

CHAPTER 17—CLASSIFICATION OF ORGANISMS

MULTIPLE CHOICE

1. The science of classifying living things is called
- a. identification.
 - b. classification.
 - c. taxonomy.
 - d. speciation.

ANS: C DIF: 1 OBJ: 17-1.2

2. Taxonomy is defined as the science of
- a. classifying plants according to their uses in agricultural experiments.
 - b. studying ribosomal RNA sequencing techniques.
 - c. grouping organisms according to their characteristics and evolutionary history.
 - d. studying reproductive mechanisms and gene flow.

ANS: C DIF: 1 OBJ: 17-1.3

3. As we move through the biological hierarchy from the kingdom to species level, organisms
- a. vary more and more.
 - b. are less and less related to each other.
 - c. become more similar in appearance.
 - d. always are members of the same order.

ANS: C DIF: 1 OBJ: 17-1.3

4. A mushroom is difficult to classify in Linnaeus's two-kingdom classification system because
- a. it has another common name, the toadstool.
 - b. it doesn't seem to fit into either kingdom.
 - c. mushrooms had not yet evolved in Linnaeus's time.
 - d. All of the above

ANS: B DIF: 1 OBJ: 17-1.3

5. Which of the following was *not* a consideration for Carolus Linnaeus when he developed his system of nomenclature of organisms?
- a. It should include detailed descriptions of an organism in its name.
 - b. It should assign each organism a unique name.
 - c. It should assign names using a language that can be recognized worldwide.
 - d. It should enable scientists to classify organisms according to their presumed evolutionary relationships to other organisms.

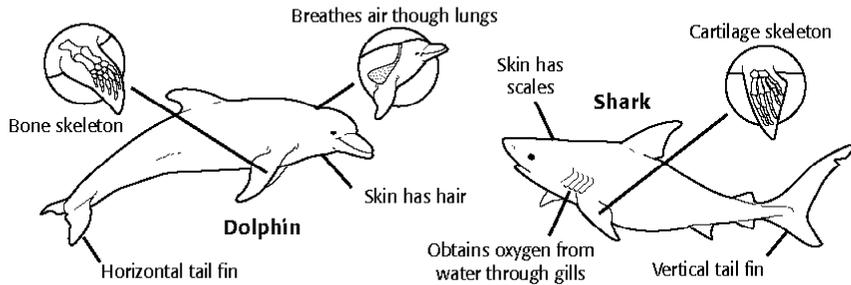
ANS: D DIF: 1 OBJ: 17-1.3

6. Which of the following scientists developed the system of classifying organisms by assigning them a genus and species name?
- a. Leakey
 - b. Aristotle
 - c. Darwin
 - d. Linnaeus

ANS: D DIF: 1 OBJ: 17-1.3

7.

A Comparison of Dolphins and Sharks



Refer to the illustration above. A shark's skeleton is made of cartilage while a dolphin's skeleton is made of bone. This is one reason the two organisms are placed in different

- a. kingdoms.
- b. domains.
- c. subspecies.
- d. classes.

ANS: D DIF: 2 OBJ: 17-1.3

8. The organism *Quercus phellos* is a member of the genus

- a. Plantae.
- b. *phellos*.
- c. *Quercus*.
- d. Protista.

ANS: C DIF: 1 OBJ: 17-1.4

9. Poison ivy is also known as *Rhus toxicodendron*. Its species identifier is

- a. poison.
- b. *Rhus*.
- c. ivy.
- d. *toxicodendron*.

ANS: D DIF: 1 OBJ: 17-1.4

10. The red maple is also known as *Acer rubrum*. Its scientific name is

- a. red maple.
- b. *Acer*.
- c. *rubrum*.
- d. *Acer rubrum*.

ANS: D DIF: 1 OBJ: 17-1.4

11. The scientific name of an organism

- a. varies according to the native language of scientists.
- b. is the same for scientists all over the world.
- c. may refer to more than one species.
- d. may have more than one genus name.

ANS: B DIF: 1 OBJ: 17-1.4

12. Scientists don't use the common names of organisms because

- a. an organism may have more than one common name.
- b. common names are too ambiguous.
- c. an organism rarely has the same name in different languages.
- d. All of the above

ANS: D DIF: 1 OBJ: 17-1.4

13. An organism can have
- one genus name and one species identifier.
 - one genus name and two species identifiers.
 - two scientific names if it is found on different continents.
 - two genus names but only one species identifier.

ANS: A DIF: 1 OBJ: 17-1.4

14. In which language are scientific names written?
- English
 - Greek
 - Arabic
 - Latin

ANS: D DIF: 1 OBJ: 17-1.4

15. Two organisms in the same class but different orders
- are in different kingdoms.
 - have the same genus name.
 - are in the same phylum.
 - are members of the same species.

