**The Earth Through Time**

# Chapter 14—Life of the Mesozoic

**Multiple Choice Questions**

**Select the best answer.**

1. The Jurassic-Cretaceous boundary was the time when \_\_\_\_\_\_\_\_\_\_\_\_\_ appeared in the geologic record.

 a. pines

 b. cycadales

 c. conifers

 d. angiosperms

 e. diatoms

2. As the proportion of ocean to land increases, climates will likely \_\_\_\_\_\_.

 a. cool down

b. warm up

 c. increase in snowfall

 d. decrease volcanism

 e. None of the above

3. Palemagnetic studies suggest that continents were at their current \_\_\_\_\_\_\_\_\_\_\_ by the Jurassic period.

 a. latitudes

b. longitudes

 c. climates

 d. Both a. and b.

 e. None of the above

4. Which of the following is evidence for a cooling event at the end of the Cretaceous?

 a. an increase in volcanic activity

b. expansion of reefs to higher latitudes

 c. oxygen isotopes from plankton

 d. erosion of mountains

 e. All the above

5. Scleractinids are corals that have a symbiotic relationship with \_\_\_\_\_\_\_\_\_\_\_\_.

 a. zooxanthellea algae

b. trilobites

 c. mollusks

 d. parrot fish

 e. digoflagellates

6. Cephalopod sutures evolved in complexity over time. Which of the following would be the youngest (most recent) suture form?

 a. ammonite

 b. belemnite

 c. goniatites

 d. ceratites

 e. coniferic

7. Which of the following has been proposed for why sutures became so complex?

 a. provide greater strength to the shell

b. provide greater size to the shell

 c. folds provide better attachment for the animal

 d. Both a. and c.

 e. None of the above

8. Forams can be used as indicators of ocean water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. tide patterns

b. salinity

 c. pH

 d. temperature

 e. Both b. and d.

9. The Cretaceous period gave rise to the most abundant and varied of the living vertebrates called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. *Sharovipteryx*

 b. lesiosasurs

 c. placodonts

 d. teleosts

 e. pterodactyloids

10. Seventeen families of amphibians survived the Permian extinction. By the end of the Mesozoic Era how many amphibian families remained?

 a. 1

b. 2

 c. 3

 d. 0

 e. 4

11. Archosaurs are diapsid reptiles. Diapsids have \_\_\_\_\_\_\_\_\_\_\_ openings behind their eye orbits.

 a. 1

b. 2

 c. 3

 d. 0

 e. 4

12. Dinosaurs evolved from which group of animals?

 a. Temnospondyls

 b. Rhynchocephalians

 c. Basal archosaurs

 d. Theropods

 e. None of the above

13. Phytosaurs and crocodiles are from different evolutionary branches yet evolved into similar forms in response to a similar environment. What is this called?

 a. Convergence

b. Unienvirons

 c. Bivergence

 d. Divergence

 e. None of the above

.

14. The earliest known dinosaur discovered thus far date to around \_\_\_\_\_\_ years ago.

 a. 115 million

b. 230 million

 c. 30 million

 d. 544 million

 e. None of the above

15. The two major groups of dinosaurs are based on what skeletal part?

 a. Knee

b. Hip

 c. Elbow

 d. Pelvis

 e. Skull

16. Ornithischians skulls lacked \_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. Both c. and d.

b. incisors

 c. teeth in the back part of the jaw

 d. teeth in the front part of the jaw

 e. bones

17. T-rex belong to which group of dinosaurs?

 a. Temnospondyls

 b. Rhynchocephalians

 c. Basal archosaurs

 d. Theropods

 e. Phytosaurs

18. What is the name of the largest meat eating dinosaur?

 a. *Tyrannosaurus rex*

b. *Giganotosaurus*

 c. *Velociraptor*

 d. *Macroraptor*

 e. *Supersaurus*

19. Birds can be traced to which type of dinosaur?

 a. Temnospondyls

 b. Rhynchocephalians

 c. Basal archosaurs

 d. Theropods

 e. Phytosaurs

20. What is the name of the structure found in feathered dinosaurs, fossilized birds, and modern birds that can be used to determine the color of feathers?

