

Study Tip

Have a “Biology Bee” and ask students questions about the Vocabulary terms and Key Concepts. When a student misses a question, he or she is out. However, allow the students who are “out” to answer a missed question so they can get back “in.” The game is over when all the Vocabulary terms and Key Concepts have been covered.

Thinking Visually

1. Marsupials
2. Placental mammals
3. Platypuses and echidnas

Chapter 32 Assessment**Reviewing Content**

1. c 5. b 9. d
2. c 6. c 10. a
3. a 7. a
4. a 8. b

Understanding Concepts

11. Hair, subcutaneous fat, and a high metabolic rate
12. Regulate body activities by releasing hormones.
13. Protect animals from disease
14. Sharp teeth, such as canines and incisors, are used for biting and ripping flesh from prey. Most carnivores also have sharp molars that are used to slice meat into small pieces. Herbivores have flattened molars to grind plant food.
15. Chest muscles lift the rib cage, and the diaphragm pulls the bottom of the chest cavity downward, increasing the volume of the chest cavity. Air enters the lungs. Chest muscles then relax, lowering the rib cage. The diaphragm relaxes, and air is pushed out of the lungs.
16. Filters urea from the blood, excretes excess water or retains needed water, and retains salts, sugars, and other important molecules the body needs.

32-1 Introduction to the Mammals**Key Concepts**

- In addition to having hair and the ability to nourish their young with milk, all mammals breathe air, have four-chambered hearts, and are endotherms that generate their body heat internally.
- The first true mammals appeared during the late Triassic Period, about 220 million years ago.
- The ability of mammals to regulate their body heat from within is an example of homeostasis.
- As mammals evolved to eat foods other than insects, the form and function of their jaws and teeth became adapted to their diets.
- The kidneys of mammals help maintain homeostasis by filtering urea from the blood, as well as excreting or retaining water.

Vocabulary

mammary gland, p. 821 • subcutaneous fat, p. 822
rumen, p. 823 • diaphragm, p. 824
cerebral cortex, p. 825

32-2 Diversity of Mammals**Key Concepts**

- The three groups of living mammals are the monotremes, the marsupials, and the placentals. Marsupials bear live young, but at a very early stage of development. Monotremes lay eggs. In placental mammals, nutrients, oxygen, carbon dioxide, and wastes are exchanged between embryo and mother through the placenta.
- Similar ecological opportunities on the different continents have produced some striking examples of convergent evolution in mammals.

Vocabulary

monotreme, p. 828 • marsupial, p. 829
placenta, p. 829

**32-3 Primates and Human Origins****Key Concepts**

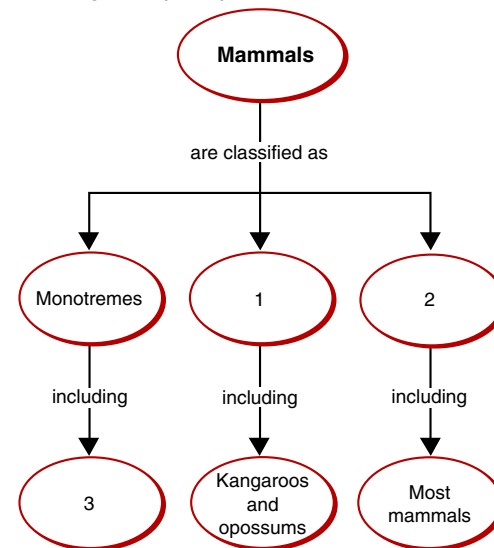
- In general, primates have binocular vision, a well-developed cerebrum, relatively long fingers and toes, and arms that rotate in their shoulder joints.
- Primates that evolved from two of the earliest branches look very little like typical monkeys and are called prosimians. Members of the more familiar primate group that includes monkeys, apes, and humans are called anthropoids.
- It is now clear that hominid evolution did not proceed by the simple, straight-line transformation of one species into another. Rather, like the evolution of other mammalian groups, a series of complex adaptive radiations produced a large number of species whose relationships are difficult to determine.

Vocabulary

binocular vision, p. 834
prosimian, p. 834
anthropoid, p. 835
prehensile, p. 835
hominoid, p. 835
hominid, p. 835
bipedal, p. 835
opposable thumb, p. 835

Thinking Visually

Using information from this chapter, complete the following concept map:

**CHAPTER RESOURCES****Print:**

- **Teaching Resources**, Chapter Vocabulary Review, Graphic Organizer
- **Chapter Tests: Levels A and B**, Chapter 32 Test

Technology:

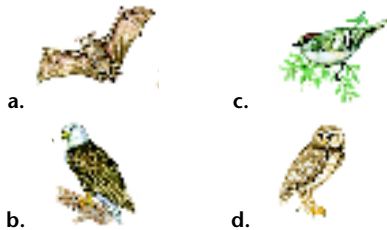
- **Computer Test Bank**, Chapter 32 Test
- **iText**, Chapter 32 Assessment

Chapter 32 Assessment

Reviewing Content

Choose the letter that best answers the question or completes the statement.

