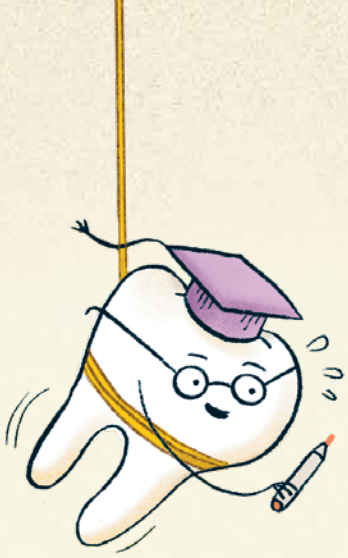


THE MUSEUM OF Odd BODY LEFTOVERS

A Tour of Your Useless Parts, Flaws, and Other Weird Bits

Companion Guide

TITLE: *The Museum of Odd Body Leftovers: A Tour of Your Useless Parts, Flaws, and Other Weird Bits*
AUTHOR: Rachel Poliquin
ILLUSTRATOR: Clayton Hanmer
GENRE: Nonfiction
THEMES: Evolution, adaptations, natural selection, vestigial structures, human ancestors, extinct species, scientific research, human development, museums, humor
SUITABLE FOR: Ages 7–11, Grades 2–6

COMMON CORE STANDARDS:

ENGLISH LANGUAGE ARTS

College and Career Readiness Anchor Standards for Reading, Writing, Speaking and Listening, and Language;
Reading Standards for Informational Text
R.CCR.1, 2, 3, 4, 5, 7
RI.3.1; RI.3.3; RI.3.5
W.CCR.2, 4, 7, 8
SL.CCR.1, 4
L.CCR.4

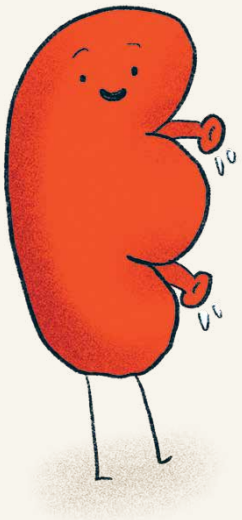
MATH

Operations and Algebraic Thinking; Number and Operations in Base Ten; Number and Operations–Fractions
2.OA.1; 3.OA; 4.OA
2.NBT.2
3.NF.3a; 3.NF.3b; 3.NF.3d; 4.NF.2

SKILLS AND COMPETENCIES

asking questions
making connections
using nonfiction text features
predicting
observing
inferring
collecting data
conducting an experiment
recording information in a table
researching a topic
determining the main theme of a book
evaluating information
drawing conclusions
comparing fractions
identifying literary devices
using tally marks

CONTENTS



BOOK SUMMARY

Welcome to the weirdest museum you'll ever explore—the one inside your body.

Did you know your amazing, incredible body is a walking, talking museum of evolution? In *The Museum of Odd Body Leftovers*, tour guides Wisdom Tooth and Disappearing Kidney will lead you through a wacky museum dedicated to vestigial structures: body parts that were essential to our ancestors but are no longer useful to us—even though they're still hanging around.

From goosebumps and hiccups to exploding organs and monkey muscles, each room in the museum shows us that these parts have stories to tell us about our past. By the time we make it to the gift shop, we'll understand that evolution is not only messy and imperfect, but also ongoing. Our bodies are constantly changing along with the environment we live in—and there's so much that is still unknown, just waiting to be discovered.

ABOUT THE AUTHOR

RACHEL POLIQUIN writes about animals, mostly. She is the author of multiple books for children including The Superpower Field Guides, The Polite Predator Series, and *The Strangest Thing in the Sea*. She lives in Vancouver with her husband and three children.

ABOUT THE ILLUSTRATOR

CLAYTON HANMER (aka CTON) has illustrated several children's books, including *Trending: How and Why Stuff Gets Popular* and *Dog vs. Ultra Dog*. His award-winning comic art has also appeared in *National Geographic Kids*, the *New York Times*, and *Today's Parent*, among other outlets. He lives in Bloomfield, Ontario.

ABOUT THIS GUIDE

This companion guide was created by Becky Noelle, an experienced teacher and biology nerd. Use this guide to help you fully enjoy the book and learn about all the weird evolutionary leftovers in your body!

As you work your way through this guide, use a notebook, binder, or folder on your computer to organize all your thoughts and activities in one place. If you don't want to write out your answers, find a friend or adult to talk to about the book instead.

BEFORE READING

Orient Yourself

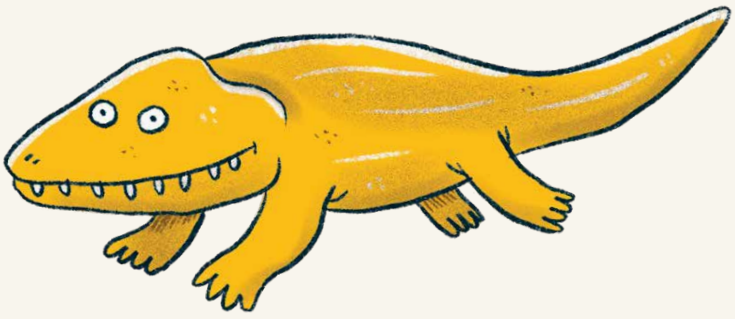
1. Look at the cover of the book and flip through the pages. Is this a fiction or a nonfiction book? How do you know?
2. What do you already know about "useless" body parts?
3. What do you know about museums that might help you navigate this book as you read?
4. Why do you think the author might have used a museum theme for the book?