 a. Red blood cells

b. Ligaments

 c. Sauropod

 d. Melanosomes

 e. Amber

21. Supersaurus was an immense animal between 80 to 100 tons that belong to the \_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. mollusks

b. theropods

 c. sauropods

 d. melanosomes

 e. phytosaurs

22. Which of the following fossils have been discovered in association with onrnithopods?

 a. eggs

b. embryos

 c. juveniles

 d. coporlites

 e. All of the above

23. What is another name for the Hadrosauridae?

 a. Duckbill dinosaurs

b. Different – tooth lizard

 c. Thumbs – up lizard

 d. Shield bearing dinosaurs

 e. Bone-headed dinosaurs

24. What does the name Heterodontosaur mean?

 a. Duckbill dinosaurs

b. Different – tooth lizard

 c. Thumbs – up lizard

 d. Shield bearing dinosaurs

 e. Bone-headed dinosaurs

25. What is believed to be the function of the plates on the back of stegosaurs?

 a. Support for its skeleton

b. Temperature regulation

 c. Increase size to discourage predatory

 d. Weapons

 e. None of the above

26. Pachycelphalsaurs or bone-headed dinosaurs likely used their head to \_\_\_\_\_.

 a. telepathic communication

b. protect their extra large brain

 c. knock down trees

 d. build dens or nests

 e. compete for mates

27. The group of dinosaurs known as the ceratosians is characterized by the presence of \_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. shield like frills

b. different teeth

 c. knobby tail

 d. big ears

 e. boney head

28. Cold blooded animals are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. exothermic

b. ectothermic

 c. endothermic

 d. exoskeleton

 e. None of the above

29. What group of animals has been proposed to be combined with dinosaurs?

 a. Lizards

 b. Reptiles

 c. Invertebrates

 d. Mammals

 e. Birds

30. Which of the following has been proposed as lines of evidence that the dinosaurs were endothermic?

a. Limbs are directly below body

b. Bones are poorly vascular

c. Oxygen isotope exhibits large differences between the limbs and the body core

 d. Narrow nasal cavities

 e. All of the above

31. *Maiasaura* made nests for eggs. What method was used to warm the eggs?

 a. The sun

b. Body heat of the siblings

 c. Fermentation of decaying plant matter covering the egg

 d. Geothermal vents

 e. None of the above

32. *Oviraptor* skeletons have been discovered in the Gobi Desert in what position?

 a. sleeping

b. running

 c. urinating

 d. squatting over their nests

 e. None of the above

33. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ were the first flying reptiles.

a. Temnospondyls

 b. Pterosaurs

 c. Rhynchocephalians

 d. Thecodonts

 e. Phytosaurs

34. The wings of pterosaurs were formed by stretching skin between the body and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. first finger

b. fourth finger

 c. arm

 d. claw

 e. tail

35. Ichthyosaurs had a body shaped that resembled which of the following?

 a. Tooth whales

b. Giant squids

 c. Clams

 d. Snakes

 e. Turtles

36. What is the name of the first bird?

 a. *Archacopteryx*

b. Theropod

 c. Pteranodon

 d. Pterosaurs

 e. All the above

37. What evidence is given that the first true bird did not fly?

 a. Wing were too small

b. No feathers

 c. Feather shafts were too thin

 d. Feather shafts were too heavy

 e. No wings

.

38. Early mammal discoveries were of \_\_\_\_\_\_\_\_\_\_\_\_\_.

 a. primates

b. finger bones

 c. coporlites

 d. skin

 e. teeth

39. What is it called when plant and animals evolve a close reciprocal relationship?

 a. coexistance

b. coevolution

 c. marriage

 d. symbiance

 e. None of the above

40. What is a bolide?

a. A coporlite

b. Flesh eating virus

 c. Space dust

 d. A leech

 e. Any extraterrestrial body that explodes upon striking the Earth

**Answers to Questions**

1. d 11. b 21. c 31. c

2. b 12. c 22. e 32. d

3. a 13. a 23. a 33. b

4. c 14. b 24. b 34. b

5. a 15. b 25. b 35. a

6. a 16. d 26. e 36. a

7. d 17. d 27. a 37. c

8. e 18. b 28. b 38. e

9. d 19. d 29. e 39. b

10. a 20. d 30. a 40. E

**Multiple-Choice Questions**

 1. Mesozoic diatoms first appeared during what geologic period?

a. Pennsylvanian c. Jurassic

b. Triassic d. Cretaceous

 2. The calcium carbonate secreting marine organism who internally deposits calcium carbonate on an internal matrix and constructs tiny, shield-like structures is called a(n)

a. diatom. c. coccolith.

