CHAPTER 1—INVITATION TO BIOLOGY

1. _____ are fundamental building blocks of all matter.

   ANS:
   Atoms

   PTS: 1 REF: Section 1.2 MSC: Self-Quiz

2. The smallest unit of life is the _____.

   ANS:
   cell

   PTS: 1 REF: Section 1.2 MSC: Self-Quiz

3. _____ move around for at least part of their life.

   ANS:
   Most animals

   PTS: 1 REF: Section 1.4 MSC: Self-Quiz

4. Organisms require _____ and _____ to maintain themselves, grow, and reproduce.

   ANS:
   energy and nutrients

   PTS: 1 REF: Section 1.3 MSC: Self-Quiz

5. _____ is a process that maintains conditions in the internal environment within ranges that cells can tolerate.

   ANS:
   Homeostasis

   PTS: 1 REF: Section 1.3 MSC: Self-Quiz

6. DNA _____.
   a. guides growth and development
   b. is the basis of traits
   c. is transmitted from parents to offspring
   d. all of these

   ANS: D PTS: 1 REF: Section 1.3 MSC: Self-Quiz

7. A process by which an organism produces offspring is called _____.

   ANS:
   reproduction

PTS: 1 REF: Section 1.3 MSC: Self-Quiz

8. _____ is the transmission of DNA to offspring.

a. Reproduction
b. Development
c. Homeostasis
d. Inheritance

ANS: D PTS: 1 REF: Section 1.3 MSC: Self-Quiz

9. An animal is a(n) _____. (choose all that apply).
a. organism
b. domain
c. species
d. eukaryote
e. consumer
f. producer
g. hypothesis
h. trait

ANS: A, D, E PTS: 1 REF: Section 1.3 MSC: Self-Quiz

10. Plants are _____. (choose all that apply).
a. organisms
b. a domain
c. a species
d. eukaryotes
e. consumers
f. producers
g. hypotheses
h. traits

ANS: A, D, F PTS: 1 REF: Section 1.4 MSC: Self-Quiz

11. Science only addresses that which is _____.
a. alive
b. observable
c. variable
d. indisputable

ANS: B PTS: 1 REF: Section 1.9 MSC: Self-Quiz

12. A control group is _____.
a. a set of individuals that have a certain characteristic or receive a certain treatment
b. the standard against which an experimental group is compared
c. the experiment that gives conclusive results

ANS: B PTS: 1 REF: Section 1.6 MSC: Self-Quiz

Match the terms with the most suitable description.
a. statement of what a hypothesis leads you to expect
b. type of organism
c. occurs at a higher organizational level
d. time-tested hypothesis
e. testable explanation
f. measure of chance

13. emergent property
14. species
15. scientific theory
16. hypothesis
17. prediction
18. probability

13. ANS: C PTS: 1 REF: Section 1.2 MSC: Self-Quiz
14. ANS: B PTS: 1 REF: Section 1.5 MSC: Self-Quiz

15. ANS: D PTS: 1 REF: Section 1.9 MSC: Self-Quiz
16. ANS: E PTS: 1 REF: Section 1.6 MSC: Self-Quiz
17. ANS: A PTS: 1 REF: Section 1.6 MSC: Self-Quiz
18. ANS: F PTS: 1 REF: Section 1.8 MSC: Self-Quiz
19. A person is declared to be dead upon the irreversible cessation of spontaneous body functions: brain activity, or blood circulation and respiration. However, only about 1% of a person's cells have to die in order for all of these things to happen. How can someone be dead when 99% of his or her cells are still alive?

    ANS:
    A person can be considered dead with only a small fraction of their cells being dead as those cells are responsible for coordinating the action of the all the other cells, and ultimately maintaining the homeostasis of the organism as a whole.

    PTS: 1 MSC: Self-Quiz

20. Why would you think twice about ordering from a cafe menu that lists the genus name but not the specific epithet of its offerings? Hint: Look up *Homarus americanus, Ursus americanus, Ceanothus americanus, Bufo americanus, Lepus americanus,* and *Nicrophorus americanus.*

    ANS:
    When understanding the complete scientific name you see that the genus defines what each of these organisms is: American black bear, New Jersey tea, garden toad, or a snowshoe hare. At a café, you are probably interested in the tea (*Ceanothus americanus*)!