Find the Text Features

TABLE OF CONTENTS

Find the table of contents on pages 4 and 5. Consider the following questions:

1. What information does the table of contents include?
2. How is this table of contents different from ones in other books?
3. How will the table of contents be useful in helping you explore the book?
4. Which topic in the table of contents interests you the most?



GLOSSARY

Find the glossary on pages 76 to 77. The glossary includes the definitions of some important words from the book. Notice that some of the words also have a pronunciation guide underneath them (in light red).

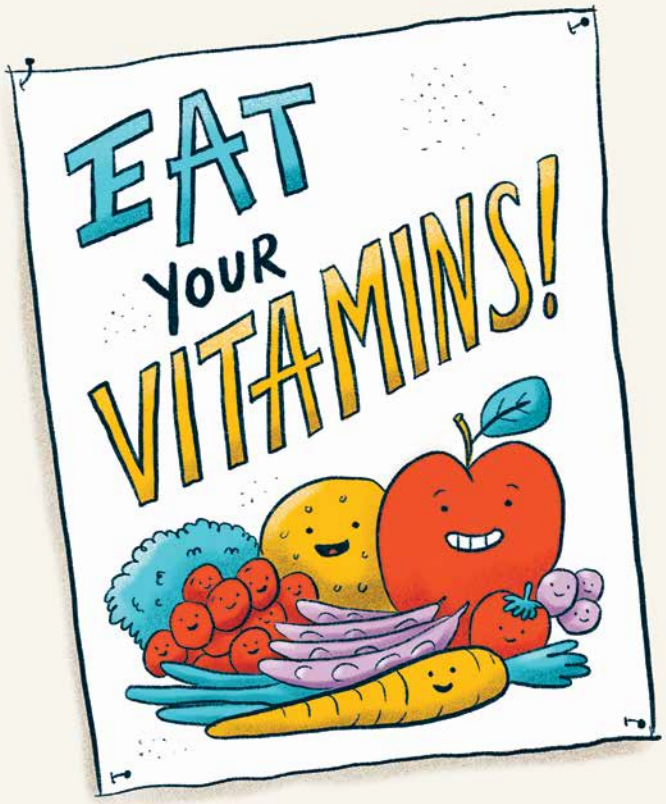
Skim the list of words and see which ones are new to you.

Words included in the glossary are bold in the book. While you're reading, if you come across a bold word that you don't understand, you can find it in the glossary to see what it means.

INDEX

The index is on pages 78 to 79. It includes the most important topics in the book and the page numbers for where you can find those topics.

What words stand out to you in the index? Practice using the index to look up a few words that catch your attention.



HEADINGS

Some of the headings in the book are part of the illustrations–you'll have to look closely to find them!

SIDEBARS

This book has three different kinds of sidebars: pronunciation guides, museum labels, and activities for you to try. Find an example of each in the book. Here are some clues to help:

PRONUNCIATION GUIDES: the word is written in red with a * beside it.

MUSEUM LABELS: the text is in a gold frame that you might find on a museum wall

ACTIVITIES: the text is in a light-blue box, with a red arrow pointing at it that says "Try This."

LABELS

This book has two kinds of labels:

1. labels with arrows (see page 37 for an example)
2. labels with numbers (see pages 14 and 15)

Both kinds of labels will give you more information about what's in the illustration. See if you can find more examples of each kind of label in the book.

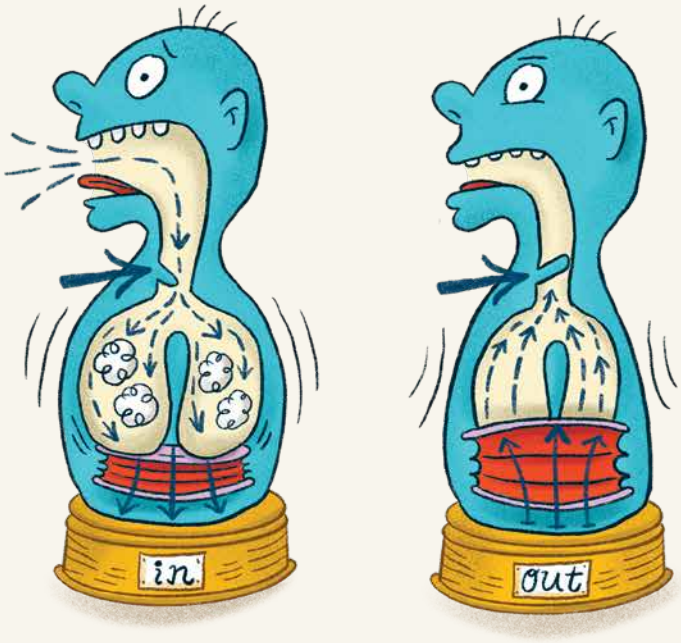
CAPTIONS

Captions are similar to labels, but they give extra information about an illustration. In this book, they give details about the species shown in the illustrations.

