

IF MY MOM WERE A PLATYPUS represents an up-close and unforgettable adventure into the fascinating world of mammals. From ordinary to the most unusual, the author captures the excitement of each baby's journey from helplessness to maturity. This Guide gives you engaging and easy-to-follow ideas on how to excite kids about the world of mammals.

SCIENCE: Go Exploring Animal by Animal

SOCIAL STUDIES: Multi-Cultural Explorations

MATH: Problem Solving Skills

LANGUAGE ARTS: Expository & Narrative Writing

RESEARCH: Cooperative Learning Unit

EXTENSIONS: Stretch Your Brain



Sparking curiosity through reading

Teacher's Guide

FOR

If My Mom Were a Platypus: Mammal Babies and Their Mothers

Teacher's Guide
Co-Written by Emily Schuster
and Kathy Leggett

The Teacher's Guide can be downloaded
free of charge at ScienceNaturally.com

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*If My Mom Were a Platypus:
Mammal Babies and Their Mothers*

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Product Information

BOOK SUMMARY

All over the world, in all kinds of habitats, mothers bring forth new life. For many animals, such as reptiles and amphibians, mothering responsibilities end before the babies are even born. But mammal babies need their mothers—they need to be nurtured and nourished long enough to learn how to survive on their own.

All mammal mothers feed, protect, and teach their young, even though these tasks can challenge their own needs for survival. But a mammal baby's journey to maturity varies dramatically depending on whether it is a bear or a bat, a shrew or a seal, a hippopotamus or a human. This fascinating look at life cycles portrays the normalcy of birth and breastfeeding and explores how mothers help 14 different baby mammals navigate the path from helpless infants to self-sufficient adults.

IF MY MOM WERE A PLATYPUS: MAMMAL BABIES AND THEIR MOTHERS

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Reviews and Acclaim

"I am blown away by this book! This is one of the most engaging nonfiction books I have ever read. It correlates so well with our science curriculum and the Common Core State Standards. The Teacher's Guide and Hands-On Demonstrations are so teacher friendly. I cannot say enough positive things about this material!"

—Sonya Smith, Science Coordinator, IMPACT2 (In-depth Mathematical Practices and Content Teacher Training), Miss. State, MS and ATOMS2XP (Advancing Teachers of Middle School Science)

"*If My Mom Were A Platypus* is enjoyable, accurate, and informative. It will be useful, indeed, in primary and middle school curricula. I know how difficult—but essential—it is to have all of the facts right, yet still be interesting and readable. This book manages both very well. I hope that it ends up in many, many schools!"

—Don E. Wilson, Ph.D., Editor, *Animal: The Definitive Visual Guide to the World's Wildlife*

"An amazing achievement! Zoologists will get lost in the accuracy and detail of the descriptions of birth and feeding. Children will be captivated by the beautiful pictures and stories of mammal mother and baby pairs. I was surprised by how many new facts I learned. And what could be more entertaining yet educationally valuable for a child to see than that mammas—whether human, bear, bat, giraffe, seal, or shrew—all have important things in common. The only problem with *If My Mom Were A Platypus* is that big adult kids might butt out smaller kids in their effort to read the book!"

—James McKenna, Ph.D., Dept. of Anthropology, University of Notre Dame, South Bend, IN

"Children are curious about the natural world around them. We are always looking for good materials to help teachers respond to their students' questions and were delighted to find *If My Mom Were A Platypus*. The book uses the simple concept of comparing offspring to expose students to life cycles, environments, animal behavior—the wonderful variety of life on Earth. Not only is the book as engaging visually as it is verbally, but the Teacher's Guide gives teachers the tools they need to present, explain and expand upon the book's content. *If My Mom Were A Platypus* is a real asset for teachers delving into the world of mammals."

—Dr. Inés L. Cifuentes, Director, Carnegie Academy for Science Education Carnegie Institution of Washington, Washington, DC

"*If My Mom Were A Platypus* fits perfectly into our 5th grade Animals curriculum. The students greeted the book like eager beavers—devouring each chapter and delving right into the next one. In class after class, they read beyond the required reading, propelled by excitement over what they were learning. The Teacher's Guide is chock-full of ways to explore the text, but the book is so full of fascinating facts, I was hardly wanting for ideas. What the kids really loved was writing up quiz questions they learned from the book, then testing each other on their newfound knowledge. This book is a natural for elementary and middle school science classes!"

—Catherine Taylor, 5th Gr. Science Teacher, Stuart Hobson Museum Magnet MS, Washington, DC

"*If My Mom Were A Platypus* is an entrancing children's book covering all sorts of animal babies—platypus, koala, lion, orangutan, whale, shrew and more. The beautifully-illustrated text pulls in children by pretending they are the baby. *If My Mom Were A Platypus* describes in detail how different babies eat, learn, grow and mature. This fact-loaded book delights both adults and children and is extraordinarily hard to put down. Even the ending is superb. Includes glossary and index and highlights endangered or threatened species. Teacher's Guides are available at ScienceNaturally.com. Perfect for school or home use. Ages 4–adult."

—Dr. Kathleen Kain, Science Educator, Science Spiders Newsletter

Discover Why Everyone Loves...

If My Mom Were a Platypus: Mammal Babies and Their Mothers



Awarded Book of the Year by **Creative Child Magazine**.



Earned the **Young Voices Foundation** Seal of Approval.



Awarded the highly regarded “NSTA RECOMMENDS” by the **National Science Teachers Association**.



CALIFORNIA
ACADEMY OF
SCIENCES

Recommended by the **California Academy of Sciences** in their Science Story Adventures series.



Recommended by the **Carnegie Institution for Science**:
“As engaging visually as it is verbally!”



Featured annually at Family Science Days at the **American Association for the Advancement of Science** (AAAS)



ForeWord Magazine: “...completely engrossing! School-aged animal lovers will really enjoy the easily digestible and fun-for-sharing facts.”



Recommend by **KidsPost** as a favorite summer reading animal book!

Beginnings

Dear Reader,

We're excited to introduce you to our **Beginnings** collection. *If My Mom Were a Platypus* was one of the first books published by Science Naturally, but the classic science content and immersive illustrations make it the perfect addition to our new collection of early childhood STEM books.

Scientific curiosity begins in childhood. Exposure to animals and their environments—whether in nature or in a book—is often at the root of a child's interest in science. Young Jane Goodall loved to observe the wildlife near her home, a passion that inspired her groundbreaking chimpanzee research. Charles Turner, pioneering entomologist, spent hours reading about ants and other insects in the pages of his father's books. Rachel Carson began writing stories about squirrels when she was eight. Spark curiosity in a child and watch them develop a lifelong enthusiasm for learning.

These beautifully illustrated, information-packed titles introduce youngsters to the wonderful world of animals, and, by extension, to themselves. They encourage children to make realworld connections that sharpen their analytical skills and give them a head start in STEM. Reading these titles together inspires children to think about how each species matures, what they need to survive, and what their communities look like—whether pride, flock, or family.

More than a simple scientific introduction, these animal stories illustrate and explore caring love across the mammal class. Showing children attachment in the natural world fosters empathy, kindness, and compassion in both their interpersonal and interspecies interactions. An easy choice for the home, library, or classroom, our Beginnings collection has something to spark or sustain budding curiosity in any child.



Cheers!

Dia L. Michels
Publisher, Science Naturally

The **Beginnings** collection also includes:

CUDDLED AND CARRIED / CONSENTIDO Y CARGADO

Bilingual Paperback: 978-1-930775-95-4 • Bilingual Hardback: 978-1-930775-96-1
English-only Paperback: 978-1-930775-98-5 • English-only Hardback: 978-1-930775-99-2

BABIES NURSE / ASÍ SE ALIMENTAN LOS BEBÉS

Bilingual Paperback: 978-1-930775-72-5 • Bilingual Hardback: 978-1-930775-73-2
English-only Paperback: 978-1-930775-71-8 • English-only Hardback: 978-1-930775-61-9

Coming Soon!

THIS IS HOW I GROW in English and Spanish editions

Meet the Team

About the Author and Illustrator



DIA L. MICHELS is an internationally published award-winning science and parenting writer. She has authored or edited over a dozen books for both children and adults. Dia conceived this book in 1989 when she was pregnant with her first child. She had wanted children very much, but found pregnancy almost unbearable. She suffered from depression, anxiety attacks and intense morning sickness. During this time, she decided to find out how other mammals handled pregnancy and birth. From her research, she concluded that when it comes to reproduction, the platypus was far superior to humans, inspiring her to write *If My Mom Were a Platypus*.

Dia gives presentations across the country about parenting, breastfeeding, and STEM topics. “I like to connect with people through the words in my books,” she says, “but it is even better to connect with people face-to-face. The magic of words, whether written or spoken, is that they can bring us together. That’s what learning how to write is all about and that’s what life is all about.” Dia lives in Washington, DC. You can contact her at Dia@ScienceNaturally.com



ANDREW BARTHELMES is a talented illustrator and graphic artist. he is the designer behind the award-winning *One Minute Mysteries* series of science and math books. His work has appeared in the *New Yorker* and other publications. He lives in Peekskill, NY with his wife and three kids. He can be reached at Andrew@ScienceNaturally.com.

