

### WHAT YOU'LL NEED

A clay pot

Two plates or trays to hold your pots

A hot glue gun (use with an adult's help)

Natural materials: small rocks, sticks, grass, acorns, pinecones, moss

- 1 Start out by finding a good location (a backyard or another area where you have permission to be) is good. If you are making a fairy house, you can use your garden space or a large pot or tray.
- 2 If you want to attract a toad (they are wonderful garden guests who eat a ton of bugs and are fun to see), look for a shady place, perhaps under a shrub or bush. Being closer to a water source is helpful, but you can set one of the clay pots into the ground as a "pool."
- 3 With an adult's help, chip out a hole about two inches across in the edge of the pot. This will be a door. Then, take the flowerpot and turn it upside down. Place it on the tray/plates. Make a roof using the pot's drainage tray on top! Then it's time to decorate: look around for natural materials. You can glue pebbles and rocks to the outside, twigs, and pinecones can look like shingles. Hot glue works the best, but make sure you use it safely. You can add dirt and press moss onto the roof to make a living roof too; the moss can grow and spread around your fairy house.
- 4 If you're making a toad house, place your house around your yard or garden. Check the water pool regularly to make sure it doesn't go dry. You can tuck some leaves into the house for your toad friend to burrow in.







ACTIVITY



## Terrarium: How to Make Your Own Mini Habitat!

A terrarium is a mini garden in a glass bowl (either completely closed or open at the top). It lets heat and light in, but keeps the moisture in, like a tiny ecosystem. (In fact, that's where terrariums get their name; *terra* means "earth.")



## WHAT YOU'LL NEED

A glass container with no drainage holes, with or without a top; if you have one with a top, it should be airtight

Small plants

Clean aquarium gravel or small crushed stone

Activated charcoal (found at nurseries or pet supply stores; look in the fish supplies section)

Clean potting soil mix

Moss

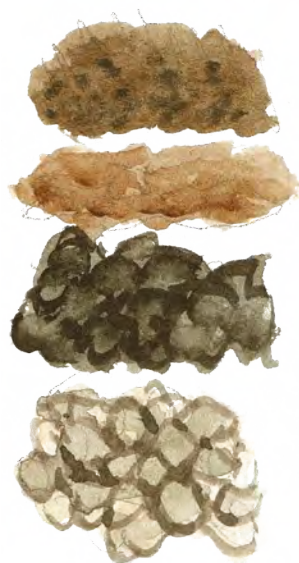
Little plastic animals/fairy garden pieces (if wanted)

**1** First, choose your container. A jar with a wide enough mouth to fit your hand is best. (*Tip:* Open containers are less likely to get mold, but they are open to the air, so they will dry out quickly and are best suited for succulents and other plants that don't need a lot of water.) Then choose your plants. You can use almost any small plants, but a good idea is to keep plants together that need the same water amounts. Succulents, violets, moss, and tropical plants do well in terrariums.