- Which structure in female mammals produces milk to nourish young?
 - kidney
 - cloaca
 - mammary gland
 - placenta
- The first true mammals appeared during the
 - Permian Period.
 - Cretaceous Period.
 - Triassic Period.
 - Jurassic Period.
- Which of the animals shown below is a mammal?



- In mammals, the powerful muscle that aids in breathing is the
 - diaphragm.
 - placenta.
 - cerebrum.
 - kidney.
- The composition and levels of body fluids in mammals are controlled by the
 - lungs.
 - kidneys.
 - intestine.
 - heart.
- The reproductive system of a monotreme empties into the
 - placenta.
 - testes.
 - cloaca.
 - urinary bladder.
- The pouch in which the young of kangaroos develop is called a
 - marsupium.
 - placenta.
 - diaphragm.
 - lagomorph.
- Which of the following are NOT examples of placental mammals?
 - cetaceans
 - marsupials
 - carnivores
 - primates

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- Primates consist of two groups, anthropoids and
 - monotremes.
 - apes.
 - hominids.
 - prosimians.
- How many hominid species exist today?
 - one
 - two
 - nine
 - twelve

Understanding Concepts

- Describe three adaptations mammals have to maintain homeostasis by conserving body heat.
- What function do endocrine glands perform?
- What is the function of the immune system?
- Describe how the teeth of mammals are adapted for different types of food.
- Sequence the events that occur during mammalian breathing.
- What functions do the kidneys of mammals carry out?
- In general, how do the brains of mammals compare with the brains of other vertebrates? What is the significance of that difference?
- Describe an example of a mammalian adaptation for movement.
- Describe how the young of monotremes, marsupials, and placental mammals obtain nourishment.
- What survival advantage does the placenta confer on mammals?
- Describe an example of convergent evolution in mammals.
- What anatomical characteristic allows for the binocular vision that occurs in primates?
- Describe how various adaptations make primates successful tree dwellers.
- List the unique characteristics of the family known as Hominidae. Give an example of a hominid.
- What are the Laetoli footprints? What is their significance?
- What is the earliest known species in the genus *Homo*? What does its species name mean, and why was it given that name?



If your class subscribes to the iText, your students can go online to access an interactive version of the Student Edition and a self-test.

(Continued from page 844)

- Mammals have larger brains than other animals in proportion to their body size. As a result, mammals are capable of complicated behaviors such as learning and social conduct.
- Sample answers: a flexible backbone; limb bones and muscles that enable mammals to run, walk, burrow, fly, hop, swim, swing, and pounce.
- The young of all three groups feed on milk. Monotremes lick milk from their mothers' abdomens; marsupials attach to nipples in the mother's marsupium; placental mammals obtain milk by nursing.
- Compared to young that are hatched from eggs, the young of placental mammals are given a longer period of development during which they receive regular nourishment.
- Mammals that feed on ants and termites evolved in different groups in different regions. They all have powerful front claws; a long, hairless snout; and a sticky tongue.
- A flat facial structure allows both eyes to face forward, with overlapping fields of view.
- Primates have flexible hands, and usually flexible feet. The position of the thumbs enables primates to grasp branches and other objects. Some have prehensile tails that help them grasp branches.
- Hominids are omnivores that have bipedal locomotion, opposable thumbs, and well-developed cerebrums. Humans are an example.
- The Laetoli footprints are fossil footprints that were probably made by a species of *Australopithecus* between 8 and 3.6 million years ago. They show that hominids were bipedal millions of years ago.
- Homo habilis*, which means "handy man." *H. habilis* was given this name because it apparently made and used tools.



HOMEWORK GUIDE

Section:	Questions:
Section 32-1:	1-5, 11-18, 29, 31, 34, 34-36
Section 32-2:	6-8, 19-21, 28, 30, 32, 37
Section 32-3:	9, 10, 22-27, 33

Critical Thinking

27. The first diagram has *A. africanus* as the only immediate descendant of *Australopithecus* and in the main line to *H. sapiens*. The second diagram has both *A. africanus* and *Homo habilis* as immediate descendants, and *A. africanus* is not in the main line to *H. sapiens*.

28. The embryo of a placental mammal develops in the mother's uterus for a longer period of time than does the embryo of a marsupial. Therefore, a marsupial is born sooner and is less well developed than a placental mammal. A newborn marsupial must develop further in the mother's pouch.