    PTS: 1 MSC: Self-Quiz

21. Once there was a highly intelligent turkey that had nothing to do but reflect on the world's regularities. Morning always started out with the sky turning light, followed by the master's footsteps, which were always followed by the appearance of food. Other things varied, but food always followed footsteps. The sequence of events was so predictable that it eventually became the basis of the turkey's theory about the goodness of the world. One morning, after more than 100 confirmations of the goodness theory, the turkey listened for the master's footsteps, heard them, and had its head chopped off. Any scientific theory is modified or discarded upon discovery of contradictory evidence. The absence of absolute certainty has led some people to conclude that "facts are irrelevant—facts change." If that is so, should we stop doing scientific research? Why or why not?

    ANS:
    "Facts change." That is true in scientific research because science is open to new data and new interpretations of old data, which can lead to discarding or modifying formerly-held tenets. This is a strength of science, not a weakness. It is this willingness to accept *change* that makes the phrase "scientific creationism" meaningless. Creationists have accepted as fact a set of immutable ideas, which are then supported by carefully chosen facts from the realm of science.

    PTS: 1 MSC: Self-Quiz

22. In 2005, researcher Woo-suk Hwang reported that he had made immortal stem cells from human patients. His research was hailed as a breakthrough for people affected by degenerative diseases, because stem cells may be used to repair a person's own damaged tissues. Hwang published his results in a peer-reviewed journal. In 2006, the journal retracted his paper after other scientists discovered that Hwang's group had faked their data. Does the incident show that results of scientific studies cannot be trusted? Or does it confirm the usefulness of a scientific approach, because other scientists discovered and exposed the fraud?

ANS:
It is unfortunate that the respectable journal did not catch any experimental fraud; however, this is an example of "facts change." The process of science did work, and when the results could not be confirmed the article was retracted. It is important to hold scientists accountable for their work, and this scientist was held accountable and lost his research privileges. As in all professions, just because one person is unethical it is not fair to judge the work of everyone in that profession based on one person's actions.

PTS: 1 MSC: Self-Quiz

CHAPTER 1—INVITATION TO BIOLOGY

MULTIPLE CHOICE

1. Humans are responsible for causing extinctions that are occurring _____ times faster than normal.
   a. 10
   b. 100
   c. 1000
   d. 10,000
   e. 100,000

   ANS: C PTS: 1 REF: Section 1.1 OBJ: Bloom's: knowledge
   NOT: New

2. Which is the smallest unit of life that can survive and reproduce on its own?
   a. an atom
   b. a cell
   c. a molecule
   d. an organ
   e. a population

   ANS: B PTS: 1 REF: Section 1.2 OBJ: Bloom's: knowledge

3. All of the coyotes (*Canis latrans*) living in the Mojave Desert constitute a(an)
   a. ecosystem.
   b. community.
   c. biosphere.
   d. organism.
   e. population.

   ANS: E PTS: 1 REF: Section 1.2 OBJ: Bloom's: comprehension

4. Which of the following is defined as "all populations of all species living in the same area?"
   a. ecosystem
   b. community
   c. biosphere
   d. organism
   e. population

   ANS: B PTS: 1 REF: Section 1.2 OBJ: Bloom's: knowledge
   NOT: Modified

5. Organisms designated as producers usually obtain their energy from
   a. other producers.
   b. dead consumers.
   c. decomposers.
   d. the sun.
   e. all of these.

   ANS: D PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

6. As energy is transferred among organisms, some escapes from the environment as ____ energy.
   a. electrical
   b. heat

c. light
d. mechanical
e. nuclear

ANS: B PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

7. The ability to maintain a constant internal environment is
a. metabolism.
b. homeostasis.
c. development.
d. physiology.
e. thermoregulation.

ANS: B PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

8. Homeostasis provides what kind of environment?
a. positive
b. constant
c. limiting
d. changing
e. chemical and physical

ANS: B PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

9. About 12 to 24 hours after the last meal, a person's blood sugar level normally varies from 60 to 90 milligrams per 100 milliliters of blood, although it may rise to 130 mg per100 ml after meals high in carbohydrates. That the blood sugar level is maintained within a fairly narrow range, despite uneven intake of sugar, is due to the body's ability to carry out
a. adaptation.
b. homeostasis.
c. inheritance.
d. metabolism.
e. all of these.

ANS: B PTS: 1 REF: Section 1.3 OBJ: Bloom's: application

10. The instructions for growth and development are in
a. proteins.
b. carbohydrates.
c. DNA.
d. energy.
e. homeostasis.

ANS: C PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

11. When the cells of an organism increase in number, size, or volume, this is called
a. growth.
b. development.
c. reproduction.
d. evolution.
e. inheritance.

ANS: A PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge
NOT: New

12. The process of transformation of the first cell of a new individual into an adult is called

a. inheritance.
b. genetics.
c. reproduction.
d. development.
e. sex.