Find the captions on pages 33, 64, and 66–68. What kind of information do they include? How might they be useful as you read?

DIAGRAMS

A diagram is a drawing that shows how something happens, which might be difficult to explain with just words. Find the diagrams on pages 41, 57, and 69. Do these diagrams help you understand what's being described in the text? How are these diagrams different from ones you've seen in other nonfiction books like textbooks?



ILLUSTRATIONS

Sometimes nonfiction books use photographs, but this book uses illustrations. Why might the creators of this book have chosen to use illustrations?

The illustrator included some fun details in the illustrations. As you read, see how many extra details you can find. Use the questions below to help.

- Can you find someone hiding on page 18 and a few other spots in the book?
- What do you notice about the gold frames on the sidebars?
- Can you find some smiley faces in places where they don't belong?
- How many spiders can you find in the book?
- What color are Disappearing Kidney's shoes?

SPEECH BUBBLES

Most nonfiction books don't include speech bubbles—but this isn't like most nonfiction books! Speech bubbles are usually a text feature in graphic novels and comics. Why might the author have included speech bubbles, and the Wisdom Tooth and Disappearing Kidney characters, in this book?

FURTHER READING

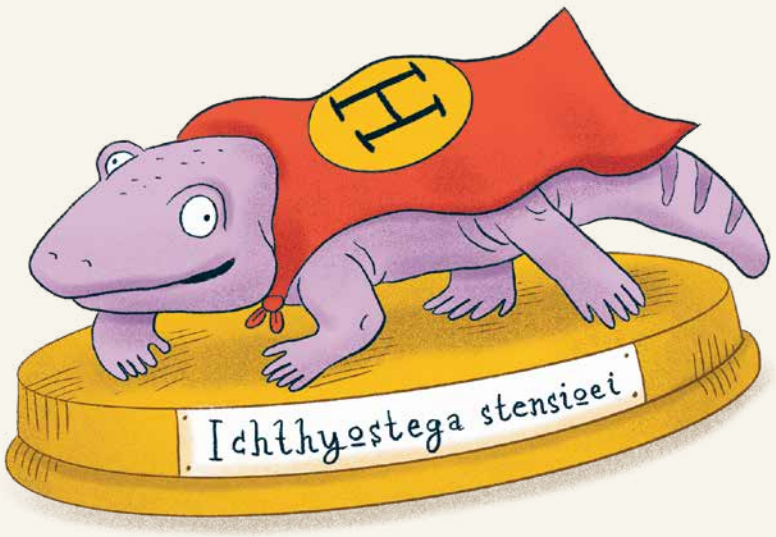
On page 77 you will find a list of resources that you can use to find out more on the topic. Take some time to read some of the other books listed and see what you can learn!

DURING READING

Look It Up

As you read, if you see a word you don't know, use the glossary or a dictionary to find out what it means. Here are some words used in the book that you may want to look up before you begin!

absurd
ancient
astonishing
climate
competition
cycles
dedicated
despair
endangered
extinct
feisty
flexible
flying trapeze
genetic variation
grasping
grooves
hammertoes
indispensably
invented
naturalist
predators
prevent
ridiculous
scuttled
somersault
stability
substitutes
tendons
tubers
under construction
voyages



Make Connections

When you're reading a book, making connections will help you understand and remember what you've read. You can make connections to things you already know, things you've experienced, or other books and movies you've seen on the same topic.

As you read the book, use the following suggestions to help you get started making connections.

1. On page 15 it says "Mostly, we hang around not doing much of anything for millions and millions of years. It doesn't feel great. I would like to be useful."
    a. What do you think it would feel like to not do anything for millions of years?
    b. Describe a time when you felt useless. How did it feel?
2. On pages 33–34, the powerful grip of a newborn baby is described.
3. Have you ever put your finger in a newborn's hand?
4. What happened?
5. How did it feel?
6. On page 34, the author describes the "Big Twitch."
7. Has that ever happened to you?
8. Have you heard any other possible explanations for the Big Twitch?

Notice Literary Devices

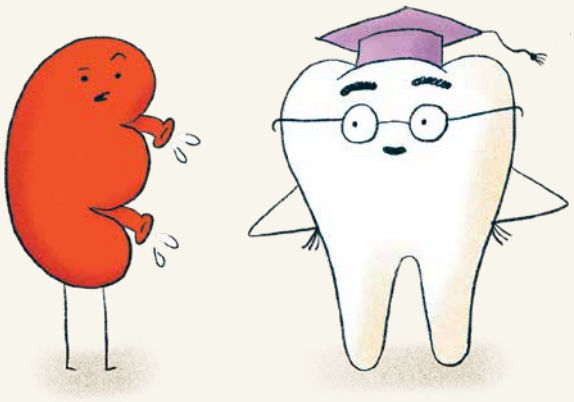
A literary device is something an author uses to make a book more exciting and interesting to read. Learn about the literary devices used in this book and see if you can find more examples of each from the book!

HUMOR

Did you find the book funny? Usually nonfiction books aren't funny, but Rachel Poliquin chose to use humor in this book. Why do you think she chose to do that?