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KATHY LEGGETT, Co-Writer, has been creating exciting schooldays for little people for 23 years, 16 of them as a first grade teacher in Prince William County, Virginia, public schools. She incorporates ideas that have worked in real classrooms into our Platypus Media Teacher's Guides. Kathy earned her teaching degree from Fairmont State University and her Masters in Gifted and Talented Education from West Virginia University. The mother of two boys, Kathy is also an active Cub Scout pack and den leader. Contact her at Kathy@PlatypusMedia.com.



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HANNAH THELEN, Editor, graduated from Bowling Green State University with a BFA in Creative Writing and a minor in Print Design and Technology. She is an editor and graphic designer for Science Naturally and Platypus Media. She lives in Silver Spring, MD, and can be reached at Hannah@ScienceNaturally.com.

Building Background Knowledge

Picture Walk through the book to draw interest to the text. Older children can be directed to read on their own. With younger listeners focus on one animal at a time.

Survey the audience as to their experience with animals. Who has visited a zoo, aquarium, or nature center? Does anyone have a pet? Has anyone ever observed an animal in its natural habitat? Discuss.

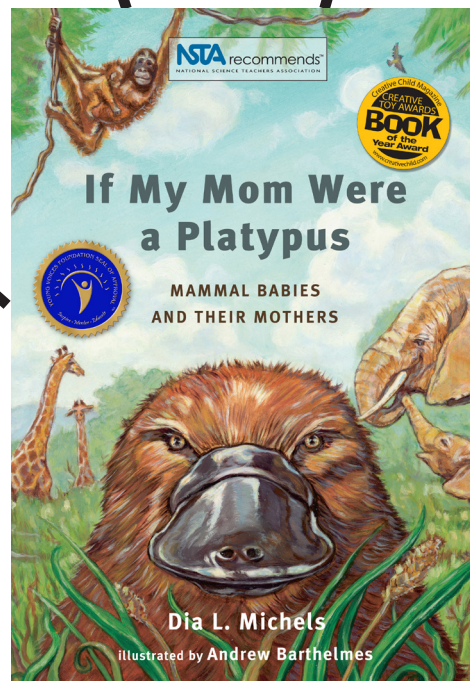
Discuss what the animals in this book have in common.

They are all mammals. Mammals all have similar characteristics. Use a dictionary or encyclopedia and have students define the word mammal.

- All mammals have backbones; have children feel their backbones.
- All mammals have hair or fur.
- Breastmilk is the first food for all mammal babies
- All mammals are warm blooded.

Predict from the title *If My Mom Were a Platypus* what the story is going to be about. Who appears to be telling the story? Will this book tell us only about the platypus? Or will this book, with a giraffe on the cover, tell us about more than one animal?

Discuss predictions, asking listeners to justify their answers. Ask older listeners to respond in writing in a journal.



If My Mom Were a Platypus is written in first person from the point of view of the baby. Encourage readers to think about problems young animals have and what the animals must learn in order to survive.

List some of the problems any animal might face and compare these to the problems humans face growing up.

All animals have a habitat that is just right for them. Name a habitat, such as the ocean. Brainstorm names of animals that might live in that habit. How many of them are mammals?

In small groups, brainstorm the lives of all the animals the groups can think of. Then, without direction, ask the groups to classify and categorize their list. Go over them with the class.

What types of characteristics did the children choose to sort by? Skin type, habitat, ways of movement?

Ask groups to validate their groupings. Use this information to assess what characteristics need additional focus.

Narrative Writing

Compare and Contrast / The Human Mammal

The final section of *If My Mom Were a Platypus* focuses on us, the human mammal. Have each child write a narrative of his or her own life, complete with a collage of illustrations and facts gathered from various recourses.

Children can interview their own families to learn the story of their birth. Invite children to design a research web on themselves to use in compiling the information. Questions such as these might be helpful:

How was I born? Was I born into a family of one or two or three or ____? How did I grow? What do I know? How did I learn? What do I eat? What are my favorite foods? Where do I live? (What is my habitat?) Can human animals have different habitats?

Suggest the use of a baby book, grandparents, photo albums, and/or a video of themselves at a younger age as possible resources.



If my mom were a Human...

...I would have been born _____ !

And this would be my story.

Music / Listening

Sing a song about all the facts learned from reading this story. Doing that could be a review for a test or a quiz, or it could be a fun-filled activity at the end of the day.

Invite children to make up rhymes to add to the song, including information on all the mammals, even themselves. Vary the information in the song according to the listening/learning levels of students.



(sing to the tune of Mary had a Little Lamb)

The elephant walks around so soft,
Around so soft, around so soft.
The elephant walks around so soft,
On his padded feet.

The koala was born in a tree,
In a tree, in a tree.
The koala was born in a tree,
A eucalyptus tree.

The giraffe has a big long neck,
A big long neck, a big long neck.
The giraffe has a big long neck,
With seven great big bones.

Children of all ages love listening, watching, and learning about animals. Supplement any activities with videos and/or CDs about different animals.

Language Skill Development

The text of this delightful story lends itself to the enhancement of many skills. When these skills are introduced and practiced within the context of the story, the lesson becomes more meaningful to the learner.

Parts of Speech

Play a “How Many Can You Find?” game with students. Explain the parts of speech by giving them a sheet of paper folded into fours and have them head each section with a different part of speech: Nouns, Adjectives, Adverbs, Verbs. On "GO" give the students 3 minutes (can be any length of time) to see how many nouns they can find. Pair/Share ideas, and then give them 3 more minutes to see how many. Pair/Share and continue until all parts have been reviewed. Make a class list on a chart to use for later references or to add to on another day. This list can even be for 1 minute at the end of class.

Dictionary / Vocabulary Development

Give children a list of the more unusual words. You can introduce one new word a day for the duration of the unit. Look up the word together as a group; discuss which definition goes with the sentence in the text, and reread the sentence. Copy the sentence and the correct definition into a spelling dictionary or class learning log for later reference. Depending on the level of your students, you may also want to find synonyms or antonyms of a word, if appropriate.

Point of View

The point of view is the angle from which the story is told. *If My Mom Were A Platypus* is written in the first-person point of view, meaning that one of the characters is telling the story. In this case, all the baby animals are telling the story of their lives. What changes would we have seen in this story had it been written from the mother's point of view or in third person? Could this story be compared to an autobiography? Survey your class to determine what they think is the most effective or interesting way to tell a story.

Letter Writing

Writing friendly letters allows us to keep in touch. With e-mail, the art of letter writing is slowly becoming a thing of the past. Yet, to get a letter, you must write one. If writing letters is a new skill for your students, introduce the parts of a friendly letter: the heading, the salutation, the body, the closing, and the signature. Then choose one of the following as a topic to reinforce the letter-writing skills of your students—or choose one of your own. Write a letter to: your grandparents, asking them how their lives were different from yours... to the author, to find out how she became interested in mammals... to an animal in the story, asking him/her a question about his/her life (it will probably not write back)... to a zoo keeper, to find out what it is like to take care of animals in captivity...

Write for Information

Write to animal protection agencies. Can you find out information on endangered or threatened species? Has a particular species on earth grown or declined? Ask them why.



Social Studies

Multi-Cultural Explorations

Mammals are found all over the world!

Investigate the cultures of the several continents that the various mammals call home. Use the text of *If My Mom Were a Platypus* as a beginning... opening a window into the diverse lifestyles, species, and habitats we have on our planet. Investigate each continent from the flags and the national anthems, to the languages and unique physical features, the native peoples and their myths and legends, and the mammals and their habitats. Culminate with a **Multi-Cultural Day** to share all that you have learned with others. Make posters to advertise. Invite guest speakers... have a tasty treat from the rain forest... listen to a drumbeat. Enjoy!!

Safari

Venture into the wilds of Africa on a simulated journey... research the itinerary of your trip. Where will you go? What will you see? What will it cost? Develop a brochure that talks about your visit.



Imagine

If I were a child in South America, I might live in the rain forest... If I were a child in China, I would speak Chinese... If I were a child in Australia, my national anthem would sound like this...

Drama

Use the information learned to write a play about an animal, make costumes or masks, design a set, build props, and act it out! TAKE ONE!

Languages

Humans, regardless of their culture, learn the language they grow up hearing. There are thousands of different languages spoken by humans. Each one has different sounds, and some have different alphabets, but all are designed to help us communicate. Which one is the most commonly used?