b. acritarch. d. foraminifer.

 3. The third great episode of plant history is marked by the appearance of species having enclosed seeds and flowers. Such plants are known as

a. angiosperms. c. chlorophytes.

b. cycads. d. tracheophytes.

 4. Members of the molluscan class Cephalopoda that were abundant during the Mesozoic and were characterized by elongate internal shell (conch) are called

a. nautiloids. c. belemnites.

b. ammonites. d. goniatites.

 5. The most important Mesozoic event in the terrestrial plant evolution was

a. the development of vascular tissue for fluid and nutrient transport.

b. the appearance of the gymnosperms.

c. the appearance of the angiosperms.

d. the appearance of the psilophytes.

 6. Of the following, which group became extinct at the end of Cretaceous?

a. brachiopods c. echinoderms

b. bryozoans d. ammonoids

 7. One of the particularly specialized Mesozoic pelecypods that had one valve in the shape of a curved or coiled cone and the other valve in the form of a lid was called a

a. brachiopod. c. belemnite.

b. rudist. d. rugose.

 8. In the Saurischians, what is the name of the bone, visible on either side of the pelvic structure, which is firmly clamped to the spinal column?

a. ischium c. fibia

b. ilium d. pubis

 9. This “basal archosaurs” was lightly built with a tail and short fore limbs and walked upright on their hind legs. It is called the

a. phytosaurs. c. triadobatrachus.

b. hesperosuchus. d. eocaecilia.

10. What is the name of the basalarchosaur that were so similar to the living crocodiles that they represent an example of evolutionary convergence?

a. pterosaurs c. phytosaursb

b. ichthyosaurs d. pleisosaurs

11. What is the name of the highly specialized Mesozoic marine reptiles that had fishlike tails, boneless dorsal fins, and paddle limbs for steering?

a. pterosaurs c. phytosaurs

b. ichthyosaurs d. plesiosaurs

12. Which of the following does ***not*** represent a member of the sauropod dinosaurs?

a. apatosaurus c. tyrannosaurus

b. plateosaurus d. stegosaurus

13. Which of the following features did *Archaeopteryx* ***not*** have?

a. a keel bone (wishbone) c. a long tail

b. teeth d. claw-bearing fingers

14. The wings of the pterosaurs were supported by

a. the fusion of two fingers into a support structure.

b. all five fingers.

c. an elongated thumb.

d. an elongated fourth finger.

15. The evolutionary process whereby new groups diverge from their ancestral lineages in order to fit into their new surroundings is called

a. adaptive radiation. c. punctuated equilibrium.

b. convergent evolution. d. isolation.

16. The largest of all of the dinosaurs were the

a. thecodonts. c. sauropods.

b. theropods. d. omithopods.

17. A well-known Jurassic representative whose remains have been found in a formation of Colorado is Apatosaurus, which was formerly known as

a. plesiosaurs. c. pteranodon.

b. mosasaurs. d. brontosaurus.

18. The quadrupedal ornithischian dinosaur which was characterized by the development of prominent horn(s) and displayed a shield-like bony frill at the back of the skull is called a(n)

a. ceratopsian. c. ichthyosaur.

b. hadrosaur. d. placodont.

19. The dinosaur group with the pelvis structure that mimics that found in birds is called

a. saurischians. c. thecodonts.

b. ornithischians. d. therapsids.

20. All of the theropods were typically bipedal dinosaurs were also

a. herbivores. c. carnivores.

b. omnivores. d. scavengers.

