

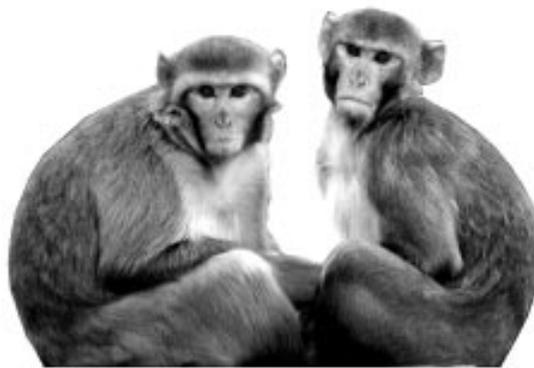
Mammals of Africa

ZOOGUIDES volume 3

TEACHERS NOTES



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Written by Gina Pisello
Edited by Rob and Anne Ransom

REMedia Inc. 13525 Midland Road, Poway, CA 92064
Telephone 619 486 5030
Fax 619 486 0679
Sales and Technical Support 800 573 6334

Please call or write to us for a copy of our latest catalog.

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INTRODUCTION

The ZooGuides™ series of software from REMedia provides a resource for K-12 teachers and librarians on life science topics. This Teacher's Guide offers suggestions, activities, and references for integrating the Mammals of Africa ZooGuide into your curriculum. Other titles in the series include:

1. Butterflies of the World
2. Whales and Dolphins
3. The Rainforest
4. World of Reptiles
5. Life in the Desert
6. Animals in Danger
7. Natural History of Yellowstone

Use this program:

- as an encyclopedic reference;
- to teach major biological concepts such as Evolution, Life Cycles, Classification, Reproduction, and Ecology; and
- to understand and appreciate the intricate and fascinating interactions of African mammals.

What is in this Guide

The Mammals of Africa Teacher's Guide offers suggestions for incorporating the accompanying CD-ROM into Life Science and Biology classes. These ideas are divided into two general levels, K-6 and 7-12. Feel free to adapt any of the activities to meet your specific curricular goals (e.g., You may want to use a suggestion for a K-6 group that was written at a 7-12 level or vice versa).

In addition, this guide provides information on how to use the various sections of the program to complete activities, making the CD-ROM more useful than a mere reference tool. Read from a chapter, look at and listen to movies and use the chapters on the different groups of African mammals to get a more complete picture of their ecosystems

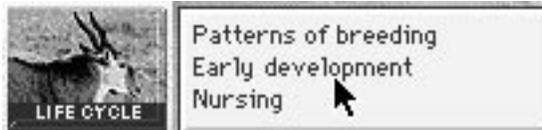
Finally, use this Teacher's Guide as a quick reference for the data provided in the ZooGuide. A list of helpful reference materials is provided so that your students can do more in-depth research once the program has sparked their imagination and interest.

USING THE MAMMALS OF AFRICA ZOOGUIDE

Navigating

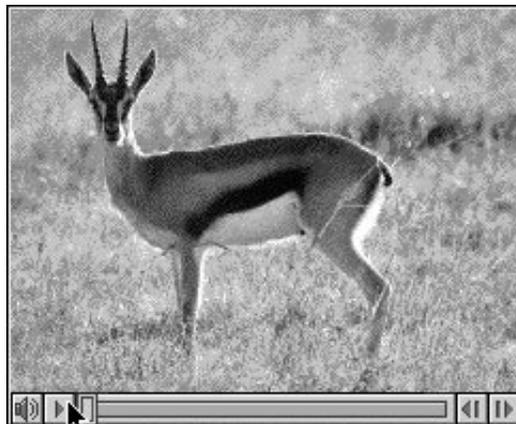
There are “chapter” buttons on the left and right hand sides of your screen.

1. Click on a “chapter” button to access that “chapter”. When you click on your chosen “chapter” button a second time a list of subtopics will appear.



2. Click on the topic or species you are interested in and its information, including text and graphics will appear in the center of the window.
3. To choose a different topic, chapter, or species; repeat steps 1 and 2 above.
4. To change the mode of viewing the Species Index buttons use the button at the bottom to toggle through the three choices (picture, Latin name, or common name). **LATIN NAMES**

Playing Movies



Chapter topics have text. Most are accompanied by a movie or animation.

To access these enhancements, click once on the picture and press the play button. Use the other buttons located under the picture to control the volume, to pause, or to jump forward or backward in the movie.

This ZooGuide also offers you an enlargement feature for making the movies the size of your computer screen. Click on the  button to expand the movie and use the play, pause, and volume buttons as before. This feature is useful if you only have one computer in the classroom and want the whole class to be able to view the movie simultaneously.

Viewing Pictures

There are pictures accompanying the text for many of the individual mammal species. They can be expanded by clicking on an active Picture button or by clicking on the picture itself. The enlargement allows closer study and more detail in the image. To return to the smaller view of the picture, click on it again.

The pictures and photographs, movies, and text contained in the Mammals of Africa ZooGuide can be directly accessed from folders called Photos, Movies, and Mammals Text respectively; located in the same folder as the program icon. Use the pictures with the activities described in this Teacher's Guide or for other class projects.

Getting Help



There is on screen help available in the ZooGuide. To access it, click once on the ZooGuides button in the upper right corner of the screen or click on the ? next to the title of the ZooGuide as shown above. It uses text and graphics to explain the functions of the different sections of the program. Click on the same area again to return to the program.

Other Buttons

There are three other buttons in the viewing window. Click once on a button to activate it. They allow you to:



print the current page of the ZooGuide,



get an index of all the topics contained in the program, and



exit the program.

INTEGRATING PARTS OF THE ZOOGUIDE

The Mammals of Africa ZooGuide has several zones of student-program interaction. They can be used singly or integrated to create more in-depth explorations of the program. For example, if students are learning about conservation in the Ecology chapter and want to find out more about the animals mentioned as endangered, they can look them up in the chapters describing different mammal groups. This provides more in-depth information than if you use only one part or the other of the ZooGuide. It also provides a context for launching into additional research using references listed at the end of this Teacher's Guide.

K-6 classes may want to use the parts of the program individually especially with younger students, increasing the integration with more interested or older students. The pictures, movies, and animation are probably the most useful parts of the program at this level. They provide interesting facts and attention grabbing footage.

7-12 classes can explore the chapters, text, graphics and individual species information separately or together depending on your focus. The activities included in this guide give other examples of how to integrate the parts of the ZooGuide to create projects and lessons that will motivate your students. It also provides suggestions for integrating Mammals of Africa into your Life Science or Biology curriculum.

ACTIVITIES FOR K-6 TEACHERS

This section of the Teacher's Guide offers 15 activities and ideas for integrating the Mammals of Africa ZooGuide into your life science curriculum. The activities range from classifying mammals to writing a letter to an African government for tourism information.