ANS: C DIF: 2 OBJ: 17-1.4

16. Organisms in different genera
- may share the second word of their scientific names.
 - may be in the same family.
 - may be in different orders.
 - All of the above

ANS: D DIF: 2 OBJ: 17-1.4

17. Two organisms in the same order but different families may
- be more similar than two organisms in different classes.
 - be in the same class.
 - have the same species identifier.
 - All of the above

ANS: D DIF: 2 OBJ: 17-1.4

18. Kingdoms are divided into phyla, and each phylum is divided into
- families.
 - classes.
 - orders.
 - genera.

ANS: B DIF: 1 OBJ: 17-1.4

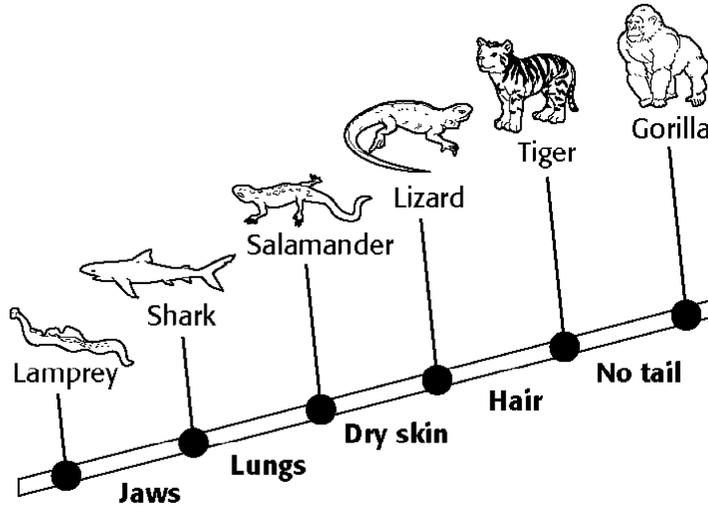
19. The correct order of the biological hierarchy from kingdom to species is
- kingdom, class, family, order, phylum, genus, species.
 - kingdom, phylum, order, family, class, genus, species.
 - kingdom, phylum, class, order, family, genus, species.
 - kingdom, class, order, phylum, family, genus, species.

ANS: C DIF: 1 OBJ: 17-1.4

20. The lowest hierarchy level in biological classification is the
- genus.
 - species.
 - family.
 - order.
- ANS: B DIF: 1 OBJ: 17-1.4
21. Which of the following is the *least* inclusive classification group?
- class
 - genus
 - phylum
 - species
- ANS: D DIF: 1 OBJ: 17-1.4
22. *Quercus rubra* : *Quercus phellos* ::
- Anolis carolinensis* : *Parus carolinensis*
 - Erithacus rubicula* : *Turdus migratoria*
 - Aphis pomi* : *Aphis gossypii*
 - carp : goldfish
- ANS: C DIF: 2 OBJ: 17-1.4
23. class : family ::
- order : phylum
 - genus : class
 - species : genus
 - phylum : order
- ANS: D DIF: 2 OBJ: 17-1.4
24. Today, biologists classify organisms by their
- physical similarities.
 - chemical similarities.
 - behavioral similarities.
 - All of the above
- ANS: D DIF: 1 OBJ: 17-2.1
25. Phylogenetic trees depict
- known evolutionary relationships between organisms.
 - presumed evolutionary relationships based on physical features only.
 - only living organisms.
 - presumed evolutionary relationships based on a variety of types of evidence.
- ANS: D DIF: 1 OBJ: 17-2.2
26. The DNA sequences of two species of sharks would
- be more similar than the DNA sequences of a shark and a dolphin.
 - show no discernible differences.
 - be very close to the DNA sequences of a dolphin.
 - indicate how the sharks evolved.
- ANS: A DIF: 1 OBJ: 17-2.5
27. Which of the following is (are) used in systematic taxonomy to classify organisms?
- patterns of embryological development
 - homologous features
 - amino acid sequences of proteins
 - All of the above
- ANS: D DIF: 1 OBJ: 17-2.1

28. analogous features : convergent evolution ::
- two members of the same genus : same species
 - cladogram : evolutionary relationships
 - common names : universal identification
 - cladograms : exact, direct information

ANS: B DIF: 2 OBJ: 17-2.6



29. Refer to the illustration above. A branching diagram like the one shown is called a
- phenetic tree.
 - cladogram.
 - family tree.
 - homology.

ANS: B DIF: 2 OBJ: 17-2.3

30. Refer to the illustration above. Each particular feature, such as dry skin, that is used to assign an organism to a group is called a(n)
- special character.
 - analogous character.
 - derived character.
 - homologous character.

