

Take a Spark and
make it burn!

ROCKIN' SPARK STATION IDEA PACKET



**Magnify
It!**

Connecting Families with the Spark Station



Mary Ann Johnson

Take a **Spark** and make it burn!

Dear Rockin' Idea Packet user,

Congratulations on joining the Spark Station family! I hope you are as excited as I am here at Home School Coach, LLC! I am looking forward to adding you to a growing list of successful and inspired parents! These packets will provide you many opportunities to connect in some meaningful ways with your children as you learn together.

I want to take this opportunity to share a few things that will help you make the best use of this Rockin' Spark Station Idea Packet.

- Print off each packet as it arrives in your in-box. They can also be filed and stored on your hard drive. However, if they are in hard copy form your children can help you use them to the fullest.
- Punch the pages and store them in a binder.
- Have them in an easily accessed place so you and your children can view the binder on a regular basis. You can even store the binder in the Spark Station itself.
- Let your children who can read help you choose the activities that appeal to them most right now, from the topic that interests them most.
- Mix it up. Don't think you have to do all of the activities in one packet before moving on to the next.
- Remember that when you use a packet with a two year old you will probably return to the same topic again when they are six, eight, ten, or twelve. So save that binder!
- Have a lot of fun!!!

If you have purchased a single packet I hope you enjoy it. If it is helpful to you, you might want to check out the monthly subscription which is the most cost effective way to receive Rockin' Spark Station Idea Packets on a regular basis. You can find out more about the monthly subscription at:

<http://home-school-coach.com/store-2/rockin-closet-idea-subscription/>

If the Spark Station is a new concept to you learn a bit more about it and what makes it work at home-school-coach.com in the "START HERE" category.

If you have any questions, you can contact the office by email: majcoach@gmail.com

To greater family connections,

Mary Ann Johnson

Owner, Home School Coach, LLC

A ROCKIN' SPARK STATION IDEA PACKET

Magnify It

INTRODUCTION

A Magnifying Glass

A magnifying glass is grand
To study things on hand,
Like caterpillars, oh, so fat,
and snails and things like that.

A magnifying glass is keen
To study what can't be seen,
Like ants that crawl upon the ground,
and bugs that creep around.

A magnifying glass is right
To study what's in sight,
Like fingers, toes, and people's hands,
and things like rubber bands.

Now if you have one like me,
How busy you must be!
With many things so tiny and small,
You're sure to see them all.



We are going to explore the world of magnification. What is magnification? Who invented it? Why is it important?

Euclid in 300 BC and Ptolemy 150 BC studied the concepts of reflection and refraction and an Arabian scientist, Abu Ali al-Hasan Ibn al-Haytham, gave a description of a convex lens used as a magnifying device. The Greek playwright Aristophanes refers to the "burning-lens" in his play "The Clouds in the 5th Century B.C." The Romans observed the magnifying properties of glass in the first century AD.

Roger Bacon is the person who most often receives credit for the first known use and descriptions of a magnifying glass or lens. He lived in the 13th century. He was an Englishman who taught at the University of Oxford. There are so many tiny things in the world that we would not be able to see if he had not had the idea that lenses, used in a particular way, could make small things appear larger.



Many people thought that Roger Bacon was a radical because he believed that a person ought to conduct scientific experiments to find out what was true rather than just believing what others said. It took a lot of courage to think differently so long ago. He was the first to one advocate the use of a magnifying lens to improve reading. He was also the first person to hypothesize that strong lenses, such as what later became telescopes, might enable humans to see objects extremely farther away. In Roger Bacon's time these magnifying lenses were called "flea glasses" and were used to study insects.

During the Renaissance microscopes (in the 16th century) and telescopes (in the 17th century) were developed. Now magnifying lenses could be used in practical ways in pure science and medicine. Magnifying lens technology is used in everything from cameras to reading glasses today and it helps us see objects that the naked eye can't see without help.

A lens is a curved shape you can see through. A magnifying lens is a convex

lens that makes a close object appear larger. Both sides of the lens curve outward and it is thicker in the middle than on the edges. As light hits the edge of the glass, the convex shape pushes the light towards the center, hence magnifying any item underneath the glass.

**When the magnifying lens is placed on top of an object it appears the same size. If you raise the lens the object appears larger. If you raise the lens too close to your eye the object will appear blurry. When looking at objects through a magnifier, since things appear larger, you can discover small details that you might not otherwise be able to see.

Magnifying glasses are typically constructed of either glass or acrylic. Glass lenses tend to deliver a clearer image because they allow light to pass through more easily. Glass magnifying glasses can be quite heavy and are subject to breakage. Acrylic lenses do not provide the same level of clarity as glass magnifiers, but they are much lighter and much less likely to shatter. Most magnifying glasses, particularly for home use, are made of acrylic.

The above is an adaptation and compilation from <http://bit.ly/jcDiMC> and <http://bit.ly/kY1sT5> and <http://bit.ly/23GbO5>

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PART I: LEARNING ABOUT MAGNIFICATION

1. MAKE 3 TYPES OF MAGNIFIERS

Ask your children - what they know about magnifying glasses. Have they ever seen a magnifying glass before? Why would people use them? Share parts from the introduction that are age appropriate for your children.

Invite your children to look at simple objects around your home. What do they notice when they look at objects with the lens? Share with one another what you notice.

Use the magnifying glass to look at a small plant. What do they see? Now, look at the plant with the magnifying glass. What do they see? Are there any differences?

Pass out a piece of paper to each child and have them fold it in half. On one side draw the plant as it appears to them when they look at it with only their eyes. On the other half of the paper have them to sketch what they see when they use a magnifying glass. Encourage them to look closely at the plant. Can they see how the petals are attached to a flower? What about the tiny hairs that make a leaf feel fuzzy?