Each activity lists the topic covered, the sources of information it will use, materials you will need, a step-by-step description of the activity, and discussion questions to help you conclude and find out what your students have learned in the process. Modify, delete, or edit these activities to tailor them to your specific needs. Also look at the 7-12 activities for other ideas and ways to use the ZooGuide with your students.

K-6 Activity 1:

TOPIC: Introduction to Mammals of Africa ZooGuide

SOURCE: Mammals of Africa ZooGuide

MATERIALS: Paper
Pen or pencil
Markers, crayons, or colored pencils

ACTIVITY: In this activity students will explore the Mammals of Africa ZooGuide looking for clues to what defines a mammal. They will answer questions and create an original drawing of a mammal using the features they learn about.

Begin this activity by asking students if they can list some mammals. Write their answers on the blackboard or overhead projector. If they include non-mammals leave them for now. Next, ask students what characteristics are required to be called a mammal. Make a second list of these features next to the list of animal names. Now that students have some ideas about what defines a mammal they can explore the ZooGuide to verify or refute these ideas. To aid in their search, students can look for answers to the following questions.

1. Why do mammals have hair? (to keep their bodies warm)
2. How do mammals feed their young? (with mammary glands and milk)
3. What does warm-blooded mean? (warm blooded animals maintain a constant body temperature)
4. Name three places mammals can live. (anywhere on earth, eg., Arctic, forests, deserts, water, in trees, underground, etc.)
5. Describe the body parts of a mammal. (round head, short neck, narrow body, long tail, 4 limbs (arms and legs) with 5 toes, 2 nostrils, a mouth with lips, lungs for breathing, larynx for making sounds, a 4 chambered heart, etc.)
6. Which mammal does not have a larynx? (giraffe)
7. Where do mammal babies grow? (inside the mother, in the uterus)

8. What group of mammals lays eggs? (Monotremes)
9. Name a flying mammal. (bat)

Now that students have a good idea of what makes a mammal, pass out drawing paper and ask them to draw a mammal of their own creation or one that they like. Label the parts that make them mammals such as their fur, tail, nipples, lips, nostrils, etc.

DISCUSSION: Go over students' answers and revise your lists of mammals and characteristics made at the beginning of this activity. Ask students why animals that they originally thought were mammals are not. Discuss the following questions to wrap up this activity.

1. How are mammals different from birds?
2. Why are humans mammals?
3. Name a mammal, other than a human, that you see everyday.

Introduction to Mammals Worksheet

Name:

Date:

Answer the following questions using the Mammals of Africa ZooGuide.

Introduction — What are mammals?, movie:

1. Why do mammals have hair?
2. How do mammals feed their young?
3. What does warm-blooded mean?
4. Name three places mammals can live.

Body Plan — Mammal Body, text and movie:

5. Describe the body parts of a mammal.
6. Which mammal does not have a larynx?

Life Cycle — Early Development, movie and text:

7. Where do mammal babies grow?

Species — Grouping Mammals, text:

8. What group of mammals lays eggs?

Species Index:

9. Name a flying mammal.

K-6 Activity 2:

TOPIC: Sizing Up Mammals

SOURCES: 'Diversity of Mammals' subtopic of 'Introduction' Chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Bulletin Board
Colored Paper
Markers, crayons, or colored pencils
Stapler or thumb tacks
Scissors

ACTIVITY: In this activity students will compare the sizes of various mammals from the smallest to the largest. They will visualize this concept by organizing pictures from smallest to largest on a bulletin board.

To begin this activity ask students what they think the largest mammal on earth is. They may answer an elephant, hippopotamus, or a whale. The Blue Whale is the largest mammal at 30 meters (200 feet). Ask students to think of the smallest mammals they can name. These are mice and shrews (about 2 inches long).

Now that your students have some idea of the range of sizes of mammals, ask them to look in the Diversity of Mammals section of the Introduction chapter in the ZooGuide for more information on different mammals' sizes. Choose 10 more animals of various sizes from the Species Index to include in your scale.

Print the pictures from the Pictures folder on the disc or by taking a picture of the screen containing the animal you want. Cut out and color each animal's picture and write its length on the back. Students will have to read the information provided in the species index to find length measurements. If none are given there use other reference materials found in your school or local library.

As an extension of this activity, students could include other statistics about the mammals they have chosen like weight or head circumference.

Once the data has been collected for each type of mammal and students have colored and mounted the pictures on colored paper, have them post the pictures on the bulletin board in order from shortest to longest.

DISCUSSION: Students can answer the following questions based on the above activity.

1. What range of lengths do most mammals fall into? (eg., 10-20 feet, 11-14 feet, etc.)
2. Where do humans fall on your size scale?
3. Where do your students fall on your size scale?

K-6 Activity 3:

TOPIC: Why Ask Why?

SOURCES: 'Diversity of Mammals' subtopic of 'Introduction' Chapter in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Pen or pencil
Paper

ACTIVITY: In this activity students will have the opportunity to use their imaginations as well as the ZooGuide to speculate on interesting questions in the world of mammals.

Begin this activity by giving each group of students the questions listed below. Groups can discuss clever answers or factual answers to them and present their ideas to the class.

Next, have students watch the movie in the Diversity of Mammals section of the Introduction chapter in the ZooGuide to find the answers to some of these questions. Others they will have to look up in reference books like those listed at the end of this Guide.

Why do...

1. giraffes have long necks?
2. elephants have tusks?
3. cheetahs run so fast?
4. monkeys live in trees?
5. rhinoceroses have horns?
6. bats have wings?
7. zebras have stripes?
8. lions live in prides?

Feel free to add to this list of "why" questions. Students should be encouraged to be creative and to compare their creative answers with the actual ones. They may be surprised to find out that the real answers are as interesting as the ones they invented.

DISCUSSION: To wrap up this activity discuss the following as a group.

1. Which explanation created by a student group was the funniest?
2. Which explanation was most interesting? Why?
3. Can you add three more questions to the list of "Why's" above? What are they?

K-6 Activity 4:

TOPIC: African Environments

SOURCES: 'African Environment' subtopic in 'Introduction' chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Drawing Paper or Black line drawing of Africa
Markers, colored pencils, or crayons
Pencil
Tape or glue
Scissors

ACTIVITY: In this activity students will draw the vegetation zones in Africa and place the mammals that live in each zone in their proper place on the map. Begin this activity by passing out a black line drawing of Africa (with or without geo-political lines) and ask students to use the information shown in the African Environment movie section of the Introduction chapter in the ZooGuide to draw region boundaries for the deserts, plains, savannahs, etc.