ANS: C DIF: 1 OBJ: 17-2.3

31. Nearly all single-celled eukaryotes that are either heterotrophic or photosynthetic belong to the kingdom
- Animalia.
 - Fungi.
 - Plantae.
 - Protista.

ANS: D DIF: 1 OBJ: 17-3.4

32. Most multicellular, nucleated autotrophs that carry on photosynthesis belong to the kingdom
- Animalia.
 - Eubacteria.
 - Fungi.
 - Plantae.

ANS: D DIF: 1 OBJ: 17-3.3

33. Multicellular, nucleated heterotrophs that always obtain food by absorbing nutrients from the environment belong to the kingdom
- Animalia.
 - Eubacteria.
 - Fungi.
 - Plantae.
- ANS: C DIF: 1 OBJ: 17-3.3
34. An organism that breaks down organic matter, which it then absorbs, is in the kingdom
- Fungi.
 - Plantae.
 - Animalia.
 - Protista.
- ANS: A DIF: 1 OBJ: 17-3.3
35. Simple, non-nucleated organisms that use hydrogen to produce methane are in the domain
- Archaea.
 - Bacteria.
 - Eukarya.
 - None of the above
- ANS: A DIF: 1 OBJ: 17-3.2
36. The kingdom defined as including any eukaryotes that are not plants, animals, or fungi is the kingdom
- Protista.
 - Plantae.
 - Animalia.
 - Fungi.
- ANS: A DIF: 1 OBJ: 17-3.4
37. Carl Woese proposed the three-domain system of classification based on the examination of
- embryos.
 - fossils.
 - ribosomal RNA.
 - organisms' physical features.
- ANS: C DIF: 1 OBJ: 17-3.1
38. The three domain system of classification is based on similarities and differences in ____, while the six-kingdom system is based on similarities and differences in ____.
- DNA; DNA, fossils, embryological development, and physical features
 - DNA; embryological development, fossils, physical features, and RNA
 - ribosomal RNA; embryological development, fossils, physical features, and various molecular structures
 - physical features; embryological development, fossils, physical features, and various molecular structures
- ANS: C DIF: 2 OBJ: 17-3.5
39. Which of the following groups are placed together by cladistics but are placed in separate groups by classical taxonomy?
- birds and crocodiles
 - birds and mammals
 - turtles and birds
 - snakes and mammals
- ANS: A DIF: 2 OBJ: 17-2.6

COMPLETION

1. Aristotle classified plants on the basis of differences in their _____.

ANS: stems

DIF: 1 OBJ: 17-1.2

2. The science of naming and classifying organisms is called _____.

ANS: taxonomy

DIF: 1 OBJ: 17-1.3

3. _____ devised the two-name system of naming organisms.

ANS: Linnaeus

DIF: 1 OBJ: 17-1.3

4. Biologists of Linnaeus's time classified every living thing as either plant or _____.

ANS: animal

DIF: 1 OBJ: 17-1.3

5. A genus is subdivided into smaller groups called _____.

ANS: species

DIF: 1 OBJ: 17-1.4

6. Each kind of organism on Earth is assigned a unique two-word _____.

ANS: scientific name

DIF: 1 OBJ: 17-1.4

7. All scientific names are made up of two words that are often derived from the _____ language.

ANS: Latin

DIF: 1 OBJ: 17-1.4

8. The first word of a scientific name indicates the _____ to which the organism belongs.

ANS: genus

DIF: 1 OBJ: 17-1.4

9. A kingdom is divided into phyla when animals are being classified or into _____ when plants are being classified.

ANS: divisions

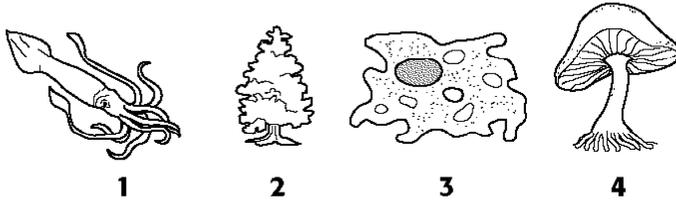
DIF: 1 OBJ: 17-1.4

10. The evolutionary history of a species is called its _____.

ANS: phylogeny

DIF: 1 OBJ: 17-2.2

11.



Refer to the illustration above. Organism 4 belongs to the kingdom _____.