Magnifier #1

Water is a natural magnifier. It can concentrate sunlight and heat a surface or start a fire. You can make a magnifier with very simple materials.

You will need:

- Eye dropper
- Piece of newspaper
- Plastic wrap

Put some plastic wrap over a newspaper page. Look at the print and notice the size of the letters. Now place a drop of water with the eye dropper onto the plastic wrap. Now look at the letters. What has happened to their size?

Directions taken from <http://bit.ly/jfReU5>



Magnifier #2

You will need:

- Clear plastic zipper bags
- a. Fill a zipper bag halfway full with water. Be careful not to get any water on the outside of the bag.
 - b. Seal the bag tightly and use a dry towel to completely dry off any water on the outside of the bag.
 - c. Hold the bag up to the surface you want to inspect and look through the water to the other side. The water will enlarge any item you look at so you can view the item in detail.

Directions taken from <http://bit.ly/kKzUhr>

Magnifier #3

You will need:

- Glass or plastic slide
 - Eye dropper
 - Water
 - Something to magnify (books are good for this)
- a. Place the surface to be magnified flat on a table or another sturdy surface. It needs to not wobble or shake; otherwise you'll dislodge your homemade magnifying glass.
 - b. Place the plastic slide or glass on top of a word or picture you want to magnify. You will be able to slide it around but probably not pick it up once you have made the magnifying glass, so be sure that it is positioned over a place that you want to magnify.
 - c. Use the eye dropper to drop several drops of water onto the slide. The drops will stick together and form a large droplet. Add one drop at a time, making sure that your drop does not get so big that it overflows to the side.
 - d. Look through the water droplet. Everything underneath the droplet will be magnified to several times its size. Your child can enjoy reading through the droplet, examining paper fibers or looking at details in illustrations much more closely than before. You can also teach you child a small science lesson by talking about how water is cohesive (meaning it likes to stick to itself whenever possible).

PART II: CREATING HEAT WITH A MAGNIFYING GLASS

You can harness the power of the sun and heat water with a magnifying glass. Energy derived from the sun, known as solar energy, can be harnessed and used for thermal energy, or heat. People often rely on thermal solar energy to heat pools and even entire homes or businesses.

1. HEAT WATER WITH A MAGNIFYING GLASS

You will need:

- Magnifying glass
- a. Prepare a container to hold the water. Although other materials like plastic and wood can work, copper is the best choice, as it is a better conductor of heat and less prone to corrosion. The narrower the container, the faster the water will heat. For tube-shaped containers, you must seal off the bottom to create a solid base before filling with water.
 - b. Fill the container with water and place it in an area outside with a direct view of the sun.
 - c. Move the magnifying glass over the top of the container, positioned on a direct angle from the sun through the magnifying glass to the container. You can position the magnifying glass directly over the top of the water or aim it at the container if using copper or a similar metal. Warming up the pipe in this instance would conduct heat rapidly and result in the water temperature increasing quicker.
 - d. Hold the magnifying glass in place until the water reaches the desired temperature.

Directions taken from <http://bit.ly/kFdCH4>



2. BURN WOOD WITH A MAGNIFYING GLASS

You will need:

- magnifying glass
 - 24 length of wood
- a. Place your piece of wood on a flat surface outside; the sidewalk is an ideal place because it will not singe or catch fire when you burn the wood.
 - b. Position the magnifying glass about a foot above the wood you want to burn. Adjust the way you hold the magnifying glass until you see a pinpoint of sunlight on the wood. The sun's rays pass through the magnifying glass and become concentrated.
 - c. Hold the magnifying glass as still as possible so that the concentration of light is as powerful as possible. After a minute or two, the wood will start smoking as the hot, bright light begins to burn it. Wait until a small flame appears, then put the magnifying glass down and blow the flame softly to fan it.

Directions taken from <http://bit.ly/iBPiSU>

**Why not do this experiment in a foil lined pit and then when you have a good fire going add more wood and let it burn down. Then cook marshmallows.

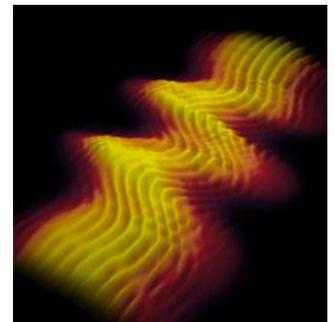
You can find a tutorial on starting a fire with a magnifying glass here –<http://bit.ly/jCBVJo>

3. WHY DOES A MAGNIFYING GLASS MAKE FIRE?

It does it with light energy. Light emitted by the sun is made up of photons, tiny packets of electromagnetic energy. Photons behave both as particles and waves. This quality is important because the nature of photons means that they are refracted when they pass through different media. Photons passing through water change their speed, causing a ray of light to appear at a different angle above the water than below the water's surface.



The lens of a magnifying glass is curved to refract light particles in such a way that the eye perceives a larger image. The important point to note is that a magnifying glass causes rays of light to change angle as they pass through the lens and meet at a specific point, focusing the energy of the photons.



A combustible material, when exposed to heat and a source of oxygen, produces fire. Holding a magnifying glass so that the rays of light passing through the lens meet on a dry, flammable item, such as a piece of paper, concentrates the energy of the photons in a single spot and produces greater heat than the heat we feel on our skin from the sun. With this heat, it is not difficult to produce a flame. However, if the magnifying glass is held at the wrong angle or distance from the paper, the heat may not be great enough to light the paper on fire.

Because it is possible to light a fire using a lens, a magnifying glass is a useful tool to carry when camping or traveling. In the presence of sunlight, it is a fairly reliable method, and unlike matches or a lighter, will not be damaged by moisture.