Once students have drawn these lines, they can use the Species Index, Map button feature to find animals that live in each kind of environment. They should include at least 10 different species of mammals covering the different vegetative regions. Students can print pictures of the animals they choose using the Pictures folder on the CD or by using the print button in the ZooGuide.

Students should create a map legend showing the colors they will use for each region of Africa. Once this is done they should color each region according to their code and place colored pictures of the animals they have chosen in the appropriate places on the map.

When students have finished their maps you can hang them around the room or on a bulletin board for display. When you learn about different African nations, you can discuss the types of animals that live there and how they contribute to the economy, if at all. You can also discuss habitat concepts with students after completing this activity.

DISCUSSION: When students have completed their maps discuss the following concepts as a group.

1. Which mammals can live anywhere in Africa? Why?
2. Which mammals have the most limited habitats? Why?
3. Where do most mammals in Africa live? Why?

K-6 Activity 5:

TOPIC: Comparing Mammal Breeding Habits

SOURCES: 'Patterns of Breeding'\subtopic in 'Life Cycle' chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Large plain paper
Marker or pen
Rulers
Scissors
Glue or tape

ACTIVITY: In this activity students will compare the breeding habits of five different species of mammals found in Africa. They will create a chart to organize their data and make comparisons easier.

Begin by viewing the movie in the Patterns of Breeding section of the Life Cycle chapter in the ZooGuide. It provides information on rituals and mating preferences of different mammals. Read the written information on this page to learn more.

Pass out large pieces of paper and a ruler to each student or group of students. They should make a chart with lines and spaces for five mammals. You can choose any five mammals that are listed in the ZooGuide's index or use the five suggested here (e.g., human, elephant, lion, mouse, and gazelle). These five mammals have different breeding habits and mating rituals and therefore, offer a broad range of approaches to reproduction strategies.

Students should list each mammal at the top of the paper and draw a line between them. They can add a picture of each animal by printing it from the ZooGuide's Pictures folder, color and paste them onto the chart.

Now that the chart has its animals it needs criteria on which to base comparisons. The following is a list of suggestions that you may add to, delete from, or use as is.

1. How often do these mammals mate?
2. How do they choose a partner?
3. What time of year do they mate?
4. How often do they mate (eg., once per year, several times per year, etc.)
5. Do they mate for life?

6. Do males of the species have a harem, a single partner, or multiple partners during a mating season?

7. How many offspring do females have per litter?

DISCUSSION: Once students have listed questions on the left side of the chart and filled in the proper responses from the ZooGuide and other references, you can get together as a group and discuss their findings.

1. Which of the five mammals mates most often per year? Why?

2. Which of the five mammals mates least often per year? Why?

3. Why do some mammals mate for life while others have groups of females controlled by a single male?

K-6 Activity 6:

TOPIC: Mammal Skeleton Puzzle

SOURCES: 'Skeleton' subtopic in 'Body Plan' chapter in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Scissors
Tape or glue
Pen or pencil

ACTIVITY: In this activity students will assemble a mammal skeleton using their knowledge of anatomy and the information provided in the Mammals of Africa ZooGuide.

Begin this activity by printing the picture of the cat skeleton from the Skeleton section of the Body Plan chapter in the ZooGuide. Cut it apart so that the head, fore limbs, hind limbs, tail, rib cage, and backbone are separate. Paste these on a new piece of paper in random order and give copies to your students with the instructions to reassemble the parts into a correct skeleton of the cat.

Students will need scissors and glue or tape to reassemble the skeletons. They should try to make the skeleton without looking at the picture of the cat in the ZooGuide as a reference. If they get stuck on a part that they are unsure of they can check with other students or the ZooGuide for help.

Once students have properly reassembled the skeletons, they can label the main parts. Students can color code the different areas of the skeleton and discuss the use of each area. After they do this they should watch and listen to the movie in the Skeleton section of the Body Plan chapter of the ZooGuide to learn what each part of the skeleton is for.

An alternative to the above activity is to have students watch the movie first and then use materials such as pop sickle sticks and toothpicks to construct a mammal skeleton replica. You could also purchase a balsa wood model of a mammal skeleton for the class to assemble based on what they saw in the movie.

DISCUSSION: Now that your students have a good idea of what a mammal skeleton is made of they can answer the following questions as a group.

1. What do all mammal skeletons have in common?
2. Do all mammal skeletons fit together in the same way? Why or why not?
3. How is a human skeleton different from a cat skeleton? Why?

K-6 Activity 7:

TOPIC: Teeth

SOURCES: 'Teeth' subtopic in Body Plan chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Pen or pencil

ACTIVITY: In this activity students will name the different kinds of teeth mammals have and compare types of teeth with what foods mammals eat. In addition, students will compare the number of teeth that five different species of mammals have.

Begin this activity by watching the movie in the Teeth section of the Body Plan chapter in the ZooGuide. Ask students what kinds of teeth they have and where they are located. Write their answers on the chalk board or overhead projector. If you have a black line drawing of human teeth, pass out a copy to each student for them to label with the different kinds of teeth shown. Ask students what each kind of tooth is for and how they use them when they eat food.

Other mammals also have different sets of teeth. Some are like humans and some are not. Choose five mammals listed in the Index or Species Index of the ZooGuide making sure that students choose representatives from the different groups such as carnivores, herbivores, and insectivores. Place their names at the top of the chart shown on the next page of this guide. Use the Species Index and other reference materials to fill in the numbers of each kind of tooth they have. At the bottom of the chart add up how many teeth each animal has altogether.

Students should compare charts to make sure they all agree on the numbers and types of teeth present. When they have finished this you can move on to the discussion of the activity.

DISCUSSION: Students should use their charts and their knowledge of teeth to answer the following questions.

1. Why do carnivores have lots of canines?
2. What kind of teeth do herbivores use most? Why?
3. Why do insectivores need sharp teeth?
4. Why do people have a mixture of incisors, canines, and molars?

Teeth Chart

Name:

Date:

Types of Teeth					
Incisors — cutting teeth					
Canines — tearing teeth					
Premolars — grinding teeth					
Molars — grinding teeth					

K-6 Activity 8:

TOPIC: Digestive Systems

SOURCES: 'Digestive System' subtopic in Body Plan chapter in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Black line master of mammal digestive system
Markers, crayons, or colored pencils
Pen or pencil

ACTIVITY: In this activity students will label a diagram of a typical mammal digestive system and color the different parts. They will also compare an herbivore and an omnivore digestive system.

Begin this activity by asking your students what their digestive system does. Ask if they know the different parts of the digestive system starting with the mouth. Don't worry about missing information at this point.

Next, pass out a black line drawing of a typical mammal digestive system and have students watch the movie in the Digestive System section of the Body Plan chapter in the ZooGuide. While they are watching they can be labeling the parts of the digestive system on their paper. They can use the pause feature of the movie to stop it at any time.