Can you find more examples of humor like the ones listed below?

- The Wisdom Tooth and Disappearing Kidney characters
- The edits in the gold-framed sidebars (Hint: look for the red writing in the sidebars like on page 7)



PERSONIFICATION

Personification is when something that is not human acts in a human way—like a tooth or a kidney!

- Why might the author have chosen to use Wisdom Tooth and Disappearing Kidney as the tour guides, instead of a human tour guide?
- Can you find any other characters in the book that use personification?

(Hint: look at the illustrations on page 24 and 36. Is that how those animals usually act?)

ANTICIPATION

Anticipation is feeling excited about what will come next. The author uses anticipation at the end of each chapter to get you to keep reading.

Can you find more examples of anticipation like the ones listed below?

- "Look, our first room. And it's a good one!" (page 15)
- "Next up, the thousands of tiny muscles in your skin." (page 22)

Did you feel anticipation when you first read the book? Did it make you want to keep reading?

FORESHADOWING

Sometimes, authors give readers hints about what will come next. In this book, the author includes hints about what the last chapter will be about–the Disappearing Kidney.

- How many places in the book can you find where there are hints about the Disappearing Kidney?
- Did the hints make you wonder what a disappearing kidney was?
- Did it make you want to keep reading to find out?

AFTER READING

Ponder the Science of Evolution

What do you already know about science? Did you learn anything new about science from the book?

Scientists look at the world around them and make predictions. They call these predictions hypotheses. A hypothesis is the start of scientific research. Scientists use experiments and other research to find out if their hypothesis might be right.

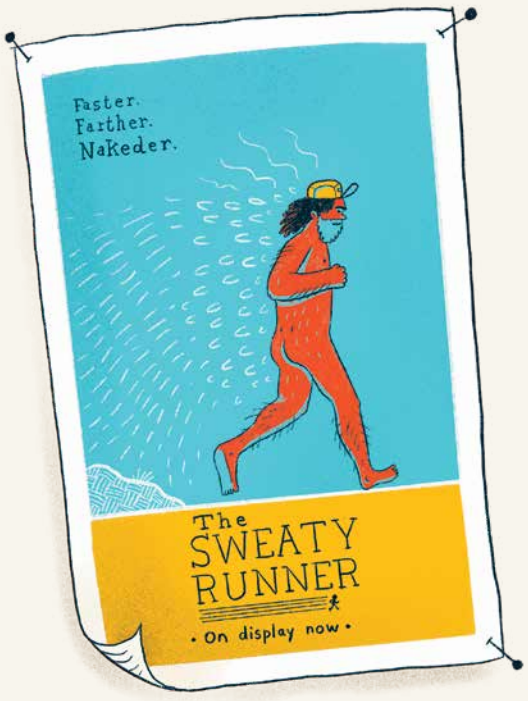
You may have also heard the word "theory" when learning about science. A theory is a prediction, like a hypothesis, but it has lots of observations and experiments to back it up.

The book describes a few theories that scientists have about evolutionary leftovers. In the book, they usually start with "scientists think...". Reread the following sections and think about how scientists may have come up with those explanations:

1. The Monkey Grip (pages 33 to 34)
2. The Big Twitch (page 34)
3. Survivor Hairs (pages 44 to 47)
4. The GULO gene (page 63)
5. Wrinkly Fingers (pages 64 to 65)
6. Hiccups (pages 68 to 69)

What information do scientists use to come up with theories about extinct species and evolution?

(Hint: read what Wisdom Tooth has to say about scientists on pages 47 and 53. Then read the gold-framed sidebar on page 27.)



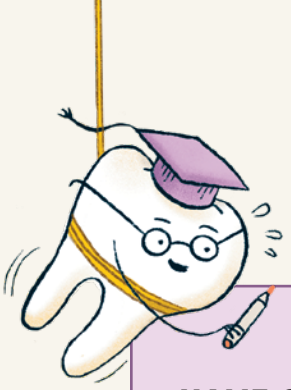
PRACTICE BEING A SCIENTIST

You can do your own scientific tests! Follow the steps below to try out some of the activities described in the Try This sidebars.

Wisdom Tooth Survey

STEPS:

1. Read the sidebar on page 23.
2. Find ten adults to ask about their wisdom teeth.
3. Write each adult's name in the first column of the table below.
4. Ask each adult the questions in the second and third column.
5. Write each adult's answers in the row next to their name.
6. Bonus: Ask the adults you talk to what it was like to get their wisdom teeth taken out. You might get to hear some good stories!
7. Answer the following questions to reflect on what you found:
    - How many adults had had their wisdom teeth removed?
    - How many adults did you find that didn't grow all four wisdom teeth?
    - What surprised you about the results?