Information taken from <http://bit.ly/kg38f1>

**Why not add a magnifying glass to your 72 hour or emergency kit and the glove box of your car.

4. POP A BALLOON WITH A MAGNIFYING GLASS

You will need:

- Round balloons
- String, streamers or thumbtacks
- Magnifying glass

- Blow up a balloon.
- Tie the end of the balloon in a simple knot to hold the air inside.
- Attach a string or streamer to the balloon by tying it around the knot. Tie the string to a fence post, table or any other stationary object that is in direct sunlight. Make sure that the string is short enough that you can still reach the balloon. You can also attach it to a wood fence post with a thumbtack stuck through the tied portion of the balloon.
- Take out your magnifying glass.
- Identify the location of the sun, and hold your magnifying glass approximately three inches over the balloon in the path of the sunlight.
- Watch the surface of the balloon. After a few seconds, a small dot will appear. The steadier you hold the magnifying glass the quicker the sun's rays will pop the balloon.



Directions taken from <http://bit.ly/mUBBrp>

5. MELT CHOCOLATE WITH A MAGNIFYING GLASS

You will need:

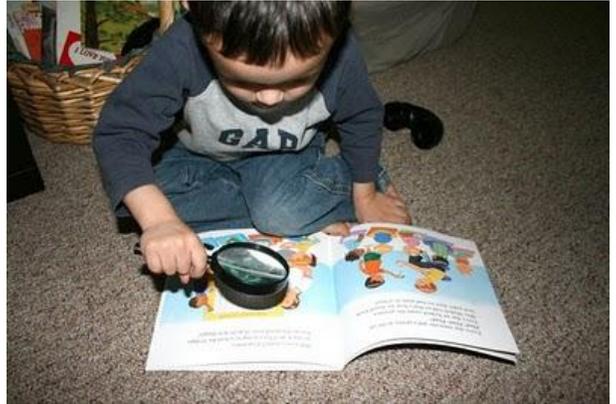
- Chocolate
 - Tin foil
- Place a piece of chocolate on a flat surface that you don't mind getting a little dirty.
 - Angle the magnifying glass so that the sun's light is focused onto the chocolate. Move the magnifying glass nearer and farther away from the glass. The smaller the beam of light is, the hotter it will be. Watch as the chocolate melts.
 - Place a piece of chocolate on a piece of aluminum foil. The aluminum will help the chocolate to heat more rapidly. Use this method as a means of comparing your results with the first method (using no reflective surface).
 - Compare and contrast your methods and results once more by holding two magnifying glasses between a piece of chocolate and the sun. This should create more heat, which will melt the chocolate faster. Spread your chocolate on sliced apples and enjoy.

PART III: INDOOR ACTIVITIES USING A MAGNIFYING GLASS

1. MAKE A MICRODOT

Use the computer to make a large black dot. Type a message in white on the dot then shrink it down so the writing is too small to read with the naked eye and print it out. Read the message with a magnifier. It would be fun to send a secret message to someone in your family and have them use a magnifying glass to read your message.

Look at parts of your body up close – a strand of your hair, your skin, your fingernail.



2. DO SALT AND SUGAR LOOK ALIKE?

Place some sugar and salt on black cardboard (keep them separate) and look at the crystals up close. Do they look the same up close? What is the difference between sugar and salt? What other safe powders or crystals do you have that can be explored?

3. MAGNIFYING PICTURE CARDS

Print out the 3 sets of "magnifying picture cards" -transportation set, living things set, and fruit set. I printed each set onto different shades of cardstock (white, gray, or beige) just to make organization easier. Leave the large pictures in a whole sheet (work mat) but cut the tiny pictures into individual cards. Children use magnifying glasses to enlarge the tiny pictures and then match them to the larger pictures. Find the magnifying picture cards at <http://bit.ly/9FIDeQ>

4. A FUN VIDEO FROM SID THE SCIENCE KID

Magnification Investigation. <http://bit.ly/dYClk>

PART IV: OUTDOOR ACTIVITIES USING A MAGNIFYING GLASS

1. WHAT'S IN YOUR BACK YARD?

Mark out a small area of ground and have your child use a magnifying glass to explore the area. Look at the grass or plants, the dirt, the rocks and so on. Are there any animals or insects? Now try a small area of a tree trunk or a dead log, or look under a rock. Challenge each one to see how many different things they can find with their magnifying glass, and write them down. It would be fun to have some cool, small notebooks with pencils attached by a string in your Spark Station.



2. PLAY A GAME OF MYSTERY PICTURES

You use the zoom on your camera to take close up pictures of everyday outdoor objects. Then have your child use the magnifying glass to hunt for and identify the objects shown in the pictures.

3. DOES ALL SAND LOOK ALIKE?

Look at sand from the beach. Collect sand from different parts of the beach. Does it look the same? Collect sand from different beaches. Do they look the same?

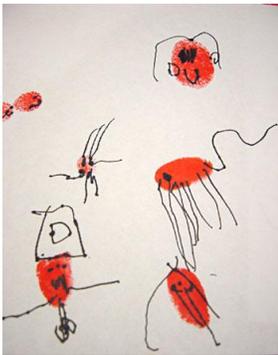
The activity suggestions above were adapted from <http://bit.ly/ioWR06> and <http://bit.ly/dfZA8X>

4. PLAY DETECTIVE

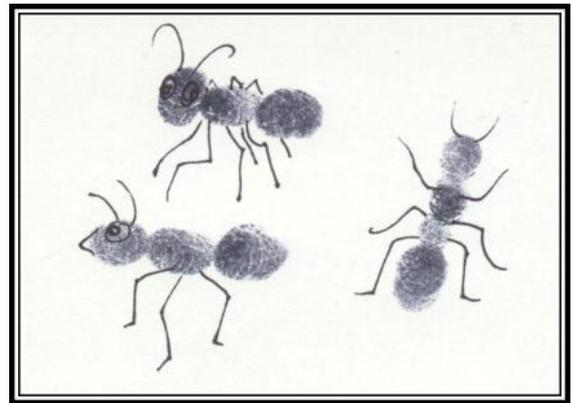
5. FIND WHAT IS LOST

Use your magnifying glass to find small lost items such as an earring back.