Once students have watched the movie and labeled their diagrams, ask them what each part of the digestive system does. They should be able to explain what happens to food in the mouth, esophagus, stomach, intestines, and rectum. Your students can now color the different parts of the digestive system.

DISCUSSION: Once your students have finished coloring the diagram and have reviewed what the parts of the digestive system are for, they can discuss the following to wrap up this activity.

1. Why do cows and other herbivores have four stomachs?
2. Why do herbivores have to chew their food twice?
3. Compare a human digestive system to an antelope's. How are they similar, how are they different?

K-6 Activity 9:

TOPIC: Habitats

SOURCES: 'Habitat' subtopic in Ecology chapter in Mammals of Africa ZooGuide
'African Environment' subtopic in Introduction chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Drawing paper
Markers, crayons, or colored pencils

ACTIVITY: In this activity students will define habitat and draw the habitat of one of the mammals found in the ZooGuide.

Begin this activity by asking your students to describe where they live, sleep, and get food and water. Explain that this is their habitat. It includes school, home, and anywhere outside where they spend time playing. Ask them to write a concise definition of a habitat.

Now that your students have a good idea of what constitutes a habitat, ask them to choose one mammal from the ZooGuide's Index to do some habitat research. They will need to answer the questions below. Once they have done so, they can make a drawing of that animal's habitat. Habitat questions (Use the Map button feature in the Species Index and the data from the African Environment section of the Introduction chapter to help you find the answers.):

1. Where does this animal live?
2. Where and what does it eat?
3. Where does it sleep?
4. Where does it get water?
5. Can it live in different kinds of habitats? List a few.

Post students' drawings of their animals around the room. The drawings should include a caption with a brief description of the habitat shown.

DISCUSSION: After students have completed this activity they can get together as a group and discuss the following questions.

1. How was your animal's habitat different from yours?
2. Why is it important to study an animal's habitat?
3. Would you like to live in the habitat that your mammal lives in? Why or why not?

K-6 Activity 10:

TOPIC: Conservation Research Paper

SOURCES: 'Conservation' subtopic in Ecology chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Pen or pencil

ACTIVITY: In this activity students will write a research paper on an endangered species of African mammal.

Begin this activity by viewing the movie in the Conservation section of the Ecology chapter in the ZooGuide. Students should make note of the animals mentioned in the text and movie as being endangered. Once they have gathered this information, they can choose from this list of animals on which to write a research paper.

The species mentioned in the ZooGuide are: Indri (large lemurs), black lechwe, Jentink's duiker, white rhinoceros, leopard, and hartebeest. There are many more endangered species of African mammals that students can look up in other reference materials.

The research paper should address the following issues and questions. Feel free to add to or delete any of these questions before assigning the research papers.

1. Where does this mammal live? (be as specific as possible)
2. What does it eat?
3. Is its food supply also endangered?
4. Is it hunted or poached by people? Why?
5. Is its habitat being destroyed or taken over by people? Why?
6. What efforts are being tried to save it from extinction? Are they working?
7. Make some recommendations of your own on how to save this mammal from extinction.

Papers can be any length you set and should include answers to the above questions in paragraph format. If students have additional ideas for topics to include in their research, please add them to the above list. Future classes may benefit from their wisdom.

DISCUSSION: Students can present their findings to the class by giving brief presentations on their research papers. They may include visual aids such as maps and pictures of the species they chose to research. They can take questions from their fellow students regarding their findings.

K-6 Activity 11:

TOPIC: Social Structure

SOURCES: 'Social Structures' subtopic in Ecology chapter in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Pen or pencil

ACTIVITY: In this activity students will explore the social structures of African mammals. They will compare several strategies and define social structure in their own lives.

Begin this activity by asking your students the following questions about their own social structures. If their answers differ, as they should, discuss the reasons for their different preferences.

1. How many people live in your house?
2. How many friends do you like to have over to your house at one time?
3. Why do you like this size group?
4. Do all your classmates like the same number of friends? Why not?

Now that students have some definite ideas about their preferences for social structure and have given reasons for them, they are ready to compare mammal social structures. To do this they should read and watch the information presented in the Social Structures section of the Ecology chapter in the ZooGuide. They can answer the following questions as they watch.

1. How many *Equus burchelli* zebras live in one herd? (5-15)
2. How many antelope live together? (several hundred)
3. Give two reasons why wildebeests live in large herds. (They can trample attackers and they can protect young and weak members in the center of the herd.)
4. How many hippopotamuses live in one herd? (15-30)
5. Who protects nurseries of young hippos? (mothers)

6. How many baboons live in a troop? (up to 100) Who are the leaders? (females)
7. Why do black rhinos live alone? (They have bad tempers.)
8. Name two other mammals that live alone. (leopards, pangolins, Grevy's zebras, etc.)
9. What is unique about lion social structure? (They are the only cats who live in groups.)
10. What is a group of lions called? (a pride)

DISCUSSION: When you have reviewed the answers to the above questions with your students, you can get together as a group and discuss the following.

1. Why do mammals live in different size groups?
2. Who leads a group? Why?
3. Why do some African mammals live alone?

Social Structure Worksheet

Name:

Date:

Answer the following questions using the information in the Social Structures section of the Ecology chapter in the ZooGuide.

1. How many *Equus burchelli* zebras live in one herd?
2. How many antelope live together?
3. Give two reasons why wildebeests live in large herds.
4. How many hippopotamuses live in one herd?
5. Who protects nurseries of young hippos?
6. How many baboons live in a troop? Who are the leaders?
7. Why do black rhinos live alone?
8. Name two other mammals that live alone.
9. What is unique about lion social structure?
10. What is a group of lions called?

K-6 Activity 12:

TOPIC: Food Web

SOURCES: 'Food Web' subtopic in Ecology chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Pen or pencil
Markers, crayons, or colored pencils

ACTIVITY: In this activity students will learn what a food web is and draw one for an animal of their choice.

Begin this activity by asking students to watch the movie presented in the Food Web section of the Ecology chapter in the ZooGuide. They can answer the following questions as they watch, pausing as necessary.

1. What is at the base of a food web? (energy, gases, and minerals)
2. Name three animals that eat only plants. (antelope, cattle, sheep, rodents, giraffes, etc.)
3. Name three animals that eat only meat. (lions, leopards, hyenas, wild dogs, etc.)
4. How do dead plants and animals add to the food web? (They are decomposed and they return nutrients to the soil.)

Now that your students are familiar with the main aspects of a food web, they can focus on one mammal and its food chain. A food chain is a set of animals and plants that link in a single line to illustrate what an animal eats and what eats it.

