

CHAPTER

33

DIRECTED READING

# Introduction to Vertebrates

## ► Section 33-1: Vertebrates Spread from the Sea to the Land

### Vertebrates Are Chordates with a Backbone

*Read each question, and write your answer in the space provided.*

1. How is the tissue of vertebrates organized?

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2. List six major organ systems that all vertebrates have.

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### The First Vertebrates Were Jawless Fishes

*Complete each statement by writing the correct term or phrase in the space provided.*

3. The first jawless fish to evolve were the \_\_\_\_\_ .
4. The \_\_\_\_\_ is an example of a modern-day jawless fish.
5. The first vertebrates appeared \_\_\_\_\_ million years ago.

### Fishes Evolved Jaws and Paired Fins

*Read each question, and write your answer in the space provided.*

6. What were the two challenges to the survival of jawless fish as predators?

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7. How did jawless fish respond to the two challenges to their survival as predators?

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8. Describe the characteristics of the acanthodians.

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9. Describe the characteristics of the placoderms.

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10. Suggest why sharks and bony fish replaced the early fishes.

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### Today, Fish Are the Largest Group of Vertebrates

*Mark each statement below T if it is true or F if it is false.*

\_\_\_\_\_ 11. Hagfish are agnathans that have become extinct.

\_\_\_\_\_ 12. Skates and rays are examples of bony fish.

\_\_\_\_\_ 13. Most fish today are bony fish.

### The First Vertebrates to Venture onto Land Were Amphibians

*Read each question, and write your answer in the space provided.*

14. Why do scientists think that amphibians evolved from lobe-finned fish?

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15. What three innovations were necessary for a species to live successfully on land?

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### Today, There Are Three Groups of Amphibians

*Read each question, and write your answer in the space provided.*

16. What are the three groups of modern amphibians?

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17. What group of vertebrates replaced the amphibians as the dominant terrestrial vertebrates, and when did this occur?

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## ► Section 33-2: Vertebrates Adapt to Terrestrial Living

### Reptiles Became the First Fully Terrestrial Vertebrates

*In the space provided, explain how the terms in each pair differ in meaning.*

1. terrestrial animals, amphibians

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2. ectothermic animals, endothermic animals

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3. sauropods, theropods

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*Read each question, and write your answer in the space provided.*

4. What two important adaptations enabled reptiles to live on land?

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5. What was Pangaea?

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### Today, Only Four Groups of Reptiles Remain

*Read each question, and write your answer in the space provided.*

6. What are two ways crocodiles are similar to birds?

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7. List the four groups of existing reptiles.

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## Mammals Replaced the Extinct Dinosaurs

*Complete each statement by underlining the correct term or phrase in the brackets.*

8. Mammals are descendants of the extinct order of reptiles called [therapsids / thecodonts].
9. Mammals evolved [later than / at the same time as] dinosaurs.

## Today, There Are Three Groups of Mammals

*Read each question, and write your answer in the space provided.*

10. What are the characteristics of marsupials?

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11. What are the characteristics of placental mammals?

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## Birds May Have Evolved from Dinosaurs

*Read each question, and write your answer in the space provided.*

12. What features did *Archaeopteryx* have in common with dinosaurs?

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13. What features did *Archaeopteryx* have in common with birds?

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14. What birdlike features are NOT features of *Archaeopteryx*?

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## Today, Birds Are the Largest Group of Terrestrial Vertebrates

*Place the following groups of birds in the order in which they evolved, based on DNA analysis. Write the correct order (1–4) in the space provided.*

- \_\_\_\_\_ 15. ducks, geese, and waterfowl
- \_\_\_\_\_ 16. birds of prey, flamingos, and penguins
- \_\_\_\_\_ 17. woodpeckers, owls, parrots, and swifts
- \_\_\_\_\_ 18. ostriches and their relatives