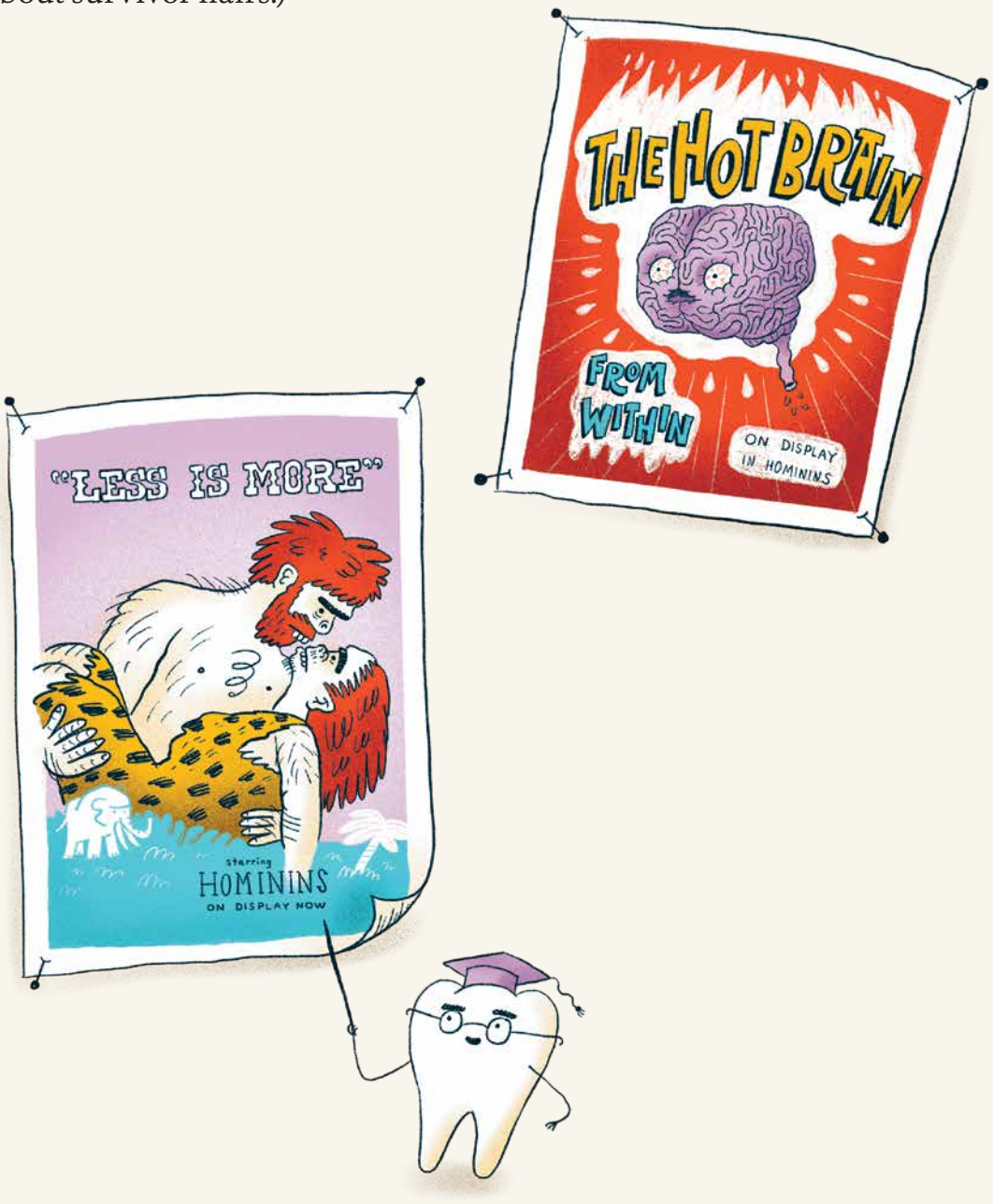


Wisdom Tooth Survey

NAME OF ADULT	HAVE YOU HAD YOUR WISDOM TEETH REMOVED? (YES OR NO)	HOW MANY WISDOM TEETH DO (OR DID) YOU HAVE?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Goosebump Experiment

The sidebar on page 27 asks, "How many ways can you give yourself goosebumps?" Try out the different ways listed below and come up with some of your own! Use the table to keep track of your results and record anything you noticed (For example, did you always get the same amount of goosebumps? Were they all over your body or just in some places? Did you notice a change in your survivor hairs when you got goosebumps? Hint: reread pages 25 to 26 for a reminder about survivor hairs.)



ACTIVITY	DID IT GIVE YOU GOOSEBUMPS? (YES OR NO)	WHAT DID YOU NOTICE?
Having a cold bath		
Rubbing ice cubes on your arms		
Hearing creepy noises		
Listening to beautiful music		
Getting a head massage		
Drinking sour lemonade		
Hearing heroic tales		
Scratching your nails down a blackboard		
Thinking about making your skin goosebump-y		

Palmaris Longus Tally

Try the palmaris longus test described on page 34. Then, find some other people to try it too. Use tally marks in the table below to keep track of how many people have or don't have a palmaris longus.

(Tip: Tallies can be made in groups of five. So, after you have four tallies in a row, add the fifth tally across the four already there. That way, you can easily add up your tallies by counting by five. See the example below.)

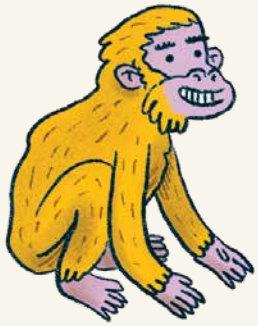
HAS A PALMARIS LONGUS	DOESN'T HAVE A PALMARIS LONGUS

On page 32, it says that about one in five (1/5) people don't have the palmaris longus. See if the data you collected matches this statistic!