Students can choose a mammal listed in the Index or Species Index on the right of the ZooGuide screen. They should gather information about what this animal eats and what, if anything eats it. They can make a drawing on paper showing the food chain starting with their mammal in the center and drawing what it eats either to the right or below it. They can use arrows to illustrate what eats what.

Make sure their food chains include decomposers like fungus and bacteria as well as the sun, water, and minerals important for plant growth. Students should label the parts of their food chain including plants, plant eaters (herbivores), meat eaters (carnivores), and decomposers (fungi, bacteria, etc.).

DISCUSSION: Students can post their drawings around the room and explain how their food chain works to the rest of the class. If there are food chains that interact, you can discuss how they link to form the food web.

K-6 Activity 13:

TOPIC: Grouping Mammals

SOURCES: 'Grouping Mammals' subtopic in Species chapter in Mammals of Africa ZooGuide
Pictures folder in the Mammals of Africa ZooGuide CD

MATERIALS: Paper
Pen or Pencil
Markers, colored pencils, or crayons

ACTIVITY: In this activity students will classify groups of mammals using their own criteria and then compare their systems to the scientific classification system. Before you begin this activity you will need to do the following:

1. Divide your class into groups of 3-4 students each.
2. Print 10-20 pictures of mammals from the ZooGuide's Pictures folder for each group. (Give each group the same set of pictures so that they can compare results at the end of the activity.) Make sure to choose mammals from different families.
3. Pass out paper, coloring materials, and the pictures to each group.

Students should be told that they are scientists for the day and their job is to classify the mammals pictured into groups based on similar characteristics. Student teams should choose criteria on which to base their comparisons and be rigorous in their application. If there is a dispute about where a mammal belongs, students in the group should vote on the one they think is most appropriate.

Once all the mammals have been classified based on each group's guidelines, compare the methods used by each group. Did any of the teams use the same criteria? Ask each group to explain how they arrived at their classification system.

DISCUSSION: Finally, students can compare their classification systems with that in the Species Index which shows the scientific classification of mammals. You can discuss the following as a whole group.

1. Are there any groups of mammals with only one member? Which ones?
2. How similar were students' classification systems to the scientific one?
3. Which mammals were easiest to classify? Why?

K-6 Activity 14:

TOPIC: Politics and African Mammals

SOURCES: Species Index in Mammals of Africa ZooGuide
References listed in this guide
Your Social Studies textbook

MATERIALS: Paper
Pen or pencil
Drawing paper
Markers, crayons, or colored pencils

ACTIVITY: In this activity students will choose an African country to research in terms of its relationship to mammals found there. In addition, students will draw a map illustrating their findings and give a presentation to the class. Begin by asking students to look through the Species Index at the Map button feature for various mammals. Several countries that have large concentrations of mammals are Zaire, Nigeria, Zambia, Kenya, Zimbabwe, and South Africa. You and your students can choose any of the countries in Africa that you want.

Once students have chosen the country they want to study, they can do research to answer the following questions. They should write an essay that organizes the information and makes presentation easier.

1. Does the country you chose have land set aside for wild animal reserves? If it does, how much land is set aside?
2. How do the people in this country feel about the mammals living there? (eg., Many farmers don't like lions and other carnivores and often kill them to keep them from their livestock.)
3. How are the mammals integrated into the mythology of the African people?
4. How is the country's economy effected by its mammals? (eg., Do the mammals contribute to tourism, etc.?)
5. How have natives' feelings changed toward mammals in recent years? Why?

Students can make a drawing of the types of habitats and animals found in the country they chose to add to the presentations.

DISCUSSION: After students give their presentations, the other students can be given the opportunity to question this new information. Maps and essays can be posted around the room as part of a unit on African history and economy. Your students could also give presentations to other classes.

K-6 Activity 15:

TOPIC: Letter Writing Campaign

SOURCES: Mammals of Africa ZooGuide
References listed in this guide

MATERIALS: Paper
Pen or pencil

ACTIVITY: In this activity students will write letters to the tourism boards of African countries that have wild animal parks within their boundaries. To find out which countries have these parks, check with a local travel agency for brochures.

Begin this activity by asking students what kinds of attractions are offered in your state to get tourists to come. How much money does tourism generate in your state? Once students realize that tourism is big business they can understand why African countries spend so much money to save and set aside land for wild animal parks.

The class as a whole or small groups of students can compose a letter to the government agency in an African country that deals with tourism. The letter should include specific information from the ZooGuide about the kinds of mammals they can expect to see in the wild animal park. The letter should be an inquiry for information about the parks, the money generated by them, the most popular attraction, etc.

Students can send the letter and wait for a response from the agency. An alternative is to use a local travel agency as a resource to write to for information about African travel packages that include wild animal parks as an attraction. They should also have the addresses for the tourism boards of the various countries you are interested in.

DISCUSSION: Once you have gotten a response from the agency you wrote to the class can discuss the following.

1. How important is the tourism trade to this country?
2. Why are the mammals in Africa so popular?
3. How many foreigners go to this country every year to see the wild animals?

ACTIVITIES FOR 7-12 TEACHERS

This section of the Teacher's Guide offers 15 activities and ideas for integrating the Mammals of Africa ZooGuide into your Biology curriculum. The activities range from evolution to predator-prey relationships among mammals.

Each activity lists the topic covered, the sources of information used, a step-by-step description of the activity, and a conclusion section with questions to help you find out what your students have learned in the process. Modify, delete, or edit these activities to tailor them to your specific needs. You can also look at the K-6 activities for other ideas and ways to use the ZooGuide with your students.

7-12 Activity 1:

TOPIC: Introduction to Mammals

SOURCES: Mammals of Africa ZooGuide

ACTIVITY: In this activity students will explore the Mammals of Africa ZooGuide looking for clues to what defines a mammal.

Use this activity when studying Classification or Mammals.

Begin this activity by asking students if they can list some mammals. Write their answers on the blackboard or overhead projector. If they include non-mammals leave them for now. Next, ask students what characteristics are required to be called a mammal. Make a second list of these features next to the list of animal names.

Now that students have some ideas about what defines a mammal they can explore the ZooGuide to verify or refute these ideas. To aid in their search, students can look for answers to the following questions.

1. Why do mammals have hair? (to keep their bodies warm)
2. How do mammals feed their young? (with mammary glands and milk)
3. What does warm-blooded mean? (warm blooded animals maintain a constant body temperature)
4. Name three places mammals can live. (anywhere on earth, eg., Arctic, forests, deserts, water, in trees, underground, etc.)