To get your students started, here are 24 ways to say *Hello*:

| | |
|--------------------------|---------------------------------|
| Arabic- <i>Marhaba</i> | Indonesian- <i>Selamat pagi</i> |
| Bengali- <i>Ei Je</i> | Italian- <i>Buon giorno</i> |
| Chinese- <i>Ne hao</i> | Japanese- <i>Konichiwa</i> |
| Croatian- <i>Bok</i> | Mohawk- <i>Sekoh</i> |
| Czech- <i>Nazdar</i> | Portuguese- <i>Bom dia</i> |
| French- <i>Bonjour</i> | Spanish- <i>Hola</i> |
| Gaelic- <i>Ia dhuit</i> | Swahili- <i>Jambo</i> |
| German- <i>Guten Tag</i> | Tahitian- <i>Iaorana</i> |
| Greek- <i>Kalimera</i> | Turkish- <i>Merhaba</i> |
| Hawaiian- <i>Aloha</i> | Ukrainian- <i>Vitayu</i> |
| Hebrew- <i>Shalom</i> | Vietnamese- <i>Chao ong</i> |
| Hmong- <i>Nyobzoo</i> | Welsh- <i>Bore da</i> |



Explore non-verbal forms of communications as well. What things can we say to one another without any words at all? Compare this to how animals communicate.

Science

Ecology/Environmental Issues

There are 4,200 species of mammals. What is a mammal? What do they have in common? We human animals must learn how to share our earth with all the amazing creatures found on our planet. Use the following activities to raise the level of awareness of environmental concerns in your class.

Protection

Discuss how the mammal species in the book protect themselves and their babies. What special adaptations do they have that help them protect themselves? How do parents and other family members take care of babies? Compare this to how humans protect and take care of children.

Do Your Part

Brainstorm ways you think we could make the earth a better place for us and for the animals. Plan a project for the class to help the wildlife in your area. Clean up trash, put up a bird feeder or a bat house, plant a garden to attract a hummingbird or butterflies....

A Lesson in Rhyme

To reinforce the environmental concerns of pollution and overuse of natural resources, use *The Lorax*, by Dr. Seuss, as an extra resource to give children of all ages some insight into what could happen if we do not take care of our planet.

As the Lorax would say...

*"Unless someone like you cares a whole awful lot,
nothing is going to get better, it's NOT!"*

EXCITING EXPERIMENT



Many marine mammals have dwindling populations due to hunting, drowning in fishing nets, injuries from boat propellers, eating plastic they mistake for jellyfish and contaminants in the water. These animals are often labeled as threatened or endangered or even extinct.

You will need:

- Five different colors of paper
- A paper bag
- Paper and pencil

Cut five dolphins or whale shapes from each color paper. Each color is to represent a different species. Write one of the potential threats listed above on each shape. Put them all in the bag. Without looking, pull out ten shapes.

Survey the results: How many of each species did not survive? What was the number one cause of endangerment to your dolphin or whale population? Discuss what happened. Repeat the process. Compare and contrast.

Math

Problem Solving

The population of humans on our earth continues to rise rapidly. In 1800, there were 980 million (.98 billion) humans on this planet. By 1900, it had gone up to 1,650 million (1.675 billion).

Calculate how many people were born between 1800 and 1900. At what rate was the population increasing?

Extensions: Now there are more than 6 billion people in the world. How many more people have been born in the last century than the one prior to it?

Graphing

Use a line graph to show the specific rates of human population growth every 10 years from 1800 till 2000. Plot the points to show the growth. Analyze the data. What do you think attributed to the big growth in population? Were there any times where the earth saw a decline in the human population?

Extension: With older students you might wish to compare birth and death rates. Are humans now living longer? How does that contribute to the population growth?

Pie Graphs

A baby koala sleeps 18 hours a day. Make a pie graph to show what portion of each day the koala is awake and asleep. Then discuss how many hours a day humans sleep. Make a pie graph to show human sleep hours. Compare and discuss the two graphs. Does the koala sleep more than half of each day? Do you sleep more than half of each day?

Word Problems

If one polar bear weighs 400 pounds, then how many pounds would eight polar bears weigh?

HOW CAN THIS BE?

Polar Bear Trivia

Question

We roam the polar icecap as our kind has done for 70,000 years. Each day we steadily march eastward in our search for seals, but we always remain in the general vicinity of our birth. How does that work? How can that be?

Answer

The ice we live on is always drifting west. We have to move to stay in one place.



Follow-Up Research Project

Expository Writing and Cooperative Learning

If My Mom Were A Platypus is an ideal reference/information book to use with 3rd through 8th graders. This research project is designed for a 2 to 3 week period, yet it could easily be modified to be shorter or longer.

DAY 1- List the 14 mammals covered in the text. Use the general information about mammals to generate a discussion from the group about the characteristics of mammals in general. At this point, introduce them to the special mammals called monotremes. Then group the children in interest groups for further research.

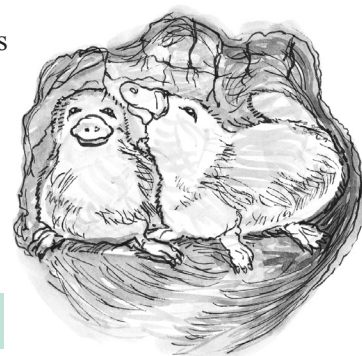
DAY 2- Allow each group to design an information web that focuses on the mammal species they have chosen to research further. Steer groups toward the types of questions you know they will be able to find the answer to. Instruct groups to list and categorize questions (on large paper) about the animal baby and its family. Do they know the animal babies' names? What do they eat? Where in the world would they live? In what type of habitat? Are they endangered? Allow time for the groups to list, cluster, and label their questions:

What I want to learn about the Platypus

Habitat

Food

Unique Characteristics



DAY 3- Introduce *If My Mom Were A Platypus* to the learners, using one of the pre-reading activities on the previous page. Pass books to students in the class and allow time for browsing and discussion. The first reading should be non-structured, enjoyable, and fun. It might be read aloud or read silently. Then discuss the fascinating similarities and differences these mammals have and give students the opportunity to analyze and synthesize the data. Consider using a Venn Diagram for comparison as a whole group, individually, or by partners. Or create posters or dioramas depicting the world of each baby animal.

DAY 4- Re-read parts of the text to enhance facts that you want the children to be especially knowledgeable about. For example, have all groups reread to find answers to specific questions. They might read until they have found out what makes the platypus unique as a mammal; why the baby koala smells like a cough drop; how much an elephant tooth weighs... Have children raise one hand when they find one answer, two hands when they find both answers, and then stand when they have found all three. Repeat the process, varying the questions based on the knowledge the students need to learn.

DAY 5- Introduce to all the learners the process by which they are going to research their animals and how they are going to present the project to the rest of the class. Emphasize that they will be the experts on their specific animals, and must be prepared to answer questions from you and their classmates. Since children learn in many different modalities, allow the groups to choose their own method of presenting the material to the class, the only requirement being that each group develop a poster-size page of their animal. This page should include facts they learned, illustrations, and possibly activities. These "BIG" pages can then be compiled to make a mammal fact book that can be shared with younger students, younger brothers and sisters, and even Mom and Dad. Let the students help you generate a list of possibilities, which might include some of the following:

Making masks of the animals so that their reports can be given in first person, making puppets, developing a video, making an activity book, a jeopardy game, trivia questions, a "day in the life of...", an advertisement or cartoon, a radio play, a brochure, or even a tall tale.

Go Exploring Animal By Animal

The following section is packed with engaging and easy ideas to help you continue to make connections from book to classroom. You have an abundance of animal facts at your fingertips to use for enhancing your teaching. You might challenge students with a daily trivia question, or have the class compete in groups to answer questions in a game-show format. The activities are designed to be done independently by students or in groups or pairs. Included are hands-on activities, as well as discussion starters and independent project ideas.

Platypus Baby • Platypus

- In 1798, the first platypus specimen was sent from Australia to Britain. British scientists were convinced it was fake, made of a duck's bill and feet stitched onto a mammal's body.
- The platypus is one of few mammals that does not have a belly button. A platypus baby gets her food from the yolk sac inside her egg, not from the umbilical cord.
- The platypus is a monotreme—it hatches its young from an egg. It is one of two monotremes in the world. The other is the echidna, also from Australia.

The platypus is sometimes called the “bits and pieces” animal. Some people think it looks as if it is made up of parts of other animals. Have children make up their own bits-and-pieces animal, using parts from at least three different animals. Have them illustrate their creation and write their own story, answering the questions: *How were you born? How did you grow? What do you know? What do you eat?* from their new animal's point of view.



Elephant Baby • Calf

- Elephants can communicate by using sounds too low for us to hear.
- An elephant's ear is so big it could cover a twin bed.
- One elephant's tooth can weigh up to nine pounds (*See Elephant Teeth Activity, page 34*).
- An elephant's eyelash is as long as your hand.
- There are 10,000 muscles in an elephant's trunk.
- Elephants weigh more than five tons.
- They have big, soft spongy feet and barely leave a footprint.

Elephant Walk—Ask your kids if anyone has ever told them that they sound like a herd of elephants. Explain that a herd of elephants is actually very quiet. This is because they have big, soft, spongy feet that help them walk quietly. Their feet spread their weight out so well that they hardly leave footprints. An activity will help them understand how this works. Give each student a soft sponge to hold. Then ask them to slap both hands on the table. Which of the hands is quieter? An elephant's foot is padded, like the sponge, and this helps the elephant walk quietly. (*See Elephant Feet Activity, page 33*).