**Fill in the Blank**

 1. Cephalopods that have a straight or gently undulating suture are placed in the subclass
 while those with more complex sutures are placed in the subclass
 .

 2. Mesozoic reefs that often were formed of pelecypod shells rather than coral skeletons were called .

 3. The lines formed on the inside of an ammonite shell (conch) where the edge of each chamber’s partition meets the inner wall are called .

 4. The class members of phylum Echinodermata that are characterized by a five-fold symmetry and a shell or test that is nearly sphericalare .

 5. The order of dinosaurs that is called lizard-hipped and includes *Allosaurus* and *Tyrannosaurus* is called .

 6. The cigar-shaped cephalopods that became common during the Mesozoic and are considered the ancestors of Triassic squids are called .

 7. What order do bird-hipped dinosaurs belong to that includes stegosaurs and ceratopsians?
 .

 8. In dinosaurs, the uppermost pelvic bone which is firmly clamped to the spinal column is
called .

 9. The large massive paddle swimmers, often called “swan lizards”, that attain an overall length in excess of 12 meters, are called .

10. The form of flying reptile of Late Triassic to Late Cretaceous that attests to the adaptive success of these flying reptiles is called .

11. The first undisputed fossil bird that is considered a close evolutionary link between small, bipedal theropods and modern birds was .

12. The dentition type of this group of mammals is described as cheek teeth in which three cusps are aligned in a row. Some members were as large as cats and may have preyed on smaller invertebrates; this group was called .

13. The evolutionary process of producing similar forms in unrelated organisms is called .

14. Saurischians are divided into two groups: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (bipedal meat-eaters) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (large quadrupedal herbivores).

15. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the first undisputed fossil bird, is a close evolutionary link between small, bipedal therapods and modern birds.

 **True-False**

 1. Coccoliths are extremely useful in stratigraphic correlation of Cretaceous to Holocene rocks.

 2. Angiosperms provide many examples of co-evolution with Mesozoic insects, reptiles, mammals, and birds.

 3. Cycads were particularly abundant land plants during the Jurassic.

 4. Angiosperms are seed-bearing plants in which true flowers have not developed.

 5. Diatoms are small microscopic organisms made of calcareous ooze called chalk.

 6. Jurassic and Cretaceous rudists are grouped with bivalvia.

 7. Ammonoid cephalopods are subdivided into ceratites, goniatites and belemnoids based on the complexity of suture patterns.

 8. Theropods, ceratosaurs, and sauropods are grouped under Ornithischian dinosaurs.

 9. The suture patterns of the gonatitic ammonoids are gently undulating or straight.

10. Mammals are divided into two groups: the prototherians that include triconodonts, multituberculates, and monotremes; and the therians that include both marsupials and placental mammals.

 **Answer Key**

**Multiple Choice**

1. d
2. c
3. a
4. c
5. c
6. d
7. b
8. b
9. b
10. c
11. b
12. a
13. a
14. d
15. a
16. c
17. d
18. a
19. b
20. c

**Fill Ins**

1. nautioloid, ammonoid
2. rudistids
3. suture
4. echinoids
5. saurischians
6. beleminites
7. Ornithischian
8. ilium
9. plesiosaurs
10. pterosaurs
11. *Archaeopteryx*
12. triconodonts
13. convergence
14. theropoda, sauropodomorpha
15. *Archaeopteryx*

**True/False**

1. T
2. T
3. T
4. F
5. F
6. T
7. F
8. F
9. F
10. T

### RESPONSES TO QUESTIONS ACCOMPANYING SELECTED FIGURES

FIGURE 14–3 (p. 421) Unlike many clams and mussels, the two valves of *Gryphaea* differ from one another in size and in shape.

FIGURE 14–9 (p. 424) The most widely accepted explanation for the wrinkled edges of ammonoid septa is that they added strength to the outer wall of the shell. This afforded protection against the pressures existing at great depths in the open ocean.

FIGURE 14–16 (p. 428) The crocodile is an example of convergent evolution with *Rutiodon*.

FIGURE 14–17 (p. 431) Predatory groups of dinosaurs in the figure are the theropods, ceratosaurs, carnosaurs, and coelurosaurs.