ANS: D PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge

13. Which domain(s) is(are) made up of organisms without nuclei?
a. Archaea
b. Bacteria
c. Eukarya
d. both Archaea and Bacteria
e. both Bacteria and Eukarya

ANS: D PTS: 1 REF: Section 1.4 OBJ: Bloom's: knowledge

14. Members of which kingdom are eukaryotes that range from multicelled seaweeds to single celled organisms?
a. Animalia
b. Protista
c. Fungi
d. Plantae
e. Bacteria

ANS: B PTS: 1 REF: Section 1.4 OBJ: Bloom's: knowledge
NOT: Modified

15. Members of which kingdom are usually multicellular producers?
a. Animalia
b. Protista
c. Fungi
d. Plantae
e. Archaea

ANS: D PTS: 1 REF: Section 1.4 OBJ: Bloom's: knowledge

16. Which of the following scientific names is written correctly?
a. Rosa canina
b. *Rosa canina*
c. *Rosa* canina
d. *Rosa canina*
e. none of the choices

ANS: D PTS: 1 REF: Section 1.5 OBJ: Bloom's: comprehension
NOT: New

17. Which is the correct format for a scientific name?
a. Homo Sapiens
b. *Homo Sapiens*
c. homo sapiens
d. *Homo* sapiens
e. *Homo sapiens*

ANS: E PTS: 1 REF: Section 1.5 OBJ: Bloom's: comprehension
NOT: Modified

18. A scientific name consists of which of the following?
    a. family name
    b. genus name
    c. species designation only
    d. family name and genus name
    e. genus name and specific epithet

    ANS: E PTS: 1 REF: Section 1.5 OBJ: Bloom's: knowledge
    NOT: Modified

19. The most diverse and inclusive classification group is the
    a. domain.
    b. genus.
    c. kingdom.
    d. phylum.
    e. species.

    ANS: A PTS: 1 REF: Section 1.5 OBJ: Bloom's: comprehension

20. Which of the following scientists defined a species as one or more groups of individuals that can potentially interbreed, produce fertile offspring, and do not interbreed with other groups?
    a. Charles Darwin
    b. Carolus Linnaeus
    c. Mary Leakey
    d. Gregor Mendel
    e. Ernst Mayr

    ANS: E PTS: 1 REF: Section 1.5 OBJ: Bloom's: knowledge
    NOT: New

21. The eighteenth-century naturalist Carolus Linnaeus is known for creating
    a. the theory of natural selection.
    b. a system for naming and classifying organisms.
    c. the biological species concept.
    d. the first microscope.
    e. the scientific method.

    ANS: B PTS: 1 REF: Section 1.5 OBJ: Bloom's: knowledge
    NOT: New

22. All of the following will strengthen a scientific theory EXCEPT
    a. repetitions of experiments.
    b. increased number of observations.
    c. time.
    d. faith.
    e. confirmation by many scientists.

    ANS: D PTS: 1 REF: Section 1.5 OBJ: Bloom's: comprehension

23. Critical thinking is the process of
    a. finding fault in others.
    b. unconditionally accepting information from a trusted source.
    c. designing a scientific experiment.
    d. making a hypothesis.

e. judging the quality of information before accepting it.

ANS: E PTS: 1 REF: Section 1.6 OBJ: Bloom's: comprehension
NOT: New

24. A testable explanation for a natural phenomenon is a(n)
a. experiment.
b. hypothesis.
c. prediction.
d. model.
e. theory.

ANS: B PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge
NOT: New

25. When one arrives at a conclusion based upon one's observations, this is
a. inductive reasoning.
b. deductive reasoning.
c. critical thinking.
d. logic.
e. the scientific method.

ANS: A PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge
NOT: New

26. A scientist investigates the result of varying temperature on the growth rate of a bacterial culture. In this experiment, temperature would be the
a. dependent variable.
b. independent variable.
c. control.
d. model.
e. hypothesis.

ANS: B PTS: 1 REF: Section 1.6 OBJ: Bloom's: application
NOT: New

27. In order to arrive at a solution to a problem, a scientist usually proposes and tests
a. laws.
b. theories.
c. hypotheses.
d. principles.
e. facts.

ANS: C PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge

28. To eliminate the influence of uncontrolled variables during experimentation, one should
a. increase the sampling error as much as possible and suspend judgment.
b. establish a control group identical to the experimental group except for the variable being tested.
c. use inductive reasoning to construct a hypothesis.
d. both increase the sampling error as much as possible and suspend judgment and use inductive reasoning to construct a hypothesis.
e. all of these.