ANS: Fungi

DIF: 2 OBJ: 17-3.3

12. Eukaryotic organisms that lack specialized tissue systems are members of the kingdom _____.

ANS: Protista

DIF: 1 OBJ: 17-3.4

13. Corals, spiders, and rodents all belong to the kingdom _____.

ANS: Animalia

DIF: 1 OBJ: 17-3.3

14. The domains of the three-domain system of classification are Archaea, Bacteria, and _____.

ANS: Eukarya

DIF: 1 OBJ: 17-3.1

15. The variety of organisms at all taxonomic levels is called _____.

ANS: biodiversity

DIF: 1 OBJ: 17-1.1

16. Cladistics uses shared and _____ characters to group taxa.

ANS: derived

DIF: 1 OBJ: 17-2.3

17. The Greek philosopher _____ classified organisms as either plants or animals.

ANS: Aristotle

DIF: 1 OBJ: 17-1.2

PROBLEM

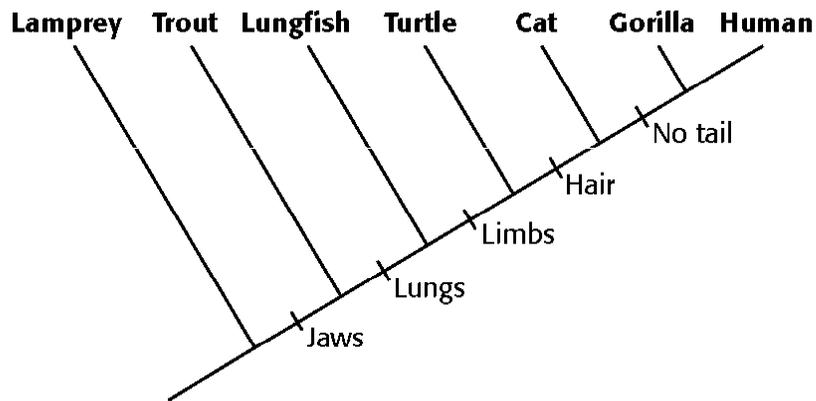
- The following table presents data on some characteristics found in vertebrates. A “+” indicates that an organism has a particular characteristic and a “-” indicates that an organism does not have a particular characteristic.

Organism	Characteristics				
	Jaws	Limbs	Hair	Lungs	Tail
Lamprey	-	-	-	-	+
Turtle	+	+	-	+	+
Cat	+	+	+	+	+
Gorilla	+	+	+	+	+
Lungfish	+	-	-	+	+
Trout	+	-	-	-	+
Human	+	+	+	+	-

Using these data, construct a cladogram illustrating the evolutionary relationships among these organisms. Each branch point should indicate a common ancestor. Write the name of the shared character that is common to all organisms above each branching point. A shared character can be the absence of a structure common to organisms below that point on the tree. Write your answer in the space below.

ANS:

Students’ cladograms should look something like the one depicted below. (A student’s cladogram should also be considered correct if the gorilla and the human are placed in opposite positions.)



DIF: 3

OBJ: 17-2.4

ESSAY

1. Why might the use of common names to describe organisms sometimes cause confusion? Give several examples to support your answer. Write your answer in the space below.

ANS:

The use of common names to describe organisms may cause confusion because common names may not describe an organism accurately. For example, a jellyfish is not a fish. Sometimes the same common name is used for different species. For instance, a maple tree might be a sugar maple, a silver maple, or a red maple. (Other answers are also possible.) Also, some organisms have more than one common name, depending on the region in which they are found.

DIF: 2 OBJ: 17-1.4

2. While on a biological expedition to a tropical rain forest, you discover a previously unidentified animal. Explain the guidelines you would follow to choose a genus and species name for the animal. Write your answer in the space below.

ANS:

Based on the animal's physical characteristics, you would decide if it belongs in a known genus. If it does, it must be given that generic name. If a new generic name is needed, it should be descriptive. The species identifier may describe the appearance or lifestyle of the organism or may be given in honor of an individual. The given scientific name must be Latin or constructed according to the rules of Latin grammar.

DIF: 2 OBJ: 17-1.4

3. The red fox (*Vulpes vulpes*), the coyote (*Canis latrans*), and the dog (*Canis familiaris*) are all members of the family Canidae. The mountain lion (*Felis concolor*) is a member of the family Felidae. Describe the relationships among these animals. Write your answer in the space below.

ANS:

Since the coyote and the dog are both members of the same genus, they are the most closely related. The red fox is more closely related to these two animals than to the mountain lion since the mountain lion is in a different family.

DIF: 2 OBJ: 17-1.4

4. A species is defined as a group of organisms that are similar and can interbreed and produce fertile offspring in nature. Horses and donkeys can interbreed and produce mules, which cannot produce offspring. Is it possible that horses and donkeys belong to the same species? Explain. Write your answer in the space below.

ANS:

Horses and donkeys cannot belong to the same species because their offspring, mules, are infertile.

DIF: 2 OBJ: 17-3.3

5. What are the main criteria currently used to classify organisms? Write your answer in the space below.

ANS:

Scientists use fossils, homologous features, patterns of embryonic development, chromosomes, and macromolecules such as DNA and RNA to classify organisms.

DIF: 2

OBJ: 17-2.1