FIGURE 14–60 (p. 457) The plates, on which the coccosphere is constructed, are called *coccoliths.*

FIGURE 14–62 (p. 458) Diatoms are members of the Kingdom Protoctista.

# Chapter 14—Life of the Mesozoic

**Multiple Choice Questions**

1. What is the age of the Solnhofen Limestone which produced *Archaeopteryx*?

1. Late Triassic - Early Jurassic
2. Late Cretaceous
3. Triassic
4. Jurassic
5. Early Cretaceous

Ans: d

Feedback: See pages 426, 450, and 454

2. *Archaeopteryx* was an early:

1. amphibian.
2. insect.
3. bird.
4. phytosaur.
5. dinosaur.

.

Ans: c

Feedback: See pages 450, 451, and 454

3. Dinosaurs are divided into two groups (two orders) on the basis of:

1. whether they had horns or not.
2. endotherms vs. ectotherms.
3. whether they walked on 2 legs or 4 legs.
4. differences in hip bone structure.
5. carnivores vs. herbivores.

Ans: d

Feedback: See page 429

4. Ginkgoes are a type of:

1. extinct bird.
2. gymnosperm.
3. angiosperm.
4. small 2-legged dinosaur.
5. marine phytoplankton.

Ans: b

Feedback: See page 458

5. The flowering plants belong to this group:

1. cycad.
2. gymnosperms.
3. angiosperms.
4. seed ferns.
5. lycopods.

Ans: c

Feedback: See page 459

6. Plates on the back of the stegosaurs may have been used for what purpose?

1. fighting other dinosaurs
2. sails to help them move about in the water
3. regulation of body temperature
4. gliding through the air
5. protection from predators

Ans: e

Feedback: See pages 439-440

7. What was the nature of most of Cretaceous climate?

1. cool and dry
2. warm and stable
3. cold and wet
4. hot and dry
5. much like today

Ans: b

Feedback: See page 420

8. Around what time did Mammals appear?

1. Late Triassic
2. Late Cretaceous
3. Jurassic
4. Early Cretaceous
5. Early Triassic

Ans: a

Feedback: See pages 451-452 and 454-455

9. Around what time did Dinosaurs appear?

1. Late Triassic
2. Late Jurassic
3. Late Cretaceous
4. Early Cretaceous
5. Early Triassic

Ans: a

Feedback: See page 429

10. A major extinction event occurred at the end of what Mesozoic period, causing the extinction of the dinosaurs, ammonites, plesiosaurs, mosasaurs and many other groups?

1. Triassic
2. Jurassic
3. Cretaceous

Ans: c

Feedback: See page 459

11. What was the 1977 discovery in the uppermost layer of Cretaceous rocks in Italy that supported the modern hypothesis that comet or asteroid impact caused a mass extinction 65 million years ago?

1. tektite-rich layers
2. iridium-rich clay
3. a giant impact crater
4. a giant asteroid in Cretaceous sediments
5. a layer of broken shells, bones, and burned wood

Ans: b

Feedback: See pages 459-462

12. The extensive chalk deposits of the Cretaceous were formed from the remains of planktonic foraminifera along with the remains of what type of organism?

1. coccolithophorids
2. diatoms
3. acritarchs
4. dinoflagellates
5. coralline algae

Ans: a

Feedback: See pages 426 and 456

13. What type of pelagic swimming animal is useful in worldwide correlation of Mesozoic rocks because they were abundant, morphologically variable, globally distributed in a variety of marine environments, and had short geologic ranges (they evolved rapidly)?

1. crustaceans
2. foraminifera
3. dinosaurs
4. ammonoids
5. coccolithophorids

Ans: b

Feedback: See pages 425-426

14. Which of the following is endothermic?

1. fish
2. reptile
3. mammal
4. amphibian
5. foraminifera

Ans: c

Feedback: See pages 444-445

15. Where is the Chicxulub impact structure located?

1. United States
2. Mexico
3. Canada
4. South America
5. southern Atlantic

Ans: b

Feedback: See pages 461-462