5. Describe the body parts of a mammal. (round head, short neck, narrow body, long tail, 4 limbs (arms and legs) with 5 toes, 2 nostrils, a mouth with lips, lungs for breathing, larynx for making sounds, a 4 chambered heart, etc.)
6. Which mammal does not have a larynx? (giraffe)
7. Where do mammal babies grow? (inside the mother, in the uterus)
8. What group of mammals lays eggs? (Monotremes)
9. Name a flying mammal. (bat)

CONCLUSIONS: Go over students' answers and revise your lists of mammals and characteristics made at the beginning of this activity. Ask students why animals that they originally thought were mammals are not. Discuss the following questions to wrap up this activity.

1. How are mammals different from birds?
2. Why are humans mammals?
3. Name a mammal, other than a human, that you see everyday.

Introduction to Mammals Worksheet

Name:

Date:

Answer the following questions using the Mammals of Africa ZooGuide.

What are mammals?(Introduction chapter) movie:

1. Why do mammals have hair?
2. How do mammals feed their young?
3. What does warm-blooded mean?
4. Name three places mammals can live.

Mammal Body (Body Plan chapter) text and movie:

5. Describe the body parts of a mammal.
6. Which mammal does not have a larynx?

Early Development (Life Cycle chapter) movie and text:

7. Where do mammal babies grow?

Grouping Mammals (Species chapter) , text:

8. What group of mammals lays eggs?

Species Index:

9. Name a flying mammal.

7-12 Activity 2:

TOPIC: Evolution of Mammals

SOURCES: 'Evolution of Mammals' subtopic in Introduction chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
References listed in this guide

ACTIVITY: In this activity students will conduct research on an aspect of mammal evolution using the Mammals of Africa ZooGuide as a reference.

Use this activity in conjunction with studies of Evolution, Adaptation, or Mammals.

Students can begin this activity by reading and watching the information presented in the Evolution of Mammals section of the Introduction chapter in the ZooGuide. They can look through the mammals listed in the Species Index or Index and then answer the following questions.

1. Which animals shown in this CD are the most primitive mammals? How do you know?
2. Which groups probably evolved from the earliest kinds of mammals?
3. What are some of the evolutionary advances that mammals have made?

Next, students can do some research on one of the following aspects of mammals evolution:

1. Geographic isolation and mammal evolution.
2. Mammal evolution support for the Pangea theory.
3. Human evolution from anthropoid apes.
4. Evolution of the first mammals during the Triassic Period.
5. Other.

CONCLUSIONS: Students can present their findings with visual aids to the class. They can take questions and discuss various findings if more than one student does the same topic.

7-12 Activity 3:

TOPIC: Diversity of Mammals

SOURCES: 'Diversity of Mammals' subtopic in Introduction chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook

ACTIVITY: In this activity students will name mammals that live in varied habitats and discover how this illustrates their diversity.

Use this activity to enhance studies of Mammals, Environment, or Evolution.

Begin this activity by reading and viewing the information presented in the Diversity of Mammals section of the Introduction chapter in the ZooGuide. Students should now be able to name at least five adaptations that mammals have developed to deal with their environment.

To get a better understanding of how diverse mammals really are ask students to play a name game. The object of the game is to name as many mammals as they can that do the following. Divide the class into two teams to play and switch between them to answer questions.

Name a mammal that:

1. flies (bat, flying squirrel)
2. swims (whale, seal, walrus, manatee, etc.)
3. climbs mountains (goat, sheep, llama, mountain lion, etc.)
4. lives in the desert (fox, mouse, camel, etc.)
5. lives in the Arctic (Arctic fox, caribou, reindeer, etc.)
6. lives in forests (deer, bear, wolf, monkey, lemur, squirrel, etc.)
7. lives in savannahs/plains (buffalo, antelope, giraffe, elephant, lion, cheetah, hyena, etc.)
8. lives in cities (dog, cat, mouse, rat, mole, etc.)

Add your own criteria for which students have to come up with mammals. The team that names the most mammals wins. Now that you have a list of mammals that live in different habitats, you can discuss how they are adapted for that kind of environment. You can also discuss adaptations to food sources and limitations in water supplies.

CONCLUSIONS: Wrap up this activity by discussing the following as a class.

1. Can you name an environment where mammals are not found?
2. Why are mammals so well adapted to earth's many environments?
3. How does giving birth to live young help?

7-12 Activity 4:

TOPIC: African Environments

SOURCES: 'African Environment' subtopic in Introduction chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will research an African environment and explain its limiting factors for the mammals that live there.

Use this activity when studying Biomes, Evolution, or Mammals.

Begin this activity by asking your students to read and watch the information presented in the African Environment section of the Introduction chapter in the ZooGuide. It will explain the different types of environments and some of the species that live in them.

Next students should choose one environment (desert, rain forest, plains/savannahs, or lakes of the Great Basin) to research. They should:

1. describe it,
2. explain its limiting factors in terms of food and water availability,
3. look up five mammals that live there, and
4. explain how each is adapted for life in this region.

Once they have gathered the above information they can organize it into an essay. Research can be presented to the class or turned in for a grade.

CONCLUSIONS: Discuss the following open-ended questions to wrap up this activity.

1. Which environment(s) in Africa support the most diverse types of mammals? Why?
2. What are the dangers of living in each of these regions?
3. Why are many African mammals nomadic?

7-12 Activity 5:

TOPIC: Life Cycles

SOURCES: Life Cycle chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will choose an aspect of the mammalian life cycle and develop a presentation for the class explaining it.

Use this activity when studying Mammals or Life Cycles.

Begin this activity by asking your students the following question:
What are the main components of the mammalian life cycle?

Students can use the three sections of the Life Cycle chapter in the ZooGuide to gather information. They should choose one aspect of the mammal life cycle that interests them and develop a class presentation to explain it to their fellow students. Students can work alone or in small groups to do the presentations. They can use visual aids from the ZooGuide or create their own using video equipment or posters to illustrate their point.

Presentations can be on one of the following aspects of the life cycle or students can come up with their own ideas.

1. mating rituals
2. male role in child rearing
3. female role in child rearing
4. how females communicate a readiness to mate
5. the stages of early development — including diagrams of female and male sex organs
6. the importance of nursing — how long it continues, benefits to offspring, etc.
7. number of offspring in a litter versus gestation and parental care time
8. knowledge parents pass on to offspring.

CONCLUSIONS: There can be a Q and A section to the presentations allowing students to share their knowledge and clarify any points that were not well understood by the class. In addition, the whole class can discuss the following questions upon completing their presentations.

1. Why do mammals care for their young for such a long time?
2. Do predators take longer to train their offspring than prey mammals? Why or why not?
3. Is there a correlation between the size of the mammal and its gestation period? If so, what is it?

7-12 Activity 6:

TOPIC: Mammal Anatomy

SOURCES: 'Skeleton' subtopic in Body Plan chapter in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will identify the components of a mammal's skeleton and construct a skeleton from what they have learned.