6. FINGER PRINTS



Put out a stamp pad and the magnifying glasses. Show your children how to make a fingerprint on a piece of paper. Have them to look at their fingerprints using magnifying glasses. Are they bigger? Do they all look the same? Have children to compare their prints with those of others. Next show children how to make fingerprint pictures by adding details to them.



You can see some more good finger print art ideas at <http://bit.ly/1HdJ8Z> and check out the book about finger pictures listed below.

7. FINGERPRINT GAME

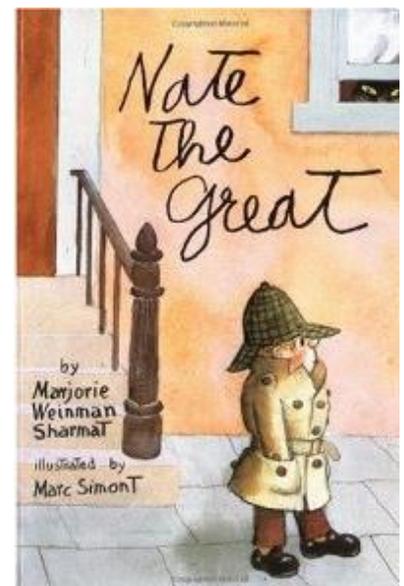
If you have a few children, turn the fingerprinting into a detective game by having the detective leave the room while one child makes a fingerprint. The detective should then examine everyone's fingers to find who left the fingerprint.

8. READ ABOUT DETECTIVES

Why not read the book Nate the Great. The quirky characters and fun storylines are a big hit with kids--all of whom love to solve each mystery alongside the most popular sleuth in the business.

You will find some wonderful detective worksheets at <http://bit.ly/lwbAGG> or <http://bit.ly/lZU5PH>

You could also read about the most famous detective who is always shown with his magnifying glass, Sherlock Holmes.



PART V: EXPLORE FURTHER

Use some other types of magnifiers such as binoculars or telescopes. Look at animals and birds that you can't normally get close to. Watch the stars at night. If you don't have a telescope there are some good books about them below.

1. BUILD A TELESCOPE

Even better than a good book, why not build a telescope. This project is moderately challenging.

You will need:

- 2 convex magnifying lenses
- 2 mailing tubes, one slightly smaller than the other
- Manila file folder
- Scissors
- Glue
- Poster board

- a. Figure out the focal length of your lenses by having someone shine a flashlight up and down over the lens until it creates a bright point.



Measure the distance between the point of light and the lens. Do this with both lenses, and add the two focal lengths together. Then, divide the number by two, and add 1 inch to it to determine the total length of your telescope. Use the scissors or a serrated knife to cut both of the cardboard tubes to the length determined.

- b. Cut two circles out of Manila paper to the size of the diameter of the tubes. Place the lenses in the center of the Manila paper circles, and draw a line around the lens. Cut just inside of this line to create frames for the lenses. Use glue to frame the lenses, and glue the framed lens with the shorter of the two focal lengths into the eyepiece position of the smaller tube. Glue the lens with the longer focal length into the other end of the larger tube.
- c. Slide the smaller tube into the larger tube; this creates a refracting telescope. Put your eye to the eyepiece, and move the outer tube back and forth until you are able to focus on an object clearly.
- d. Decorate your telescope if you like by using a spray adhesive on the cardboard and adding colorful wrapping paper or specialty paper to the outside. You can also paint the scope, or add touches of paint around the lenses frames to make it look authentic.

2. MAGNIFIED SPECIMENS

Look at a variety of interesting magnified specimens at the <http://bit.ly/a8VY3>

3. MAGNIFICATION WORKSHEETS

Google “magnification worksheets” to find sites with many more advanced worksheets.

PART VI: BOOKS

Fingerprint Drawing Book by Ed Emberley

Now & Ben by Gene Barretta

A great kids book about Benjamin Franklin. Ben had poor vision and needed glasses to read. He got tired of constantly taking them off and putting them back on, so he decided to figure out a way to make his glasses let him see both near and far. He had two pairs of spectacles cut in half and put half of each lens in a single frame. Today, we call them bifocals.

I'm A Seed by Jean Marzollo

Two different seeds start off in the ground together. As the two begin to sprout they compare the different growth patterns of their stems, their leaves, their flowers, and what happens to their petals. One of the seeds becomes a beautiful marigold and the other becomes many bright pumpkins. After the seeds have grown they realize that more seeds are produced. The cycle then begins all over again. This is an excellent science book.

You Can Use a Magnifying Glass (Rookie Read-About Science) by Wiley Blevins

Miffy's Magnifying Glass by Dick Bruna This is a preschool book.