Number of people with a palmaris longus = _____
(Add up the tallies in the first column of the table above.)

Number of people without a palmaris longus = _____
(Add up the tallies in the second column.)

Total number of people surveyed = _____
(Add up the two numbers above to get your total.)



Now, write the following fraction:

$$\frac{\text{Number of people } \textit{without} \text{ a palmaris longus}}{\text{Total number of people surveyed}}$$

What did you get? Use equivalent fractions to compare your result. Is your result close to 1/5?

When scientists do an experiment, they have to do the test many times. The number of tests they do is called the sample size. The bigger the sample size, the better the results. If your number wasn't close to 1/5 it might be because your sample size was too small. If you could ask every person in the whole country about their palmaris longus, then you might get an answer closer to 1/5!

Pruney Fingers Test

When scientists do research, they have to use a fair test. A fair test makes sure each time the scientist does the experiment, they do it in the exact same way. That way, the results can be trusted. Fair tests have three kinds of variables. A variable is something that could be changed in a test. Here are the three kinds of variables:

1. **INDEPENDENT VARIABLE:** the one variable that the scientist changes
2. **DEPENDENT VARIABLE:** the variable that changes because of what the scientist does. This is the variable that the scientist will observe and collect data on.
3. **CONTROLLED VARIABLES:** the variables that the scientist must keep the same for every test

When you're trying out the experiments below, make sure you keep everything the same except the independent variable! Here are the variables for the pruney fingers test:

INDEPENDENT VARIABLE:
whose fingers are being tested

DEPENDENT VARIABLE:
how long it takes to get pruney

CONTROLLED VARIABLES:
the bucket used, the amount of water, the stopwatch used, how far the hand is in the water. Can you think of any more controlled variables?

Read about Wrinkly Fingers on pages 64 to 65. Use the steps below to see how long your fingers take to get pruney.

MATERIALS:

large bucket
stopwatch

STEPS:

1. Fill the bucket with water.
2. Set the stopwatch for 1 minute.
3. Put your hand into the bucket so it's completely underwater.
4. After 1 minute, pull your hand out of the water.
5. Look closely at your fingertips.
6. In the table below, write some notes on how pruney your fingers are.
7. Repeat steps 2 to 6 until your fingers are completely pruney.
8. Have a friend try it out too and see whose fingers take longer to get pruney!

TIPS FOR SUCCESS:

- Most smartphones have a stopwatch app on them that you could use.
- Test the hand you don't write with, so you can still take notes when your hand is wet and pruney!
- Add more rows to the table if it takes longer than 5 minutes for your fingers to get pruney.

TEST 1: MY PRUNEY FINGERS

TIME IN WATER	LEVEL OF PRUNEY-NESS
1 minute	
2 minutes	
3 minutes	
4 minutes	
5 minutes	

TEST 2: MY FRIEND'S PRUNEY FINGERS

TIME IN WATER	LEVEL OF PRUNEY-NESS
1 minute	
2 minutes	
3 minutes	
4 minutes	
5 minutes	

Marble Test

Try the marble test described on page 65 by following the steps below. Make sure you keep the controlled variables the same for both tests! Here are the variables for this test:

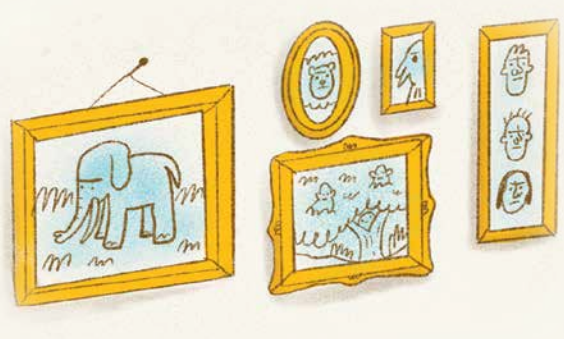
INDEPENDENT VARIABLE: finger status (normal or pruney)

DEPENDENT VARIABLE: time it takes to get all ten marbles into the container

CONTROLLED VARIABLES: the type of marbles, the number of marbles, the bucket, the amount of water in the bucket, the container used, the stopwatch used, how far the hand is in the water

MATERIALS:

large bucket
small container with a lid
ten marbles
stopwatch



STEPS:

1. Fill the large bucket with water.
2. Cut a hole in the lid of the container big enough to fit the marbles through.
3. Put the marbles into the bucket of water.
4. Hold the container on the bottom of the bucket with your left hand.
5. Start your stopwatch.
6. Use your right hand to pick up each marble and put it through the hole into the container, all while underwater!
7. Once all the marbles are in the container, stop the stopwatch.

8. Record the time it took to get all ten marbles into the container in the table below.
9. Add anything you noticed during the test under "Observations" in the table.
10. Hold your right hand in the water until it gets pruney.
11. Repeat steps 3 to 9 above with your pruney fingers.