As an extension, have students get down on their hands and knees, holding a sponge in each hand and “walk like an elephant.” They will move their right arm and right leg together, and then their left arm and left leg together. They will sway back and forth like an elephant. Humans crawl using their right arm and left leg instead. Crawl like a human for comparison. Which is easier for you? Why?



Go Exploring Animal By Animal

Koala Baby • Joey

- Newborn koalas are so tiny that you could mail more than 50 of them with a first-class stamp.
- A koala smells like a cough drop because of the amount of eucalyptus it eats. The smell keeps fleas away (*See Koala Odor Activity, page 28*).
- Eucalyptus leaves have so much fiber that they are hard for the koala's body to break down—it's like eating cardboard. A bacteria lives in the digestive system that helps them digest the leaves.

A koala sleeps 18 hours a day. How many hours do you sleep a day? What if you slept as much as a koala? What would you do while you were awake? What activities would you have to give up? Write a story about how your life would be different.



Golden Lion Tamarin Monkey Baby • Infant

- When golden lion tamarins are excited or angry, the hairs in their manes stand on end, making their heads look large and fierce.
- Both male and female tamarins have manes.
- In the 1970s, golden lion tamarins were almost extinct. There were only about 100 tamarins left in the world. They were in danger because people cut down the rain forest where they lived and captured them as pets. In the late 1980s, a program began to reintroduce zoo-born tamarins into protected forests in Brazil. There are now more than 800 golden tamarins living in the wild.

Golden tamarin monkeys eat lots of fruit. In zoos, they are fed apples, bananas, and oranges. Make a golden lion tamarin fruit salad using these fruits. Because golden lion tamarins share their food, have your kids share their fruit salad with friends.



Pacific Gray Whale Baby • Calf

- Gray whale milk is 53% fat and 15 times richer than cow milk.
- Newborn gray whale calves double their birth weight in 60 days!
- When whales breathe out through their blowholes, they make a mist called a "spout" or "blow" above the water. A gray whale's spout is shaped like a heart and can be up to 13 feet high. Gray whales can blow four times a minute.
- A whale is not a fish. It is a mammal. Dolphins, seals, and walruses are also mammals. Sharks, on the other hand, are fish.

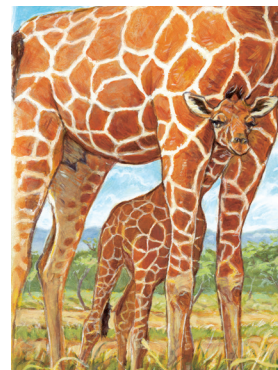
Whales have a layer of fat, called blubber, beneath their skin. This helps to keep them warm. To demonstrate this, have your kids spread a thick layer of shortening onto one of their index fingers. Then dip both fingers into a jar or bowl filled with ice water. They will find that the shortening helps insulate their finger and keep it warm. (*See Whale Blubber Activity, page 30*).



Go Exploring Animal by Animal

Giraffe Baby • Calf

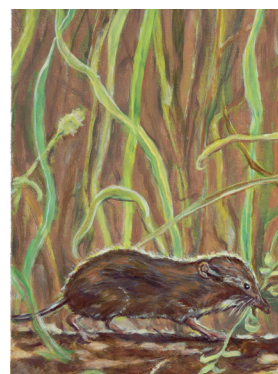
- Giraffes can feed higher in the trees than any other animal, except elephants. Their long legs and necks also give them the ability to tip their heads way back.
- Giraffes have 18-inch long, dark blue tongues that help them reach even higher.
- A male giraffe can reach a leaf growing 20 feet above the ground.
- Giraffe calves can grow one inch a day. They do not run and jump and play like many baby mammals. They play less because they need to use their energy to grow. Giraffes protect themselves by being big, so they grow as large as they can, as fast as they can.



Giraffes and swans both have very long necks. A giraffe's neck is very stiff, though, and a swan's is flexible. Why? Like most mammals, giraffes have only seven neck bones. Giraffe neck bones can be up to a foot long! A swan has between 23 and 25 small neck bones. Your kids can build their own giraffe and swan neck models and compare them. For the giraffe neck, use seven spools of thread laced onto a string, and tie off the ends. For the swan neck, string 25 plastic beads onto a piece of string. Compare the two models. Which model is easier to fold into an S shape? Which is sturdier? Which is more flexible? How does a flexible neck help a swan? How does a stiffer neck help a giraffe? (*See Adaptable Necks Activity, page 27*).

Least Shrew Baby • Least Shrew

- When a least shrew's nest gets dirty, the mother shrew builds a new one nearby. She carries her babies to it in her mouth, one by one.
- Animals that hunt least shrews do not usually eat them, because they smell bad. Their strong musky smell helps them mark paths and identify each other.
- Least shrews do not have very good eyesight.
- Least shrews have so little body fat that they cannot go more than a couple of hours without food. Missing a meal is a sure way to a quick death.



A least shrew's heart beats 1,200 times a minute. An adult human heart beats about 70 times a minute; a child's beats faster, about 90 times a minute. Show children how to take their own pulse to compare. They can find their pulse on their wrists or necks. Count beats for one minute (*See Shrew Heartbeat Activity, page 32*). This will help them to understand the "very fast life" of the shrew.

Hooded Seal Baby • Pup

- Seals cannot see colors.
- Hooded seals get their name from the black pouches that males have on their heads. When they want to impress another seal, they close their nostrils and inflate the pouches to the size of two footballs. This makes their heads look big and scary!
- Hooded seals go from infancy to adulthood in just four days. This is the shortest childhood of any mammal.



Hooded seals dive underwater to catch their dinner of fish, crab, shrimp, clams, and squid. Before they dive, they breathe out, or exhale. This helps them to dive deeper. To demonstrate, fill up a sink or small tub with water. Inflate two balloons, one completely inflated and the other with only a little air in it. Have the children attempt to sink the balloons to the bottom of the water. Which would be easier and why? You might assign this as homework for more exploration in the bathtub at home.

Go Exploring Animal by Animal

Mexican Free-Tailed Bat Baby • Pup

- So many free-tailed bats live together in a cave that you can find 4000 bats in one square yard! (See *Baby Bat Cups Activity*, page 25).
- Twenty million free-tailed bats can eat 250 tons of insects in one night.
- There are almost 1,000 different kinds of bats.
- Bats hang upside down because they can't stand right side up. Their leg bones are too thin to hold up their bodies.



Mexican free-tailed bats use echolocation to hunt moths and to navigate. They make high squeaking noises that bounce off the moths and tell the bats where the moths are located. Play a game of “BAT AND MOTH.” Blindfold one student to be the bat and assign other kids to be the moths. When the bat calls out “Bat!” the moths respond with “Moth!” The moths may not move. Only the bat is permitted to move around and locate all the moths by listening to sounds coming from the location.

Lion Baby • Cub

- When lion cubs are born, they weigh between four and eight pounds. As adults they weigh 70 times as much. Most humans weigh only 22 times their birth weight.
- Lions have loose skin on their stomachs. That means if their prey kicks them there, there is more padding to keep them from getting hurt.



Lions use their rough, sandpaper like tongues to scrape meat off the bones of their prey. Ask your class to draw a picture with crayons. Try to use another piece of paper to rub and “clean off” the crayon. Will it work? Next, try a piece of sandpaper. Which works better? (See *Lion Tongue Activity*, page 35).

Polar Bear Baby • Cub

- Polar bear milk is thicker and richer than whipping cream. It is 30% to 40% fat!
- Polar bears can use their noses to track a seal for miles, even when the seal is under two feet of ice.
- An adult polar bear can eat up to 20% of its weight in one meal. That could mean eating 120 pounds of seal blubber for lunch.
- A polar bear looks white. But he isn't, really. His long, shaggy hairs are colorless and hollow. Beneath his hair, the skin is black.



A mother polar bear is 400 times heavier than her newborn cub. If this were true for humans, how much would your students' moms weigh? Ask them to find out their birth weight... then multiply this number by 400. Ask mom to see if she weighs as much as a polar bear.

Go Exploring Animal by Animal

Hippopotamus Baby • Calf

- Hippos rise to the surface of the water to breathe, even when they are asleep.
- Hippos can't see each other very well through the murky water, so they make sounds to let each other know that they are there.
- Hippos are the only mammals that can hear as well out of water as underwater.
- A hippo gives birth and feeds its young underwater, even though almost all of their predators live in the water.

Hippos stay in the water all day and leave only to look for food in the evening. Their skin dries out easily in the sun. To demonstrate this, place damp paper towels on two paper plates... place one in a dark closet and one in the bright sun... check after an hour... then two hours. The towel in the sun will be dried out. The towel in the dark place will be wet and cool. Smart hippo!



Orangutan Baby • Infant

- The word “orangutan” means “person of the forest” in Malay.
- Orangutans are the only apes that do not live in large family groups.
- Orangutans are great apes, not monkeys. Apes are usually bigger than monkeys. They also have larger brains and they do not have tails.
- Chimpanzees and gorillas are also great apes.