Exploring with a Magnifying Glass by Kenneth G. Rainis

A Child's Introduction to the Night Sky: The Story of the Stars, Planets, and Constellations--and How You Can Find Them in the Sky by Michael Driscoll

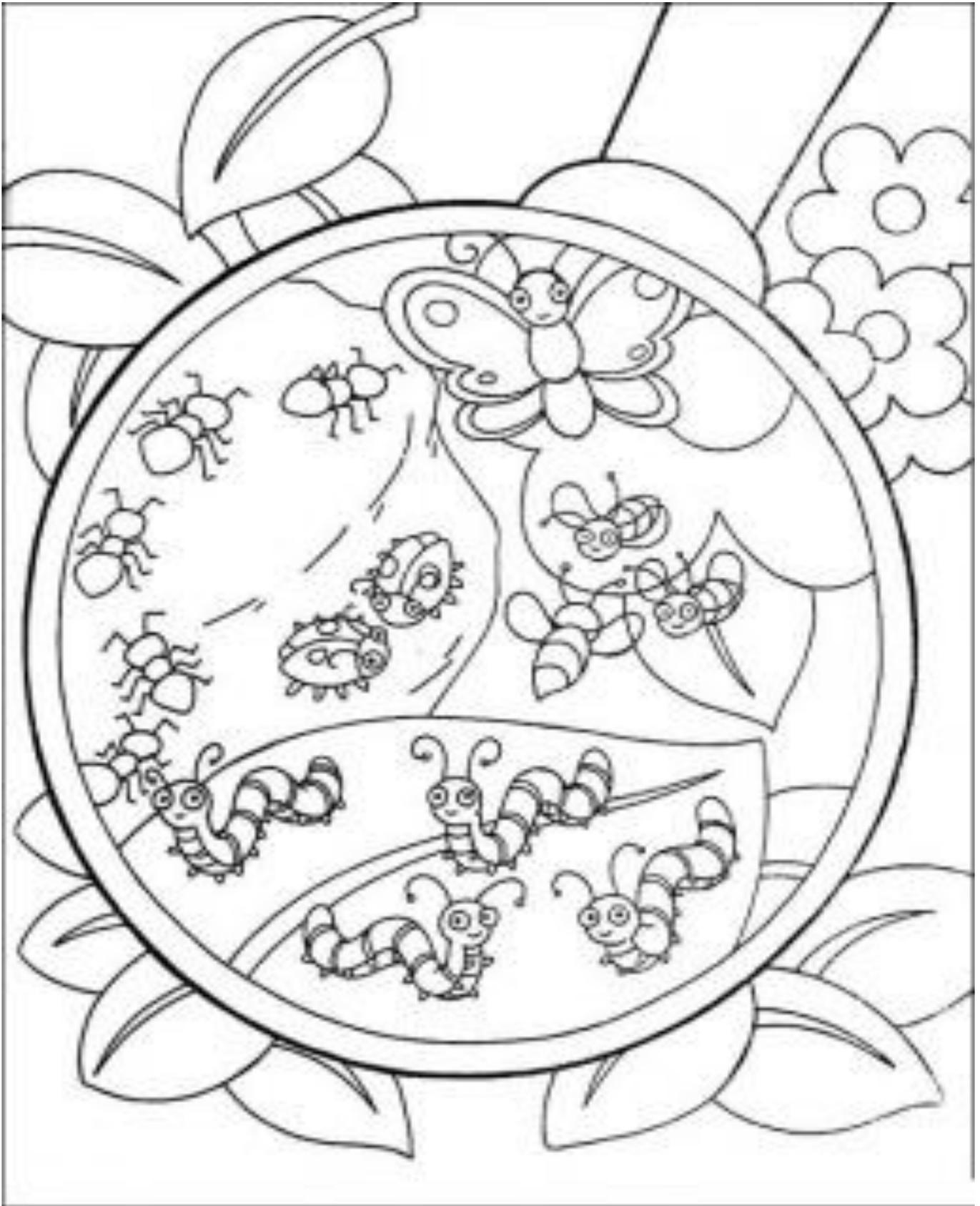
Looking Through a Telescope (Rookie Read-About Science) by Linda Bullock