TIPS FOR SUCCESS:

- Make sure you choose a container that you can cut a hole in. A yogurt container would work nicely!
- Ask an adult to help you safely cut a hole in the container lid.
- If you're left-handed, then use your right hand to hold the container on the bottom of the bucket and your left hand to move the marbles.
- Get an adult or a friend to help you start and stop the stopwatch.
- Most smartphones have a stopwatch app on them that you could use.
- If you complete the "Pruney Fingers Test" (page X of this guide) first, you'll know how long to hold your hand in the water to make it pruney for step 10 above.

FINGER STATUS	TIME IT TOOK TO GET ALL TEN MARBLES INTO THE CONTAINER (SECONDS)	OBSERVATIONS
Normal		
Pruney		

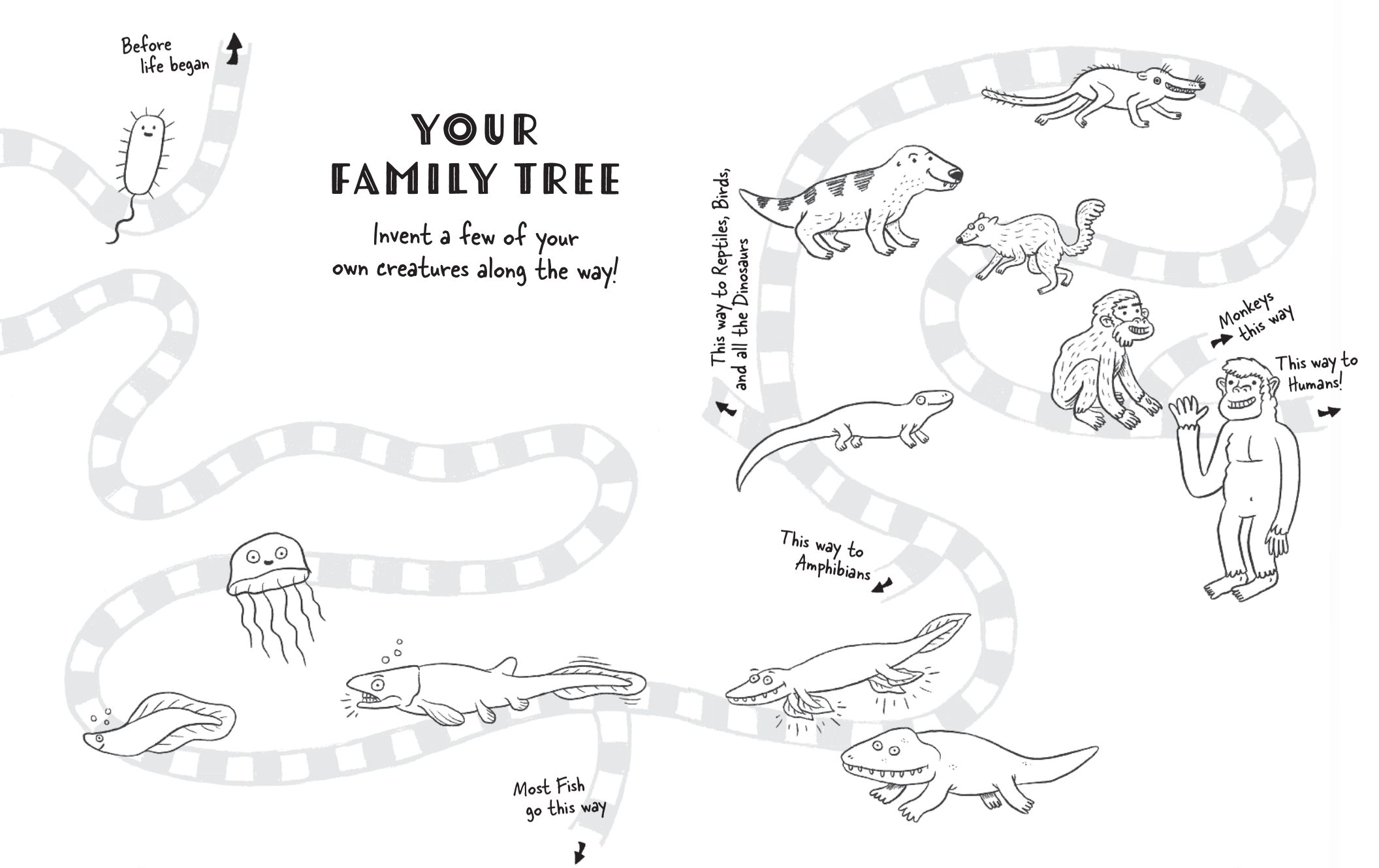
LEARN MORE

Want to keep going? Use the ideas below to learn more and further enjoy the book!

- Choose a leftover part from the Museum Storage shelf on page 50 and see what you can learn about it online. What does the part do? Where is it located in your body? How is it connected to evolution?
- Pages 56 to 57 describe how babies grow inside their mothers. Research online to learn more about how babies grow and change before they are born.
- Use any of the species names from the book to research and learn more about that species. Here are a few to get you started:

Archaeothyris florensis
Ardipithecus ramidus
Australopithecus afarensis
Carpolestes simpsoni
Castor canadensis
Homo erectus
Ichthyostega stensioei
Juramaia sinensis
Loxodonta africana
Nacholapithecus kerioi
Panthera leo
Thrinaxodon liorhinus

- Design your own museum. If you could visit a museum about literally anything, what would it be? Draw a map for your museum, choose a tour guide, design museum signs, and choose items you'd include in your museum—all to match the theme of your museum!