Orangutans keep track of all fruit trees in the forest, so they they'll know where to find a good meal. They also follow the movements of certain birds that can spot fruit from the sky. Design a memory game to play to see how good you are at keeping track of trees, fruits, and birds. Have each child design a matching pair of cards. Place all in a pile, shuffle and lay out on the table facedown. Pick up two at a time, attempting to find all the matches. The person with the most matches wins.



Human Baby • Baby

- Humans are the most intelligent of all mammals.
- They live in family groups and care for their young for many years.
- Human babies are the only mammals that drink milk from other mammals in childhood.
- Humans are the only mammals to consume milk of any kind beyond childhood.
- Human hands are very important. Since we walk on two legs all the time, our hands are free to do all kinds of things.

Experiment to see why hands are so important to humans. Have your students try doing some everyday things with hands tied behind their backs. Is it hard to eat? To pick up something? To open a door? To turn on the light? List things we need our hands in order to do.



Extensions: Stretch Your Brain

Animal Field Trip

Units on animals can be enhanced by visiting a zoo, an aquarium, or a nature center to observe real animals in action. Observe animals described in *If My Mom Were A Platypus* and look for particular behaviors and characteristics. Assign students research groups for various species. Have them report back with their findings. What new information did they learn?

Mythology

People have often used myths to explain things they do not understand. Many myths also teach a lesson.

Learn about the Karraur, an aboriginal group in Australia, who say that *Yhi*, the goddess of light and creation, granted the wishes of all the animals of earth. Among them was the platypus, which was so confused that he wished to have some part of every other animal.

Or Yahsa, an angry woman found in Japanese mythology who was reborn as a bat.

Or Selkies, the mythical creatures of British Isles that could transform seals into beautiful human women.

Sensory Perception

The Mexican free-tailed bat has an enhanced sense of smell. Twenty million bat moms can live together in one cave. Each bat mother has her own baby. How does she find her baby among all the millions of pups? She memorizes its smell and the sound of its voice. Use the following sensory activity to test your students' abilities to make a match (*See Baby Bat Cups Activity, page 25-26*).

Before you begin, prepare several matching pairs of paper cups, enough for each child in the class to have one. Each matching cup will have its own special smell and sound and combination. Soak cotton balls in different scents and place them inside the cups: lemon, mint, vanilla, peanut butter, vinegar, or perfume all work well. In addition, put different small objects inside the cups that will make different noises when shaken: rice, paper clips, bells, sand, beans, dry cereal, or pennies. Seal the tops with aluminum foil, attached with rubber bands or tape. Poke a few holes with a toothpick in the top of each cup. Make sure you have two of each cup! Discreetly label the pairs, so that you will know which pairs match, but the kids won't. Give one cup to each child and instruct them to find the matching cup. Discuss their results—could they match all the cups? Was it harder or easier than they expected? Was it harder to match sounds or smells?



Animal Misconceptions

Watch a movie with your class or read fiction stories that feature various animals.

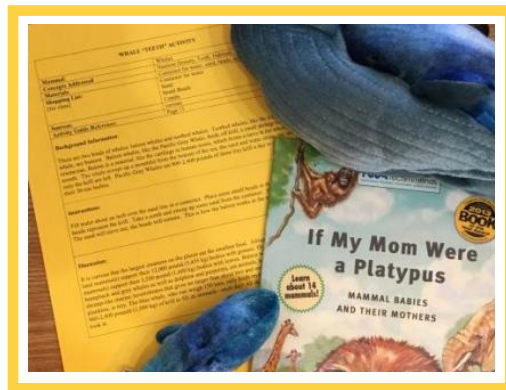
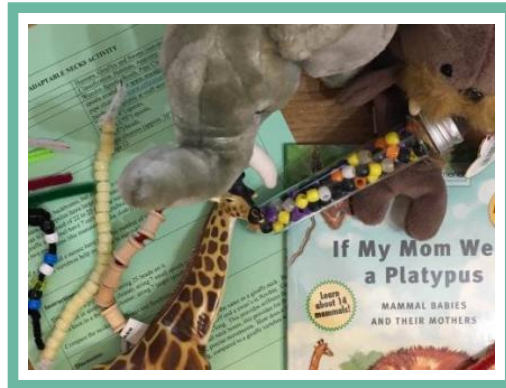
Elephants are featured in *Dumbo* and *Babar*. Whales are the main characters in *Free Willy* and *Pinocchio*. Bats appear in *Batman* and in countless vampire movies. Lions are highlighted in *The Lion King* and *Born Free*. Talk about how animals are portrayed in movies and books. Do your students think these are good or accurate representations? Discuss any misconceptions your students may have about animals in the book.

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Hands-On Demonstrations

Preparation Information and Directions



ALSO AVAILABLE ONLINE:

Individual Hands-On Activity Sheets
NGSS Standard Articulations
STEM Foundation Grant Document

*All documents can be downloaded for free at www.ScienceNaturally.com,
located in the Educational Resources tab.*

Overview

Whether the subject is biomes, habitats, reproduction, ecology, nutrition, health, life cycles, anatomy, energy systems, classification, adaptations, family life, community, or survival, *If My Mom Were a Platypus: Mammal Babies and Their Mothers* has lessons and hands-on experiments that will excite and stimulate kids of all ages!

| ACTIVITY | KEY MATERIALS | TOPICS |
|---------------------|---------------------------------------------|-----------------------------------------------------------------------|
| Baby Bat Cups | Sounds and smells in covered cups | Sensory Perception Infant Identification Habitats Life Cycle |
| Adaptable Necks | Wooden spoons, beads, pipe cleaners | Classifications Habitats Anatomy Adaptations |
| Koala Odor | Aluminum foil, paper towels, eucalyptus oil | Biomes Classifications Ecology Permeability Adaptations |
| Milk Delivery | Plush platypus | Adaptations Life Cycle Family Life Classifications |
| Whale Blubber | Ice water, Crisco | Nutrient Density Habitats Anatomy Energy Systems |
| Whale "Teeth" | Water container, beads, sand, combs | Teeth Habitats Nutrient Density |
| Shrew Heartbeat | Stopwatch | Metabolism Energy Systems |
| Elephant Feet | Sponges, rubber bands | Habitat Adaptations Weight Management |
| Elephant Teeth | Bricks, sandpaper | Nutrient Density Anatomy |
| Lion Tongue | Crayons, sandpaper, white paper | Habitats Nutrient Density Adaptations |
| Imaginative Mammals | Arts and crafts supplies | Classifications Biomes |
| Biodiversity | Biodiversity Tables | Evolution Family Life Adaptations |

Baby Bat Cups Activity

Mammal: Bats

Concepts Addressed:

- Sensory Perception
- Infant Identification
- Habitats
- Life Cycles

Materials:

- Sounds and scents in covered cups

Shopping List: [for class]

- Opaque cups
- Opaque tape or aluminum foil (to cover cups)
- Various items that produce distinct sounds (e.g. popcorn kernels, rice, lentils, noodles, beans, etc)
- Various materials with distinct scents (e.g. cinnamon, coffee, curry powder, anise, mint, etc.)
- Black and red markers

Sources:

- Cups can be purchased at restaurant supply stores
- Materials for sounds/scents can be purchased in bulk at grocery stores, food co-ops, health food stores, etc.
- Bat Erasers can be purchased at Oriental Trading

Teacher's Guide Reference: Page 19

Background Information:

Mammal moms have a number of strategies for feeding themselves while they take care of their young. Some mammal moms, primarily the herbivores such as hippos, elephants, etc., keep their babies with them while they feed. Other mammal moms, like the polar bear, eat fast while the cubs are young, because it is not safe to leave the cubs to long. Additionally, the mom can't hunt effectively with them tagging along. Some mammal moms are social carnivores, like in a lion's pride, and share the duties. Some females will care for all the young while others do the hunting for the community. Most mammal moms hide their young while they seek food. Bats are among this group. Hiding your young seems simple enough—but is it?

Mexican free-tailed mother bats leave their babies, “pups,” in a bat nursery (a cave) while they go out at night and hunt mosquitoes. At dawn, with their bellies full, they return to the nursery to feed their young. What's the catch? There are three million baby bats in the nursery! The cave is dark (no natural light), cold, and the bats are huddled tightly together (to stay warm). How does one mom locate her own baby (she won't nurse any other pup)? By memorizing their smell and the sound of the pup's voice. Try it!