Galileo's Telescope (Stories of Great People) by Gerry Bailey

The Telescope (Inventions That Shaped the World) by Tamra Orr

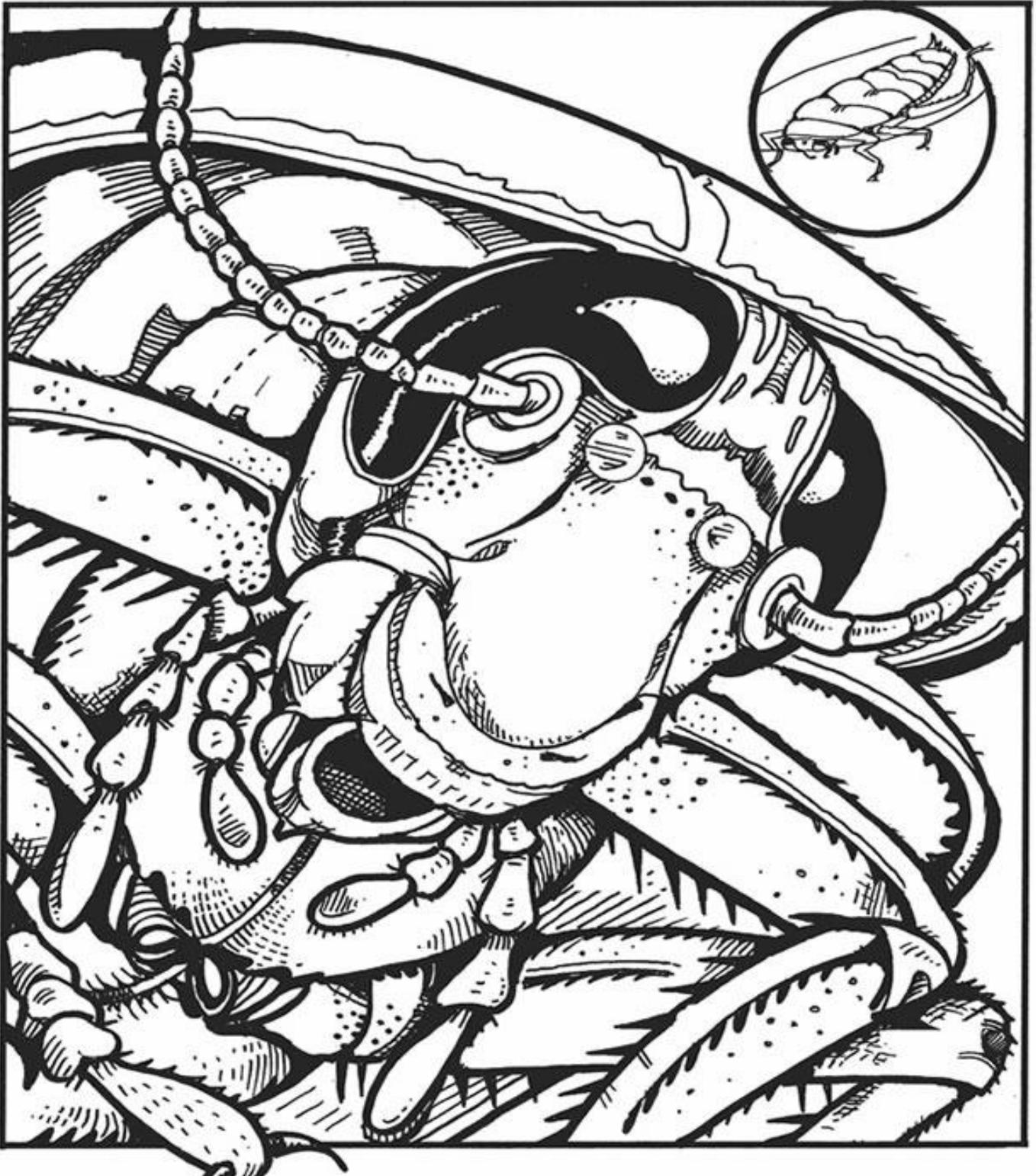
PART VII: PRINTOUTS





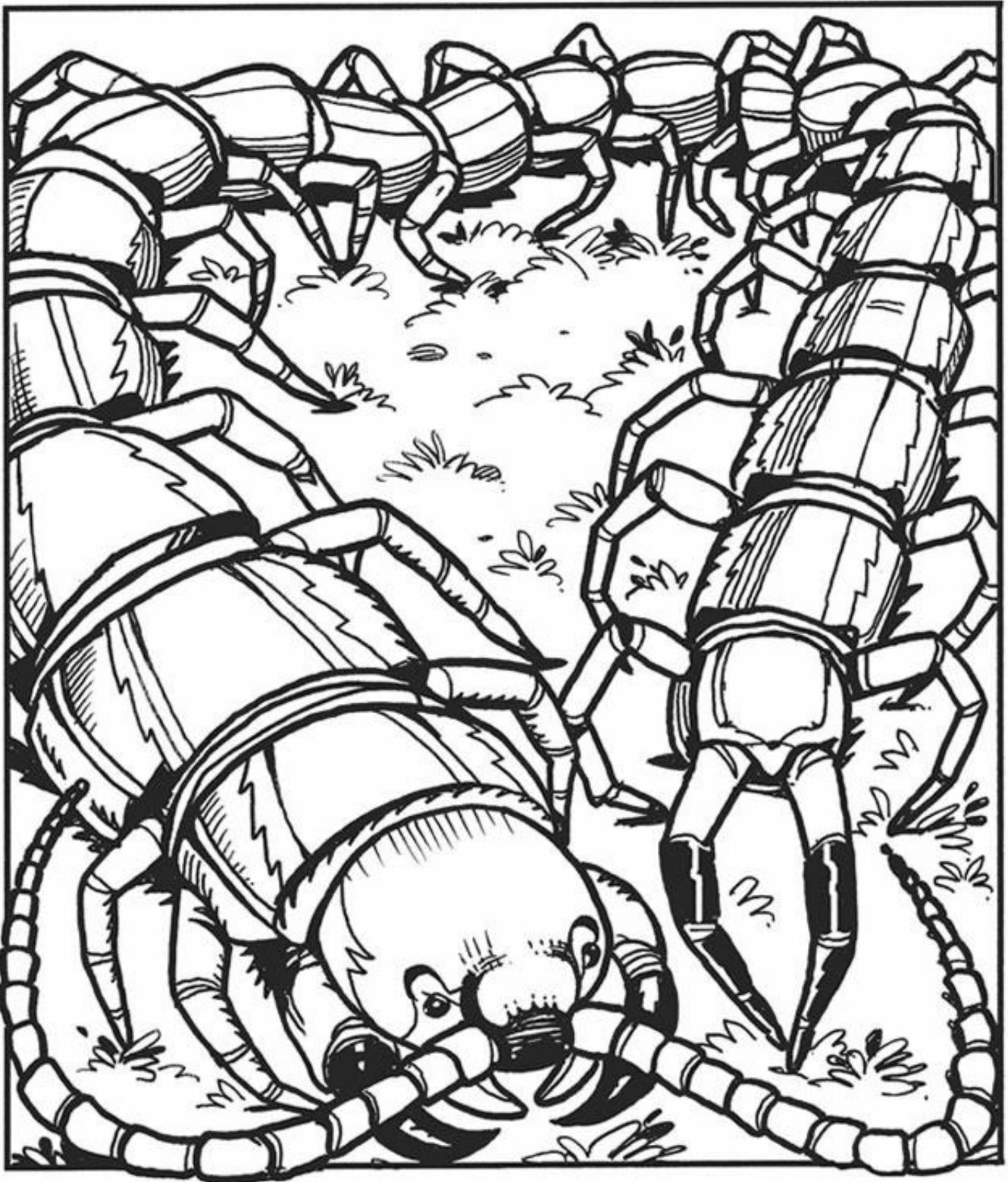
From <http://bit.ly/18xTsJ>

COCKROACH



One of the longest surviving species of insect, fossilized **cockroaches** were found to be as much as 300 million years old. They can grow to be up to three inches long, and often invade human homes! They eat human food and pet food, and have a bad odor.