Use this activity when studying Anatomy, Mammals, or the Skeletal System.

Begin by asking your students to name as many parts of a mammalian skeleton as they can. They can then watch the movie in the Skeleton section of the Body Plan chapter in the ZooGuide to check their answers and to understand the general aspects of the skeleton.

Now you can handout a black line drawing of a typical mammal skeleton or print the skeleton of the cat shown in the ZooGuide to pass out to students. They should label all the parts they know, using correct terms and then use their biology textbook or an anatomy text to label the rest of the parts (fine structures like the fore and hind feet).

Once they are finished they can compare this skeleton with that of other mammals such as a mouse, a human, and a deer. They are ready to answer the following questions.

1. How are they similar?
2. How are they different?
3. What is the physiology of each bone or group of bones?
4. Compare a predator's skeleton to that of its prey. How are they similar and different?

CONCLUSIONS: Answer the following questions once you have completed the above activity.

1. How does bone structure help indicate the type of mammal you are studying (e.g., predator versus prey)?
2. How do scientists use bones to understand physiology?
3. As an extension of this activity students can try to reconstruct a mammal's skeleton from fragments of bone. They can assemble a skeleton model or you can cut apart the drawing of a mammal's skeleton and ask them to reassemble it. How well did they do?

7-12 Activity 7:

TOPIC: Adaptations — Teeth

SOURCES: 'Teeth' subtopic in Body Plan chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will compare structure and function of mammal teeth. They will also make casts of teeth and describe how they are used.

Use this activity when studying Anatomy, Digestive System, or Predator-Prey relationships.

Begin this activity by asking students the following questions. Make a list of answers on the board.

1. How do mammal teeth differ from reptile teeth?
2. What kinds of teeth do humans have?
3. What are they used for?

Read and watch the information presented in the Teeth section of the Body Plan chapter in the ZooGuide. Choose one of the animals shown on this page and answer the following questions.

1. What does this mammal eat?
2. How else does it use its teeth?
3. Why are incisors and canines in the front of the mouth?

Students can make a model of their teeth using dental clay and plaster to make a cast of them. Label each type of tooth and give a brief description of what this kind of tooth does in the chewing process.

CONCLUSIONS: Once students have completed this activity they can get together as a group to discuss the following questions.

1. Why is the development of teeth so important for mammals to survive?
2. Why do many mammals have two sets of teeth, baby ones and permanent ones?
3. Name three mammals that have teeth that never stop growing. Why don't they stop?

7-12 Activity 8:

TOPIC: Comparing Digestive Systems

SOURCES: 'Digestive System' subtopic in Body Plan chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will identify the main parts of mammalian digestive systems and compare several.

Use this activity when studying Anatomy, Digestion, or Mammals.

Begin this activity by asking your students to name the parts of the human digestive system. Can anyone state how this differs from a cow's digestive system? If so, do they know why?

Read and watch the information in the Digestive System section of the Body Plan chapter in the ZooGuide. It shows a comparison of carnivore and herbivore digestive tracts. Ask your students to brainstorm reasons for a multi-chambered stomach in herbivores and a single one in carnivores.

Now that your class has some ideas about the reasons for differences in mammal digestive systems, you can conduct an experiment to test them. (NOTE: Use caution when handling any chemical substance. Wear protective eye wear and latex gloves.) The experiment will require hydrochloric acid (HCl) to represent stomach acid. You will also need cut grass and some ground meat (beef or chicken).

Begin the experiment by giving each group of students four beakers of HCl, 10 grams of grass leaves, 10 grams of chopped grass, and 20 grams of ground meat. Instruct them to place the grass leaves in one beaker, the chopped grass in another, and 10 grams of the meat in the other two beakers. Allow the beakers to sit for several hours then answer the following questions.

1. Which type of food dissolves fastest? Why?
2. Does the digestion time change for the chopped grass compared with the whole grass leaves? Why?
3. How does this help illustrate the importance of chewing cud in herbivores?

As an extension, students can do some research to find out what happens in each of a cow's four stomach chambers to aid digestion. How does the Caecum help herbivores digest food? Rate the efficiency of five herbivores' and five carnivores' digestive systems.

CONCLUSIONS: Discuss the following questions after you have completed this activity.

1. Why are plants more difficult to digest than meat?
2. Which type of diet provides more nutrients to a mammal, a vegetarian one or a meat based one? Why?
3. What are the advantages of being an omnivore verses a carnivore or herbivore?

7-12 Activity 9:

TOPIC: Endangered Species

SOURCES: 'Conservation' subtopics in Ecology chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will write an essay describing the endangered status of an African mammal.

Use this activity when studying Endangered Species, Habitat, or Ecology.

Begin this activity by asking students to make a list of all the endangered species of mammals listed in the Conservation section of the Ecology chapter in the ZooGuide and the Species Index. Place the list on the chalkboard or overhead projector for the whole class to compare with their lists.

Each student or group of students can then choose one animal or family of animals that appears on the list to research. Their essay should include the following information:

1. A description of its habitat,
2. Food sources,
3. Proximity to human populations, and
4. Reasons for its dwindling numbers.
5. What, if anything is being done to save it from extinction?
6. Which countries in Africa have strong laws and policies to help protect endangered mammals?
7. How successful are their efforts?

Students should compose the answers to these questions into a well written essay. They can present their findings to the class in a presentation. There may be a possible cross-over into their Social Studies classes, if they are studying foreign politics or African countries when you do this activity. You could coordinate with their Social Studies teachers to make this a joint project.

CONCLUSIONS: After students have done their presentations they can gather to discuss the following open-ended questions.

1. Why do some African countries place more importance on protecting endangered species than other?
2. How do humans contribute both to the destruction of mammals and to bringing them back from the brink of extinction?
3. Why, in general, is it important to preserve diversity among mammals in Africa?

7-12 Activity 10:

TOPIC: Social Structure

SOURCES: 'Social Structures' subtopic in Ecology chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will identify strategies that mammals use to survive in this and the next generation.

Use this activity when studying Ecology, Social Behavior, or Mammals.

Animals use different strategies to ensure survival of the current and therefore, next generation. One of these strategies relates to social behavior. Students can research a herd mammal or a lone mammal of Africa. They can use the data in the Social Structures section of the Ecology chapter in the ZooGuide as a starting place. They should answer the following questions and present the answers in a well organized paper.

1. How is this social structure beneficial to the species?
2. What are the advantages of living in a large herd?
3. What are the disadvantages?
4. What are the advantages of living alone?
5. What are the disadvantages?
6. How does the herd mentality directly relate to the hunter (carnivore) mentality? Explain how these social systems could have coevolved.