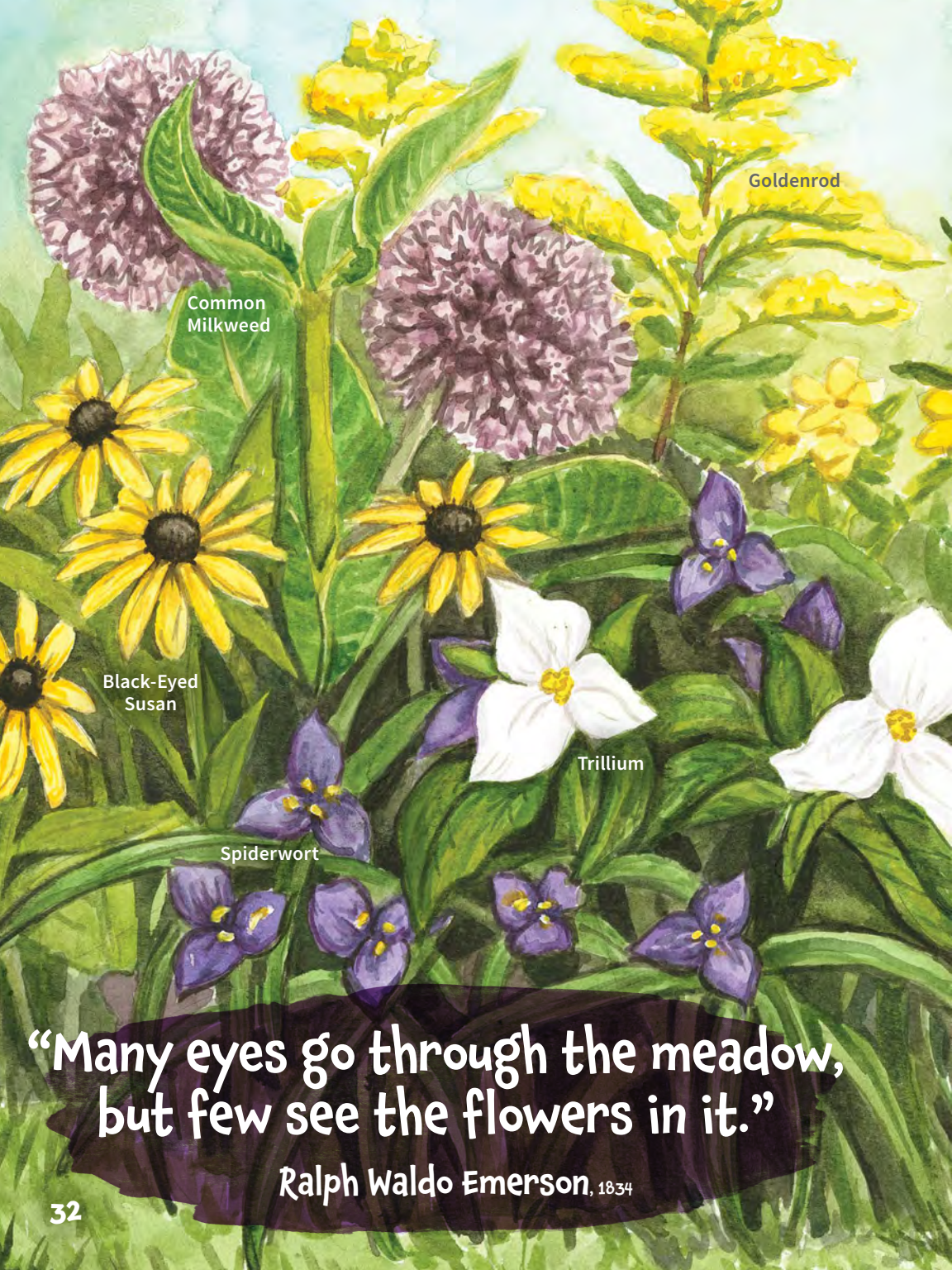
**2** Then layer your drainage materials on the bottom of your pot:

On the bottom, use your crushed gravel. Then add some activated charcoal (helps with drainage and keeps smells away). Next, add a little layer of sheet moss. Finally, add in potting soil mix. Save room for your plants! Now add your plants! Plan ahead for different heights for your plants. Now: Decorate! Add any rocks, plastic animals, or other decorations.

**3** Water carefully, just enough to get it damp, not soaked. Terrariums don't need a lot of water, check it every now and then to see if the soil is dry. If you get a lot of condensation inside, open the lid to dry it out a little.







Goldenrod

Common  
Milkweed

Black-Eyed  
Susan

Trillium

Spiderwort

“Many eyes go through the meadow,  
but few see the flowers in it.”

Ralph Waldo Emerson, 1834



# Flowers

Hairy  
Puccoon

Western  
Sunflower

Cardinal  
Flower

Bellflower

Wild  
Bergamot

Daisy  
Fleabane





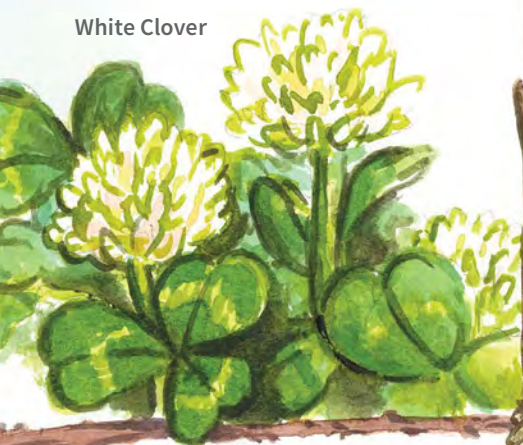
Chicory



Dandelion



White Clover



Broadleafed Dock



Purple Deadnettle



Blue Violet



## Recommended Reading

Andrews, Kim. *Exploring Nature Activity Book for Kids: 50 Creative Projects to Spark Curiosity in the Outdoors*. Rockridge Press, 2019.