Instructions on next page (26)

Baby Bat Cups Activity (Continued)

Instructions:

Prepare 5-20 pairs of cups (depending on age and ability of students) as follows. Preparing them can seem unduly complicated the first time, but once you get the hang of it, it gets easier:

- 1) Using a pin, open paper clip, or other sharp object, poke holes in the tops of all the cups so you can smell through them.
- 2) Using a marker, put a red circle on the top of half the cups, and a black circle on the tops of the other half.
- 3) On the bottom of each red cup, write a number starting with 1 and continuing through all the cups (1,2,3,4,5, etc.)
- 4) On the bottom of each black cup, write a number starting with 41 and continue through all the cups (41, 42, 43, 44, etc.)
- 5) Put the cups into pairs, with red #1 paired with black #41, red # 2 paired with black #42, etc.
- 6) Both cups in each pair need to have the same combination of sound and scent added. One scent can go into multiple pairs and one sound can go into multiple pairs—however, only one pair (one red cup and its matching black cup) should have their own combination of sound/scent. For example, put popcorn kernels in four different pairs of cups. Put mint into four different pairs of cups, but only combine popcorn (sound) and mint (scent) in one pair of cups. You will end up with pairs like this: popcorn/mint (in both red cup #1, and black cup #41), popcorn/cinnamon (#2, #42), popcorn/curry (#3, #43), noodles/mint (#4, #44), noodles/cinnamon (#5, #45), noodles/curry (#6, #46), etc.
- 7) Put all the red cups together in one area, place all the black cups together in a different area. Ask each participant to select one cup, shake and smell it, and note the number on the bottom, then place it back on the table. They then walk to the other set of cups and try to find the one cup with the identical scent and sound. You can verify if they have done this with the numeric codes (1 goes with 41, 2 with 42, etc).

Discussion:

Every living thing is adapted for its environment. Humans rely primarily on their sight and touch to gain information about their surroundings. Bats rely primarily on their hearing and sense of smell. This exercise is difficult for humans because our sense of hearing and smell are not well developed.

It helps us realize how much the senses we use are the ones necessary for survival in our environment.

Note: Bat Erasers, available from Oriental Trading, make fun, inexpensive prizes for this game.

Adaptable Necks Activity

Mammals: Humans, giraffes, and swans (non-mammal)

Concepts Addressed:

Classification
Habitats
Anatomy
Adaptations

Materials:

Wooden spools
Beads
Pipe cleaners

Shopping List: [per student]

7 small (.4") spools
7 larger (.75") spools
25 (.25") beads
3 pipe cleaners (approx. 10")

Sources:

Spools available at www.woodparts.biz, or craft stores
Pipe cleaners at www.officemart.com, or craft stores
Beads are available at craft stores

Teacher's Guide Reference: Page 18

Background Information:

All mammals have backbones, but even more interesting is the structure of their necks. While birds, amphibians, and reptiles have large variations in number of vertebrae in the neck, in mammals it is fixed at 7. The long neck of the swan is composed of 22 to 25 cervical vertebrae, while duck's necks have 16. In contrast, the long necks of the giraffe and camel have 7 cervical vertebrae, the same number as humans, mice, and whales. With just two exceptions (the manatee and the sloth), the number is constant for all mammals.

If a giraffe and a mouse have the same number of vertebrae, how are they different? How would the size of the vertebrae help an animal to survive? Let's see...

Instructions:

Tie a knot in a pipe cleaner; string 25 beads on it. Tie a knot in another pipe cleaner; string 7 small spools on it. Tie a knot in a third pipe cleaner; string 7 larger spools on it.

Compare the necks for stiffness and flexibility.

Discussion:

Not all necks are the same. A human neck has 7 vertebrae, the same as a giraffe neck. Both giraffes and swans have very long necks, but a giraffe's neck is stiff and a swan's is flexible. Giraffes have only 7 neck bones, but each bone may be up to a foot long. This provides stiffness for an animal that feeds from the tops of trees. A swan has 23-25 small neck bones, which provides for flexibility for an animal that fishes for its food and requires quick, precise movements. How does a human neck compare? Each of our vertebrae is about 1 inch long, compared to a giraffe vertebra which is about a foot long.

Koala Odor Activity

Mammal: Koala

Concepts Addressed:

Biomes
Classification
Ecology
Permeability
Adaptations

Materials:

Aluminum foil
Paper towels
Eucalyptus oil

Shopping List: [for class]

Aluminum foil
Paper towels
Eucalyptus oil

Sources:

Eucalyptus oil can be found at any health food store

Teacher's Guide Reference: Page 17

Background Information:

Koalas are slow and lazy during the day. In fact, they sleep in trees most of the day; however, at night, they eat eucalyptus leaves. These leaves are also used by humans to make cough drops because they contain menthol. Koalas eat so many eucalyptus leaves that they smell like eucalyptus or cough drops. How does this happen? Do you think it helps or hurts the koala to smell like menthol?

Instructions:

Have the participant smell the eucalyptus oil from the bottle; show them how to wave the odor towards their nose so they don't accidentally inhale a scent that could be dangerous.

Discuss that leaves have oil even though they are primarily water and fiber.

Have them put a few drops of the oil onto a paper towel. What happens?

Have them put a few drops of the oil onto a piece of foil. What happens?

Discussion:

Discuss permeability (having pores or openings that permit liquids or gases to pass through).

Discuss mucous membranes (A membrane lining all body passages that communicate with the exterior, such as the respiratory, genitourinary, and alimentary tracts, and having cells and associated glands that secrete mucus).

The oil passes through the koala's mucus membrane and is excreted through the skin, thus the smell (humans can witness this by consuming large amounts of garlic).

Students will guess that the smell is bad for the koalas because it will point them out to predators. This is logical, but koalas don't have any natural predators. In fact, the menthol smell helps the koala as it drives away fleas.

Milk Delivery Activity

Mammal: All mammal species

Concepts Addressed:

Adaptations
Life Cycle
Family Life
Classification

Materials:

Plush platypus for demonstration

Shopping List: [for class]

Plush (or plastic) toy platypus

Sources:

Toy store

Teacher's Guide Reference: Page 16

Background Information:

All mammals have milk glands, but not all mammals necessarily have breasts or nipples as the source of delivering milk to their babies. Likewise, all baby mammals consume milk, but not all baby mammals have lips to suckle. Platypuses are unique in the sense that they have no breasts, or nipples, and no lips to latch on with. So, how does the mother feed her baby?

Instructions:

How does the mom do it?

Using the plush platypus, demonstrate that there are no breasts or nipples on the chest. Explain that, like a human mother, the platypus does have glandular tissue that produces breastmilk. Her glandular tissue lines her whole chest wall. The milk is excreted through the pores in her skin. It simply oozes out of her chest and onto her fur, the way that sweat is excreted from us onto our skin.

How does the baby do it?

In order to breastfeed, a human baby must make a vacuum seal around the nipple and then suck, pulling the milk out with movements in the lower lip and jaw. A platypus baby has no lips and therefore can't make a vacuum seal, so they cannot breastfeed like us. Instead, they use their bill to push against the chest of the mother so she will release the milk. When the milk excretes out, the baby licks it off the mother's chest fur.

Discussion:

The breastmilk production system for a platypus is sterile, but the breastmilk delivery system is not. Exposure to small amounts of microbes is part of building a strong immune system. The platypus is a good way to observe this.

Extra credit: What other mammals have no lips, and therefore need an adaptation for drinking breastmilk? (Whales)

Whale Blubber Activity

Mammal: Whales

Concepts Addressed:

- Nutrient Density
- Habitats
- Anatomy
- Energy Systems
- Insulation

Materials:

- Ice water
- Crisco
- Paper towels

Shopping List: [for class]

- Bucket or bowl
- Crisco
- Paper towels

Sources:

- Grocery store

Teacher's Guide Reference: Page 17

Background Information:

The Pacific gray whale has the longest known migration of any mammal. They feed in Alaska in the summer, eating 900-2,400 pounds of krill a day. When they begin their journey to Mexico in the fall, the mothers weigh 30 tons and is coated in a 5-10" layer of blubber. The mothers will swim 24 hours a day, travel 10,000 miles, gestate a 2,000 pound baby, and produce 6 tons of breastmilk—all with NO food. Even if they wanted to eat, there would be no food available to them because the krill they feed on are only found in Alaska. For 270 days each year, they live off their blubber. Fat is a concentrated food source for the whales. This fat layer not only provides nourishment for the, but also helps keep them warm during the long journey. Use solid fat to show the insulation properties of the whale's fat.

Instructions:

Put Crisco around one pointer finger of the participant while leaving the other one clean. Dip both fingers (one with and one without Crisco) into ice water and keep them there for about a minute. How do the fingers feel? Do they feel different? The Crisco finger resembles the blubber on a whale. The Crisco keeps the participant's finger warm, just like the blubber keeps the whale insulated.

Have the kids rub their fingers together, comparing the fat-coated fingers with uncoated fingers. What's the difference?

Discussion:

Fat has many functions in the body. Most kids know that fat provides a place to store energy, but they may not know that it plays an essential role in lubricating the insides. It protects the body from injury and it insulates it against both hot and cold. This activity helps kids experience the way fat insulates the body and protects it from cold.

Whale "Teeth" Activity

Mammal: Whales

Concepts Addressed:

Nutrient Density
Teeth
Habitats

Materials:

Container for water
Sand
Beads
Combs

Shopping List: [for class]

Container for water
Sand
Small Beads
Combs

Sources:

Grocery store
Craft store

Teacher's Guide Reference: Page 11

Background Information:

There are two kinds of whales: baleen whales and toothed whales. Toothed whales, like the killer whale, are hunters. Baleen whales, like the Pacific gray whale, feeds off krill, a small shrimp-like crustacean. Baleen is a material similar to the cartilage in human noses, and forms a sieve in the whale's mouth. The whale scoops up a mouthful from the bottom of the sea, the sand and water strain out, and only the krill are left. Pacific gray whales eat 900-2,400 pounds of these tiny krill a day to support their 30-ton bodies.