CONCLUSIONS: Students can present their findings to the class and have an open question and answer session once they have finished. What kinds of questions do they still have? You could add these to the list above for the next time you teach this activity.

7-12 Activity 11:

TOPIC: Food Web

SOURCES: 'Food Web' subtopic in Ecology chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will learn what a food web is and draw one for an animal of their choice.

Use this activity when studying Ecology or Food Webs.

Begin this activity by asking students to watch the movie presented in the Food Web section of the Ecology chapter in the ZooGuide. They can answer the following questions as they watch, pausing as necessary.

1. What is at the base of a food web? (energy, gases, and minerals)
2. Name three animals that eat only plants. (antelope, cattle, sheep, rodents, giraffes, etc.)
3. Name three animals that eat only meat. (lions, leopards, hyenas, wild dogs, etc.)
4. How do dead plants and animals add to the food web? (They are decomposed and they return nutrients to the soil.)

Now that your students are familiar with the main aspects of a food web, they can focus on one mammal and its food web. Students can choose a mammal listed in the Index or Species Index on the right of the ZooGuide screen. They should gather information about what this animal eats and what, if anything eats it. They can make a drawing on paper showing the food web starting with their mammal in the center and drawing the web of related foods radiating out from it. They can use arrows to illustrate what eats what. Make sure their food webs include decomposers like fungus and bacteria as well as the sun, water, and minerals important for plant growth. Students should label the parts of their food web including producers, consumers, and decomposers.

CONCLUSIONS: Students can post their drawings around the room and explain how their food web works to the rest of the class. If there are food webs that interact, you can discuss how they link to form more complex food webs.

1. Why are these structures called food webs?
2. How is a food web like a life cycle chart?
3. Why are plants the basis for all food webs?

7-12 Activity 12:

TOPIC: Classifying Mammals

SOURCES: 'Grouping Mammals subtopic in Species chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will study the three main groups of mammals described in the Grouping Mammals section of the Species chapter in the ZooGuide.

Use this activity when studying Mammals, Evolution, or Classification.

Begin this activity by asking students to read and view the information presented in the Grouping Mammals section of the Species chapter in the ZooGuide. It describes the three groups of mammals; placentals, monotremes, and marsupials.

Use information presented in the ZooGuide, your Biology textbook and reference materials to answer the following questions.

1. How do scientist know that the monotremes are the first mammals to appear on earth?
2. How do the differences between these three groups illustrate the evolution of mammals from earlier reptilian ancestors?
3. Which of the three groups is the most recent and most advanced type of mammal? How do you know?

CONCLUSIONS: Students can work alone or in groups to research the above questions. They can gather as a whole group to discuss their findings. They may want to find pictures of each type of mammal to compare external and internal features.

1. What features are consistent among mammals?
2. What characteristics have evolved the most over time? Why?

7-12 Activity 13:

TOPIC: Grouping Mammals

SOURCES: Species chapter in Mammals of Africa ZooGuide
Species Index in Mammals of Africa ZooGuide
Your Biology textbook
Pictures folder in the Mammals of Africa ZooGuide CD

ACTIVITY: In this activity students will classify groups of mammals using their own criteria and then compare their systems to the scientific classification system.

Use this activity when studying Classification or Mammals.

Before you begin this activity you will need to do the following:

1. Divide your class into groups of 3-4 students each.
2. Print 10-20 pictures of mammals from the ZooGuide's Pictures folder for each group. (Give each group the same set of pictures so that they can compare results at the end of the activity.) Make sure to choose mammals from different families.
3. Pass out paper and the pictures to each group.

Students should be told that they are scientists for the day and their job is to classify the mammals pictured into groups based on similar characteristics. Student teams should choose criteria on which to base their comparisons and be rigorous in their application. If there is a dispute about where a mammal belongs, students in the group should make reasonable arguments supporting the placement they feel is most appropriate and vote on the one they prefer.

Once all the mammals have been classified based on each group's guidelines, compare the methods used by each group. Did any of the teams use the same criteria? Ask each group to explain how they arrived at their classification system.

CONCLUSIONS: Finally, students can compare their classification systems with that in the Species Index which shows the scientific classification of mammals. You can discuss the following as a whole group.

1. Are there any groups of mammals with only one member? Which ones?
2. How similar were students' classification systems to the scientific one?
3. Which mammals were easiest to classify? Why?

7-12 Activity 14:

TOPIC: Predator-Prey Relationships

SOURCES: Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide

ACTIVITY: In this activity students will describe a predator-prey relationship and define its importance to the overall ecosystem.

Use this activity when studying Ecology, Predator-Prey Relationships, or Evolution.

Students should begin by choosing a predator-prey pair from among the species listed in the Mammals of Africa ZooGuide. Then they can answer the following questions and organize them into a well structured presentation.

1. How is each member of this pair adapted for its role? Include information on anatomy, habitat, camouflage, special abilities, social structure, and other important adaptations.
2. Describe a typical encounter between the two.
 - a. How often is the predator successful?
 - b. When is the predator more likely to take the greatest risks? Why?
3. How many prey per range area are required to keep one predator alive? Is this number higher or lower than you expected? Why?

CONCLUSIONS: Once students have presented their findings in a scientific report, the class can gather to discuss the following questions.

1. How would the ecosystem be effected if there were no carnivorous predators?
2. How would the ecosystem be effected if there were no herbivores?
3. How do predator-prey relationships illustrate the balance of nature in an ecosystem?

7-12 Activity 15:

TOPIC: Latin Names

SOURCES: Species Index in Mammals of Africa ZooGuide
Your Biology textbook
References listed in this guide
Latin-English Dictionary

ACTIVITY: In this activity students will translate Latin names for mammals to their English equivalent. They will attempt to develop an understanding for how scientists name organisms in nature.

Begin this activity by asking students to look at the Latin names for mammals listed in the ZooGuide. To do this click once in the button in the lower right corner under the Species Index buttons that says Latin Names on it. This will change the Species Index buttons from pictures to the Latin names for each.

To do this activity students should choose five to ten Latin names from the list and look up their meanings. Then they can answer the following questions in small groups or as a class.

1. Are the names appropriate for each animal? How?
2. Which name is the funniest? Why?
3. Does this show that scientists have a sense of humor? How?
4. Which name is based on a very obscure feature of the animal?
5. What is the purpose for giving all organisms Latin names?

CONCLUSIONS: Review the answers to the above questions as a group. Use a Latin-English dictionary to look up characteristics of the mammals chosen above and give them new names in the Scientific tradition. What features did your class decide to base the names on? Why?

References:

The references listed in this section are divided into two parts: K-6 activity references, and 7-12 activity references. The references listed were found in a local public library and represent a small portion of the books that are available on this topic. If you cannot find a specific reference listed here, try to find a book with similar content in your school or local library.

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