Arment, Ainsley. *Wild and Free Nature: 25 Outdoor Adventures for Kids to Explore, Discover, and Awaken Their Curiosity*. HarperCollins, 2021.

Daniels, Jaret C. *Insects & Bugs Backyard Workbook: Hands-On Projects, Quizzes, and Activities*. Adventure Publications, 2021.

Hoare, Ben. *Nature's Treasures: Tales Of More Than 100 Extraordinary Objects From Nature*. Penguin Books, 2021.

Leslie, Clare Walker. *The Nature Connection: An Outdoor Workbook for Kids, Families, and Classrooms*. Storey Publishing, 2010.

Ortler, Brett. *Backyard Nature & Science Workbook: Midwest: Fun Activities & Experiments That Get Kids Outdoors*. Adventure Publications, 2021.

Storey Publishing, LLC. *Backpack Explorer: On the Nature Trail: What Will You Find?* 2018.

Rothman, Julia. *Nature Anatomy: The Curious Parts and Pieces of the Natural World*. Storey Publishing, LLC, 2015.

Zambello, Erika. *Backyard Birding for Kids: An Introduction to Ornithology*. Adventure Publications, 2022.





# Community Science

Kids can do real science too! Community science projects are a great way to get involved in real science wherever you are. Did you know that your pictures and notes about frogs, bugs, or the weather can actually help real scientists? They can! After all, there are far more regular people—and kids—than scientists, so by observing, photographing, and contributing your finds to online science projects, you can contribute to real science. Scientists regularly use these community science projects in scientific papers, research, and to help protect species!

There are so many ways you can participate in the science community.

Help the birds! Join the **Audubon Society's Christmas Bird Count** ([www.audubon.org/conservation/science/christmas-bird-count](http://www.audubon.org/conservation/science/christmas-bird-count)), the **Celebrate Urban Birds Census** (<https://celebrateurbanbirds.org>), or the **Great American Bird Count** ([www.birdcount.org](http://www.birdcount.org)). Keeping accurate numbers of our birds is one of the first things we can do to help them. All you need to do is watch and count! Or, this winter, help **Project FeederWatch** (<https://feederwatch.org>) record winter habits of backyard birds. For daily observations, **eBird** (<https://ebird.org/home>) allows you to upload photos daily of your sightings. Grab your binoculars and a camera!

Participate in a one-day butterfly count in your area through the **North America Butterfly Association** ([www.naba.org/counts/participate.html](http://www.naba.org/counts/participate.html)), or help Monarch Butterflies directly by participating in the **Monarch Larva Monitoring Project** (<https://monarchjointventure.org/mlmp>).

**The National Phenology Network** ([www.usanpn.org/usa-national-phenology-network](http://www.usanpn.org/usa-national-phenology-network)) will help you learn about the plants in your area, while you observe and record what you see around you. **Project Budburst** (<https://budburst.org>) is an organization interested in monitoring plants and trees and how climate change is affecting them in your area.

And there's so much more: Ask your science teacher if they know of any other local groups or organizations that would love your help. And remember—caring about your environment starts with you, at home, with decisions you make about recycling, the plants in your yard, and how you go about protecting your planet.

# Glossary

**Amphibian** A group of animals that includes frogs and toads, newts, and salamanders; these animals spend their larval stage in water and their adult life on land.

**Beetle** Insects in the order Coleoptera; fireflies, ladybugs, and Junebugs are all beetles.

**Biological classification** A system that organizes all life-forms into related groups; levels are Kingdom, Phylum, Class, Order, Family, Genus, Species. Every life-form has exactly one name—a genus and a species—sort of like a first and last name. For example, domestic cats (house cats) belong to the kingdom Animalia (animals), the phylum Chordata (animals with a special nerve cord), the class Mammalia (mammals), the order Carnivora (carnivores), the family Felidae (cats), the genus *Felus* (small-to-medium cats), and the species name *catus*. That means your kitty’s scientific name is *Felix catus*.