GIANT TIGER CENTIPEDE



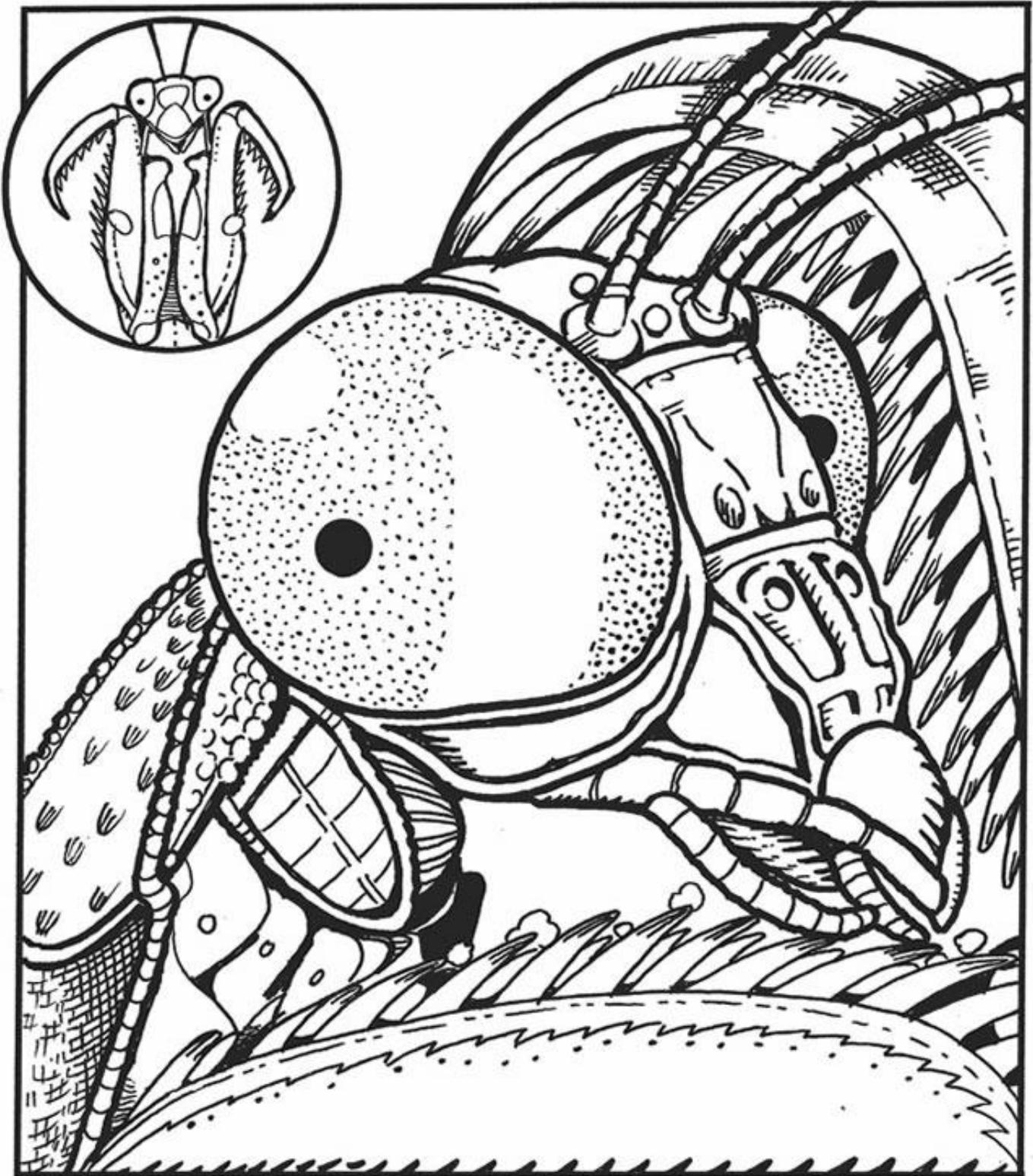
The **giant tiger centipede** is orange and black, just like a tiger. Its many legs contain pincers that produce the poisonous venom it uses to kill its prey. It eats bugs, toads, lizards and small animals.

LONG HORNED BEETLE



The **long horned beetle** is usually considered a pest by humans, since colonies of these bugs burrow inside of tree trunks and feed off the tree's nutrients, eventually killing the tree. It gets its name from its long antennae, which can be twice the length of the body.

PRAYING MANTIS



The **praying mantis'** long, thin body and brown-green coloring makes it resemble a stick, and it often hides camouflaged among the trees and shrubbery. In this way it can pounce upon its prey unseen.