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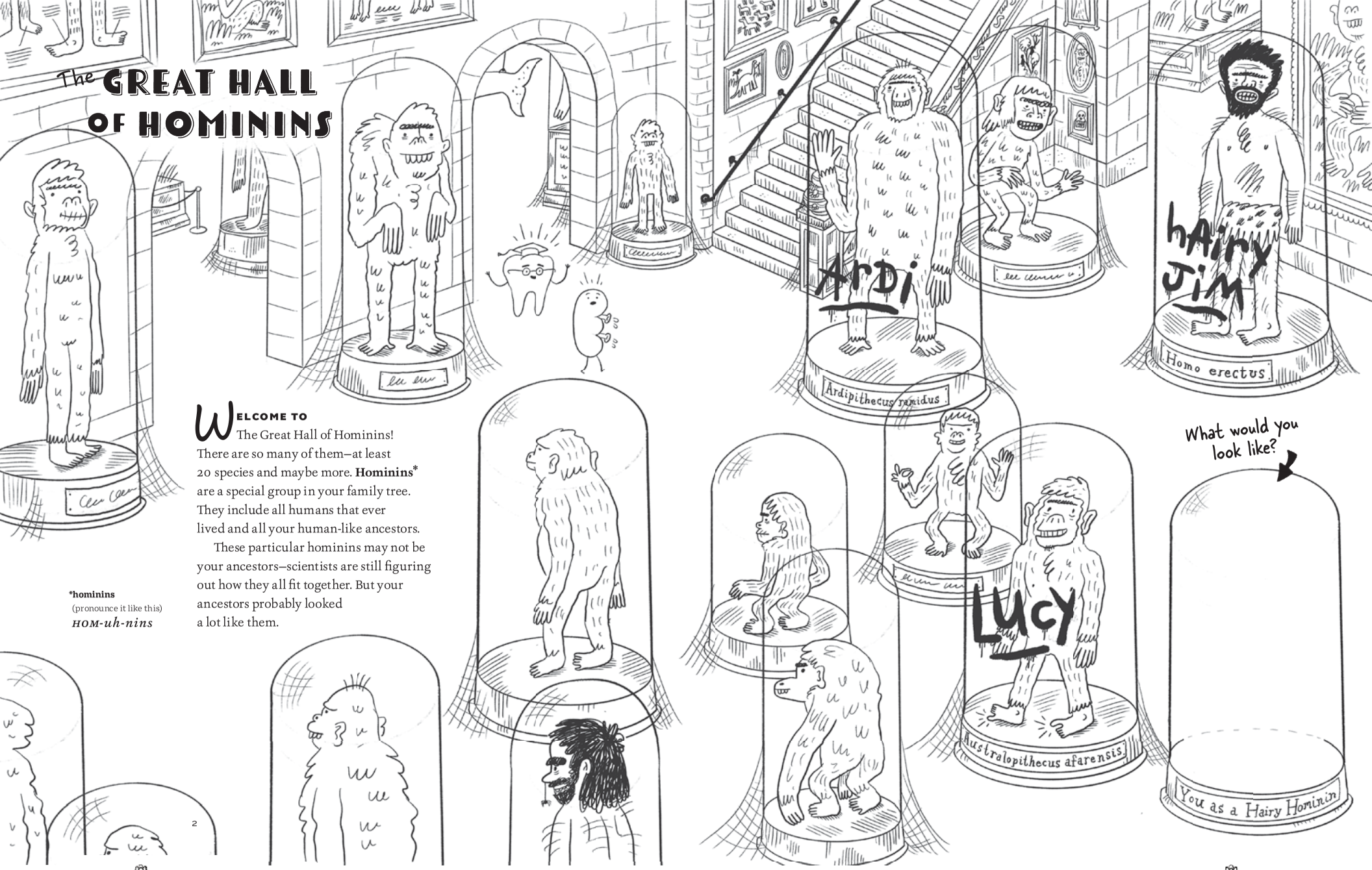

WELCOME TO The Great Hall of Hominins! There are so many of them—at least 20 species and maybe more. **Hominins*** are a special group in your family tree. They include all humans that ever lived and all your human-like ancestors.

These particular hominins may not be your ancestors—scientists are still figuring out how they all fit together. But your ancestors probably looked a lot like them.

***hominins**
(pronounce it like this)
HOM-uh-nins

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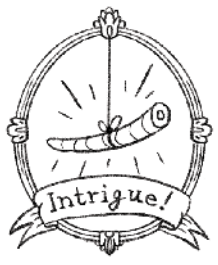
RACHEL POLIQUIN
ILLUSTRATIONS BY Clayton Hanmer



Mystery!

THE MUSEUM OF ODD BODY LEFTOVERS

A Tour of Your Useless Parts, Flaws, and Other Weird Bits

RACHEL POLIQUIN

ILLUSTRATIONS BY Clayton Hanmer

Intrigue!