Instructions:

Create a demonstration for students or have students create their own simulations. To prepare, pour a layer of sand in the bottom of a container. Fill water about an inch over the sand line. Place some small beads in the sand. The beads represent the krill. Take a comb and sweep up some sand from the container. Shake it slightly. The sand will sieve out; the beads will remain. Explain that this is how the baleen works in the whale's mouth.

Discussion:

It is curious that the largest creatures on the planet eat the smallest food. African elephants (the largest land mammals) support their 12,000 pound (5,455 kg) bodies with grasses. Giraffes (the tallest land mammals) support their 3,500 pound (1,600 kg) bodies with leaves. Baleen whales, which include blue, humpback, and grey whales, as well as dolphins and porpoises, eat animals, but their food, plankton and krill—shrimp-like marine invertebrates that grow no larger than about two and one-half inches (6 cm), is tiny. The blue whale, who can weigh 150 tons, only feeds on krill. It needs to eat 900-2,400 pounds (1,000 kg) of krill to fill its stomach—each day!

Shrew Heartbeat Activity

Mammal: Shrew

Concepts Addressed:

Metabolism
Energy
Systems

Materials:

Stopwatch or clock with a second hand

Shopping List: [for class or per student]

Stopwatch or clock with a second hand

Sources:

Sporting goods store

Teacher's Guide Reference: Page 18

Background Information:

Least shrews are exceptional in the mammal world because they have no ability to store or metabolize fat. In fact, shrews have so little body fat that they cannot go more than a few hours without food. Missing a meal is a sure way to a quick death; a good night's sleep could be fatal. The least shrew's life is all about getting enough food often enough to survive. A shrew eats 60-100 percent of its body weight within 24 hours—if you weigh 75 pounds, then to be like a shrew you would have to eat about 50 large hamburgers in 24 hours! Just as shrews eat on a large scale, their hearts beat on a similarly grand scale.

Instructions:

Using the stopwatch, have students count how many times their heart beats in a minute. This is their pulse. A human child's heart beats about 90 beats per minute, while a human adult's heart will beat about 70 times each minute. A shrew's heart beats 1,200 times per minute! Compare the difference and discuss.

Discussion:

It is very hard on the body to operate at such high speeds. In fact, the shrew has a very short life span of just 18 months because, with the system working at such high speed, the body wears out.

Elephant Feet Activity

Mammal: Elephant

Concepts Addressed:

Habitat
Adaptations
Weight Management
Anatomy

Materials:

Thick sponge (needs to be moist for softness) with rubber band wrapped around it

Shopping List: [per student]

Thick sponges
Rubber bands

Sources:

Grocery or craft store

Teacher's Guide Reference: Page 16

Background Information:

Elephants have the largest land mammal feet on the planet. A male African elephant can weigh up to 7.5 tons! You might think that carrying so much weight around would be hard on the joints. You might also think that moving through the jungle would be a loud endeavor. However, you would be wrong on both accounts.

Instructions:

Give each student a moistened sponge with a rubber band around the girth. Have them put the sponge on their hand using the rubber band to hold it into place. Using the other hand, with no protective padding, have them gently hit a flat surface. Hear how much sound it makes and feel how much impact is made. Now, using the padded hand, gently hit the same flat surface. Notice that there is almost complete silence. Also, notice that there is very little impact. Soft padded feet help the elephant move over rocks, absorb the pressure from their weight off their leg bones, and allows even a herd of elephants to move almost silently through the jungle—barely leaving footprints!

Discussion:

Elephants are the largest land animals, yet their size and weight do not mean that they have a noisy walk or even leave footprints. How would you design a human shoe to walk silently and not leave a footprint?

Elephant Teeth Activity

Mammal: Elephant

Concepts Addressed:

- Nutrient Density
- Anatomy
- Health
- Dental Care

Materials:

- Bricks
- Sandpaper

Shopping List: [for class or per student]

- Bricks
- Sandpaper

Sources:

- Hardware or home improvement store

Teacher's Guide Reference: Page 16

Background Information:

The majority of mammals are herbivores, eating grasses, leaves, and plants. These foods are mostly fiber and water and are low in nutrients. In order to get the nutrients they need to survive, most herbivores have to eat for up to 20 hours a day (and even then, some resort to vomiting food and re-eating it or re-eating their stools to extract any nutrients missed the first time!). Eating can be very hard on the teeth. Herbivores largely grind their food, while mammals who eat seeds and nuts need to crack them open. Either way, the teeth take a beating!

Instructions:

Elephants spend 16 hours each day looking for food. While eating, they grind their teeth. Using the sandpaper, have students rub the brick until you see dust in the air. This is what happens to the elephants' teeth with each meal.

Discussion:

After 10 years of constant grinding and wearing away, the elephants will grind their teeth until there is nothing left. Fortunately, this triggers a new set of teeth to erupt. Their full set of teeth will grow back six times, but after the sixth set, no more will grow in. What will happen when the elephants no longer have teeth? How are teeth connected to survival? How many sets of teeth do humans have? How are teeth important to carnivores? From a dental point of view, would you rather be a herbivore, an omnivore, or a carnivore?

Lion Tongue Activity

Mammal: Lion

Concepts Addressed:

Habitats
Nutrient Density
Adaptations

Materials:

Antelope Coloring Page (provided on Page 41, one 1/2 sheet per person)
Crayons
Sandpaper

Shopping List: [per student]

Crayons
Sandpaper sheets

Sources:

Hardware store
Craft store

Teacher's Guide Reference: Page 19

Background Information:

Prides, or groups of lions, have amazing social structures. The females do all the hunting and share tasks and motherly duties within the pride while the males protect them as a whole. They hunt antelope, wildebeest, and buffalo, which are eaten by the whole pride. Hunting is serious work with a low success rate, requiring a lot of risk. When an animal is felled, it is essential to gain all the nutrients possible from the animal. Lions have an adaptation in their tongues that allows them to leave no waste behind. Their tongues are like sandpaper, and efficiently scrape all the flesh off the bones.

Instructions:

Using a dark-colored crayon, have students color in a section of the antelope. Then have them take a piece of sandpaper and rub it on the section they colored. Tell them to look at the sandpaper. The crayon has lifted off the paper and attached itself to the sandpaper. This is how a lion's tongue works. The scratchy tongue catches the remaining flesh and pulls it off the bone.

Discussion:

Cats are known as the only true carnivores, because they feed solely on meat. You may see a cat eating grass, but they cannot digest plant material and eating grass helps them bring back up fur they may have swallowed while grooming themselves. Most meat-eaters are actually omnivores. They can feed on meat and plant matter. Omnivores have teeth adapted for eating both.

It is not surprising, then, that cats are the only mammals with a scratchy tongue since it is specifically adapted for scraping flesh off bone.

When you notice something distinct about an animal, it is always interesting to ask why....

Imaginative Mammals Activity

Mammals: Species not yet discovered...

Concepts Addressed:

Evolution
Family Life
Adaptations

Materials:

Assorted arts and crafts supplies

Shopping List:

Assorted arts and crafts supplies

Sources:

Various

Background Information:

Mammals come in all different shapes and sizes, and each has its own adaptation methods to survive. Using arts and crafts materials, design and create a mammal. Decide what its habitat is, how it lives, and how its adaptations allow it to survive. Then, using a first-person lifecycle story, in the style of the *If My Mom Were a Platypus*, describe how the animal lives and what it needs to survive.

Biodiversity Activity

Mammals: Assorted

Concepts Addressed:

Classification
Biomes
Diversity

Materials:

Biodiversity Tables (attached)

Sources:

If My Mom Were a Platypus Teacher's Guide

Background Information:

There are thousands of mammal species sharing our planet. Most scientists believe there are approximately 4,600, while others put the number closer to 5,100.

Although we do not know the exact number of species, we do know that all of them have milk glands, hair or fur, a backbone, and are warm-blooded. All mammal mothers feed, protect, and teach their young. And all mammal babies need to learn how to feed and protect themselves, but that's where the similarity ends. Humans have classified animals in order to group them by characteristics. All mammals are in the kingdom *Animalia* and the Phylum *Chordata* (having a backbone). Our Class is *Mammalia*. Within that class, there is tremendous diversity. See if you can fill out the biodiversity table supplied to get a glimpse of how much variety there is in the world of mammals!