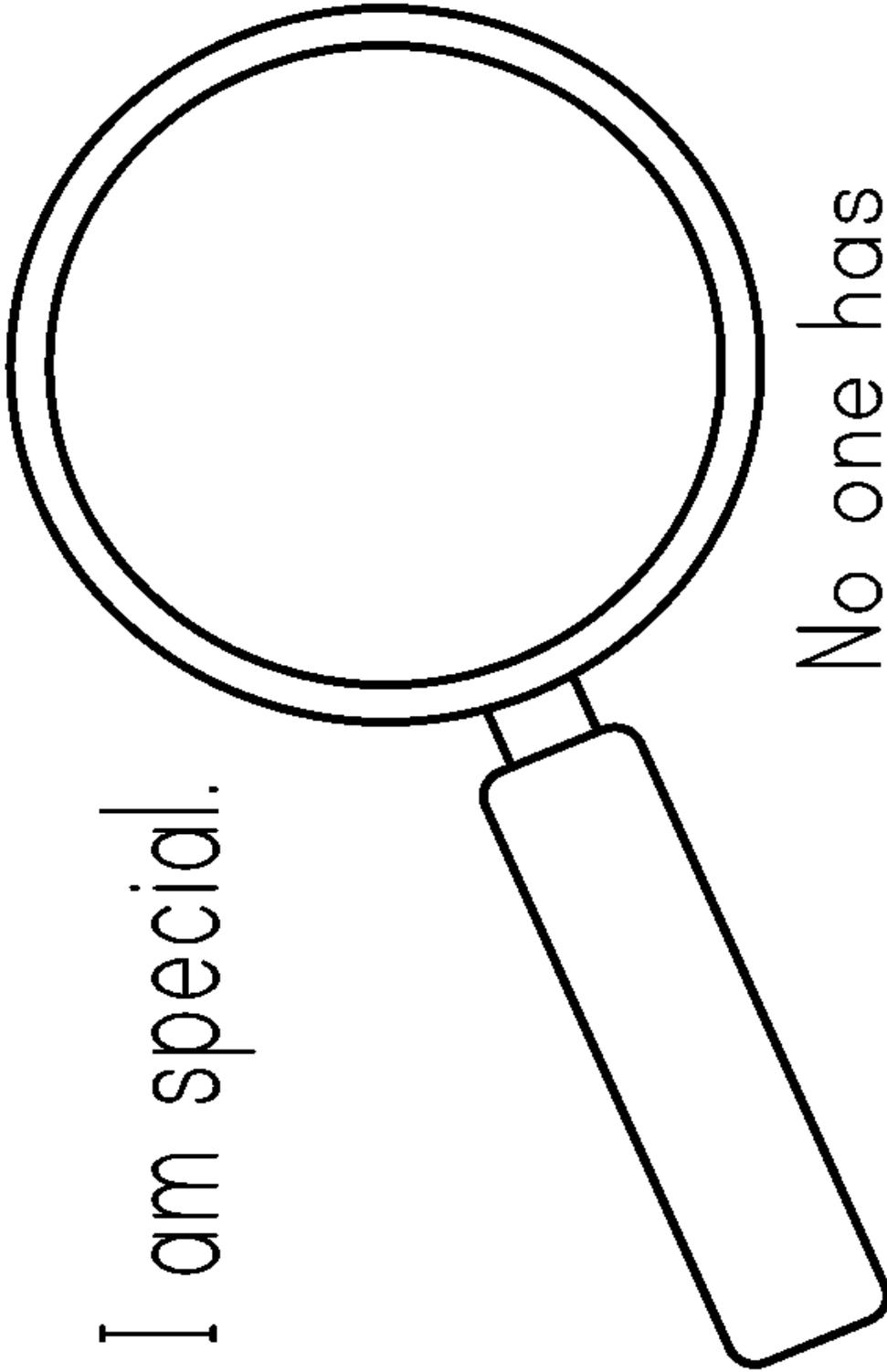
Magnified bugs from the Dover free sampler - <http://bit.ly/eDSZ0Y>

You could be a zoologist. Finish this picture with some creatures that you'd like to study.



The zoologist is using binoculars to make animals who are far away seem bigger. Zoologist from the Dover free sampler - <http://bit.ly/eDSZ0Y>

I am special.



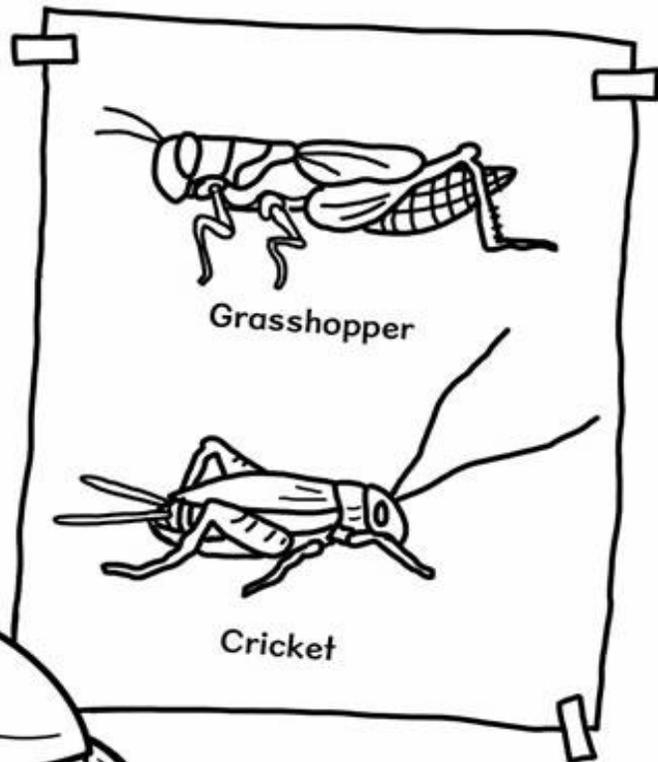
No one has
fingerprints like mine.

For more creative learning ideas check out
www.makinglearningfun.com

Have children put their fingerprint inside the magnifying glass. From <http://bit.ly/lclv7X>

Crickets...

- are nocturnal (active at night).
- are dark in color (pale green to brown) to blend in the shadows at night.
- chirp at night to communicate with other crickets.
- do not fly.
- have long antennae.
- have ears in their legs (look for a white dot near the bend of each leg).



Grasshopper

Cricket



hose or cloth secured with rubber band

large glass jar

Cricket habitat:

dry pet food, fish flakes, wheat germ or bran.



wet cotton ball in plastic lid



egg carton pieces for hiding places

coarse grass or shredded newspaper



Use your magnifying glass to find some crickets. Study the crickets and make them a temporary home. from the Dover free sampler - <http://bit.ly/eDSZ0Y>