29. Well-developed senses enable mammals to be aware of dangers and to find food. Well-developed brains enable mammals to react much more quickly to dangers. For example, dolphins can detect location of objects by sound, so they can find food even in poor light. Dogs can track prey by scent, so their chance of finding food is increased.

30. Monotremes have two reptile characteristics: they have a cloaca, and they lay soft-shelled eggs that are incubated outside the body.

31. Mammals have hair and produce milk to nourish the young, characteristics that bats share. Birds lay eggs and have feathers and do not nourish their young with milk, so bats are not birds, even though they fly.

32. Mammal A is a chiropteran, or member of the bat order, because it can fly. Mammal B is a rodent, such as a chipmunk, because of its diet and tooth structure. Mammal C is a cetacean, such as a whale, because it is a filter feeder and lives its entire life in water.

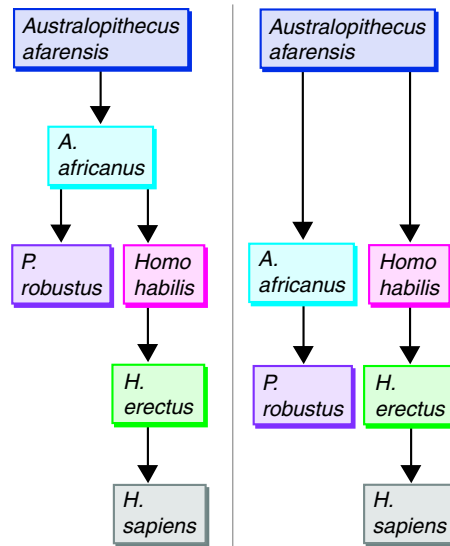
33. By estimating a fossil's age, paleontologists can infer when it was alive relative to other hominid species. Structural characteristics help them infer possible evolutionary relationships.

34. Parents protect developing young and may teach them ways to survive. If the parents die before the young are mature, the young may also die before mating and reproducing.

35. Endocrine system and circulatory system; endocrine glands produce hormones that travel in the blood to the organs that they affect.

Critical Thinking

27. **Interpreting Graphics** The following flowcharts show two alternative lines of descent from *Australopithecus afarensis*. Describe how the two lines of descent differ.



28. **Comparing and Contrasting** Describe the differences between a newborn placental mammal and a newborn marsupial.

29. **Inferring** In what ways have well-developed senses contributed to the success of specific mammals?

30. **Inferring** What evidence suggests that monotremes may have been the first mammals to evolve from reptiles?

31. **Forming Operational Definitions** Write definitions of "mammal" and "bird" that would help you explain why bats are classified as mammals even though they can fly.

32. **Classifying** You are given the following descriptions of three placental mammals: Mammal A can fly, has sharp teeth, and consumes a liquid diet. Mammal B has a single pair of sharp, curved incisor teeth and eats only plant material. Mammal C is a filter feeder, mates and bears its young in water, but comes to the surface to breathe. Place each mammal in its proper order, and explain your decision.

33. **Inferring** Why is it important for paleontologists to estimate the age of a hominid fossil as well as analyze its structural characteristics?

34. **Inferring** Many mammals care for their young for extended periods of time. This parental behavior does not help the parent survive. Why, then, might natural selection favor extended parental care?

35. **Applying Concepts** What two body systems interact to deliver hormones to the organs they affect? Describe how this interaction takes place.

36. **Inferring** How might the disappearance of the dinosaurs at the end of the Cretaceous Period have contributed to the natural selection that is partly responsible for the great diversity of mammals alive today?

37. **Connecting Concepts** In Chapter 15, you learned how adaptations contribute to the survival of a species. Name three orders of mammals. Identify two adaptations of each order, and describe the survival value of each adaptation for species in that order.

Writing in Science

Write a paragraph explaining why the process of sweating is considered to be an example of a negative feedback system. In your paragraph, explain what negative feedback is. (Hint: Before you write, you might list the steps in the process of sweating and then think about how they relate to negative feedback.)

Performance-Based Assessment

Expressing an Opinion Producers of a new television series want to create interesting episodes about the characteristics and diversity of mammals. They ask you whether viewers will enjoy the show more if it focuses on mammals alone or shows mammals along with other chordates. Write a memo giving your opinion. Include at least three specific examples to prove your point.

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36. The disappearance of the dinosaurs opened up many new niches that could be filled by mammals. The decreased competition for resources and the removal of potential predators helped stimulate the adaptive radiation of mammals.

37. Sample adaptations: Carnivores have sharp teeth that make them very efficient at capturing and eating prey; insectivores have long, narrow snouts and sharp claws that enable them to dig for food; lagomorphs have hind legs adapted for leaping that help them to escape predators.