**Biologist** A scientist who studies living things.

**Bug** A generic name for any “creepy-crawly;” the word “bug” may also refer to insects belonging to the order Hemiptera, the true bugs.

**Chrysalis** A protective silk structure constructed by butterflies for their transition from a caterpillar to a butterfly.

**Cocoon** A protective silk structure made by moths for their transition from a caterpillar to a moth.

**Crop** A special pouch in the throat of some birds (doves, for example) that helps them store food to consume later.

**Cyanotype** Also known as a sun print, this is a special kind of photo printing that is great for preserving images of flowers, ferns, and more.

**Elytra** The hardened wing cases found on the front wings of beetles (the singular word is *elytron*).

**Entomologist** A scientist who studies insects.

**Evolution** The study of how life changes or evolves over time via natural selection.

**Fungi** A group of life-forms belonging to the kingdom Fungi. They often live in the soil or on trees, and when they fruit, some produce mushrooms.

**Habitat** Settings where animals, plants, and other life are found. Habitats are everywhere, from lush forests to suburban backyards.

**Insect** An animal belonging to the class Insecta; examples include beetles, bees, and butterflies and moths, among others. Common “creepy-crawlies” like spiders, ticks, and worms are not insects; they belong to different groups.



**Invertebrate** An animal without a spinal cord.

**Isopod** An order (see Biological classification) of crustaceans; many isopods live in the ocean, but some, such as pillbugs and wood lice, live on land.

**Larval stage** The stage in an animal's life that follows the egg phase and occurs before adulthood. For example, caterpillars are the larval stage for butterflies.

**Leave No Trace** Enjoying nature without leaving a trace of your presence once you're done. Don't leave trash, don't stack rocks, and take photos instead of keepsakes. See [www.lnt.org](http://www.lnt.org) for more information.

**Leucistic** Describes an animal with a genetic mutation that makes its fur all-white (as in all-white squirrels).

**Lichen** A group of life-forms that consist of fungi and bacteria that cooperate and live together. Lichen often live on tree bark and rocks.

**Marsupial** A group of mammals that carry their young in a special pouch, which is found on the mother's belly. Examples include Virginia opossums, kangaroo, and wombats.

**Melanistic** Describes an animal with an all-black coloration. Melanistic squirrels, for example, are solid black.

**Migration** When animals move from one area to another. Seasonal bird migration is the most common example.

**Mineral** A unique chemical compound that has solidified. Salt, for example, is a mineral and the combination of two chemicals: sodium and chlorine.

**Mollusk** Animals in the phylum Mollusca, which includes slugs, snails, octopuses, and shelled animals such as clams.

**Mushroom** The aboveground fruit of a fungus; mushrooms spread spores, which is how many mushrooms reproduce.

**Natural selection** When a mutation (change) in a life-form helps it adapt, survive, and reproduce.

**Native bees** Bee species that are native to a given area. Honeybees are not native bees, and most native bees don't live in large hives; instead, they live alone.

**Naturalist** Someone who looks closely at nature: plants, animals, insects, fossils, and more.

**Nematode** Wormlike animals that belong to the phylum Nematoda. They are often microscopic and, when viewed under a microscope, can often be seen wiggling around.

**Odonata** An order of insects that includes dragonflies and damselflies.

**Pillbug** An isopod that can roll itself up into a ball as a defense mechanism.

**Prism** An object used to break light into its component colors.

**Rock** A solid substance made up of minerals.

**Rotifer** Microscopic, tubelike animals, often seen alongside tardigrades and nematodes.

**Shed** Deer antlers that have been shed; sheds can be found in the spring.

**Tapetum lucidum** A layer of mirrorlike cells in the eyes of certain animals, like dogs and cats, that help them see well in low-light conditions.

**Tardigrade** A microscopic bearlike animal that lives in moss, lichen, and aquatic environments. Tardigrades are found everywhere on Earth and in their dormant state (called a tun) can survive in extreme conditions (boiling temperatures, strong radiation, even outer space).

**Terrarium** A mini garden in a small space, often a closed glass container.

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