Mammal Biodiversity Table

| ANIMAL | TYPE OF MAMMAL | SLEEP PATTERN | NAME OF YOUNG | LOCOMOTION | HABITAT | EATING CATEGORY | SOMETHING SPECIAL |
|-----------------------|----------------|---------------|---------------|------------|---------|-----------------|-------------------|
| Platypus | | | | | | | |
| Pacific Gray Whale | | | | | | | |
| Least Shrew | | | | | | | |
| Mexican Free-Tail Bat | | | | | | | |
| African Elephant | | | | | | | |
| Koala | | | | | | | |
| Giraffe | | | | | | | |

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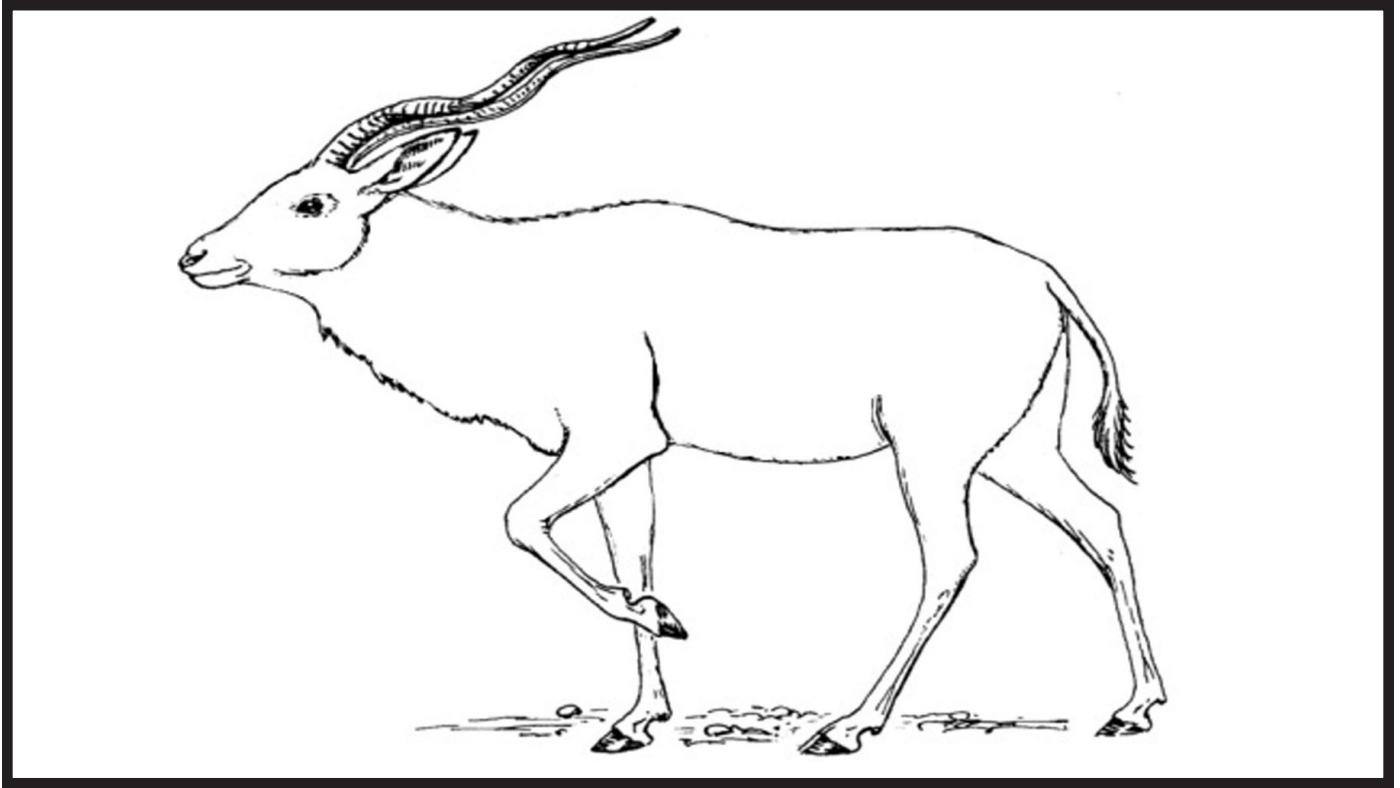
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| Mammal Biodiversity Table (Key) | | | | | | | |
|---------------------------------|----------------|---------------|---------------|--------------------|---------------------|-----------------|-------------------------------------------------------------------------------------|
| ANIMAL | TYPE OF MAMMAL | SLEEP PATTERN | NAME OF YOUNG | LOCOMOTION | HABITAT | EATING CATEGORY | SOMETHING SPECIAL |
| Platypus | Monotreme | Nocturnal | Platypus | Swims (freshwater) | Underwater burrow | Carnivore | Locates prey by detecting electric fields, most poisonous mammal (males have venom) |
| Pacific Gray Whale | Placental | (none) | Calf | Swims (ocean) | Migrates (Ocean) | Carnivore | Longest known migration |
| Least Shrew | Placental | (none) | Shrew | Walks | Underground burrow | Omnivore | Extremely fast metabolism |
| Mexican Free-Tail Bat | Placental | Nocturnal | Pup | Flies | Cave | Insectavore | Only flying mammal |
| African Elephant | Placental | Diurnal | Calf | Walks | Rainforest, Savanna | Herbivore | Largest land mammal, longest gestation |
| Koala | Marsupial | Diurnal | Joey | Climbs | Trees | Herbivore | Mothers feed predigested food to babies |
| Giraffe | Placental | Diurnal | Calf | Walks | Savanna | Herbivore | Boring childhood to conserve energy |

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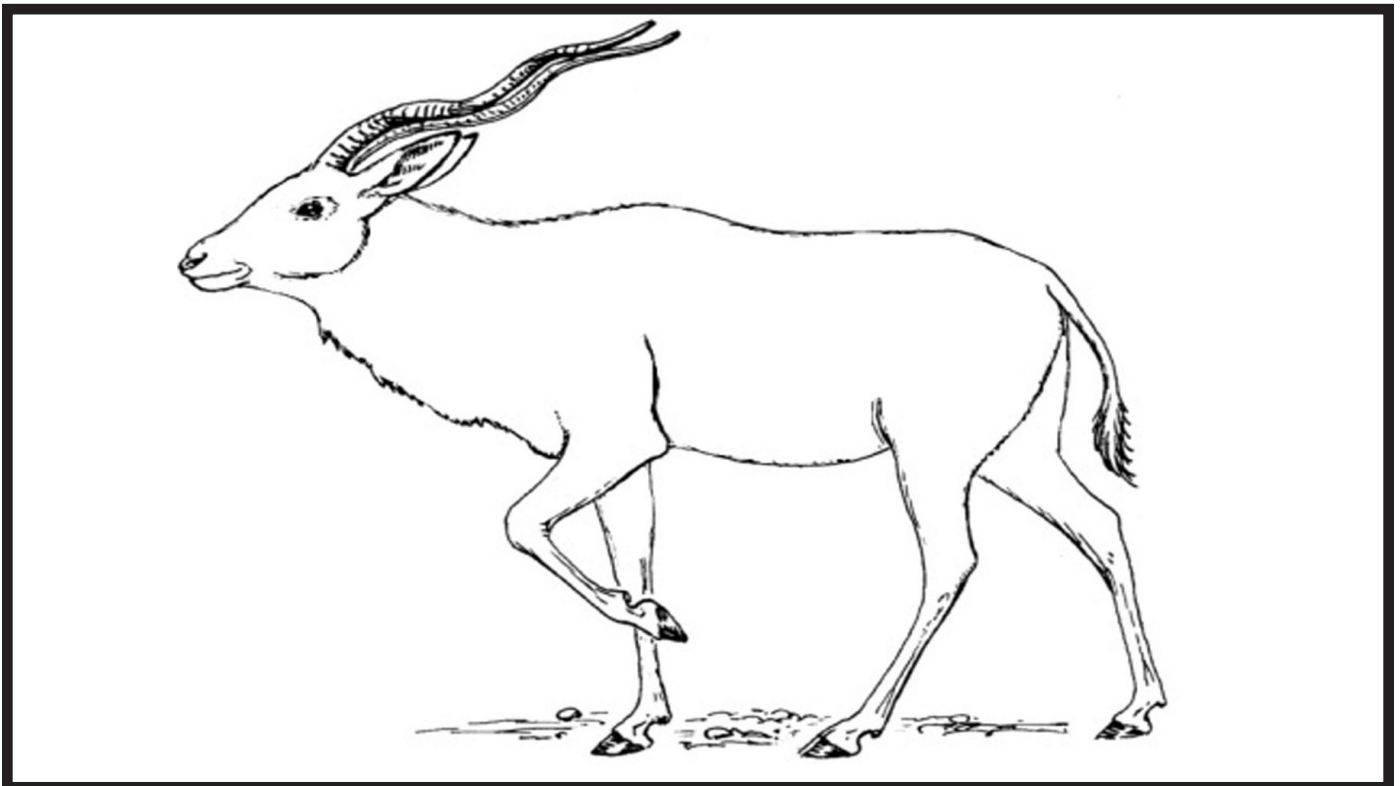
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Antelope Coloring Page (for Lion Tongue Activity pg 35)



Teacher's Guide: Materials

If My Mom Were a Platypus



Teacher's Guide: Materials

If My Mom Were a Platypus

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