ANS: B PTS: 1 REF: Section 1.6 OBJ: Bloom's: comprehension

29. In an experiment, the experimental group is
    a. not subjected to experimental error.
    b. not exposed to experimental treatments.
    c. maintained under strict laboratory conditions.
    d. treated exactly the same as the control group, except for one independent variable.
    e. statistically the most important part of the experiment.

    ANS: D PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge

30. The control group in an experiment
    a. makes the experiment valid.
    b. is an additional replicate for statistical purposes.
    c. reduces the experimental errors.
    d. minimizes experimental inaccuracy.
    e. allows a standard of comparison for the experimental group.

    ANS: E PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge

31. How many variable events is it best to test in one experiment?
    a. 1
    b. 2
    c. 3
    d. 4
    e. any number

    ANS: A PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge

32. An experimenter does all but which of the following?
    a. revises a hypothesis as a result of data collected
    b. manipulates dependent variables
    c. reviews other research results obtained by other scientists
    d. examines the effects of independent variables
    e. draws conclusions based only on appropriate experimental data

    ANS: B PTS: 1 REF: Section 1.6 OBJ: Bloom's: comprehension

Exhibit 1-1

A scientist randomly divided a group of 100 lab rats into two groups of 50. One group was fed regular rat chow while the other was fed the same amount of rat chow with added DDT. Both groups were housed in the same room with the same environmental conditions. At the end of the experiment, rats were weighed and the mean difference calculated.

33. Refer to Exhibit 1-1. What variable(s) was/were manipulated by the scientist?
    a. DDT
    b. temperature
    c. weight differences
    d. both DDT and weight differences
    e. both temperature and weight differences

    ANS: A PTS: 1 REF: Section 1.6 OBJ: Bloom's: application

34. Refer to Exhibit 1-1. What dependent variable was measured?
    a. DDT
    b. temperature

c. weight
d. amount of food
e. day length

ANS: C PTS: 1 REF: Section 1.6 OBJ: Bloom's: application

35. Experiments showed that wing spots on butterflies were
a. more likely to deter predatory birds than were clicking sounds.
b. less likely to deter predatory birds than were clicking sounds.
c. as effective at deterring predatory birds as clicking sounds.
d. completely ineffectual in deterring predatory birds.
e. associated with an increased likelihood of an attack by a predatory bird.

ANS: A PTS: 1 REF: Section 1.7 OBJ: Bloom's: knowledge
NOT: New

36. In the Olestra potato chip experiment, the independent variable was the
a. number of chips each subject consumed.
b. percent of people getting cramps.
c. larger or smaller dose of Olestra in the chips.
d. presence or absence of Olestra in the chips.
e. health of individuals participating in the experiment.

ANS: D PTS: 1 REF: Section 1.7 OBJ: Bloom's: comprehension
NOT: New

37. Scientific experiments concluded that consumption of Olestra-laced potato chips results in
a. stomach cramps.
b. no stomach cramps.
c. about the same likelihood of cramps as regular chips.
d. weight loss.
e. obesity.

ANS: C PTS: 1 REF: Section 1.7 OBJ: Bloom's: knowledge
NOT: New

38. In order to reduce bias, scientists usually prefer experiments that lead to what kind of results?
a. ambiguous
b. imprecise
c. quantitative
d. qualitative
e. subjective

ANS: C PTS: 1 REF: Section 1.8 OBJ: Bloom's: knowledge

39. The difference between results obtained from a subset and results from the whole is defined as
a. probability.
b. a trend.
c. a variable.
d. statistically significant.
e. sampling error.

ANS: E PTS: 1 REF: Section 1.8 OBJ: Bloom's: knowledge
NOT: New

40. An experimenter surveyed one-half acre of a desert preserve and found three cactus wren nests. Assuming that the habitat is fairly uniform, how many nests would he expect to be in the entire 200-acre preserve?
    a. 6
    b. 200
    c. 600
    d. 1200
    e. 6000

    ANS: D PTS: 1 REF: Section 1.8 OBJ: Bloom's: application

41. An experimental result that is statistically significant is
    a. likely to occur by chance alone.
    b. unlikely to occur by chance alone.
    c. scientifically significant or important.
    d. the result of an experiment with only one variable.
    e. influenced by sampling error.

    ANS: B PTS: 1 REF: Section 1.8 OBJ: Bloom's: comprehension
    NOT: New

42. When a hypothesis has been repeatedly and rigorously tested and supported, it is called a
    a. model.
    b. testable prediction.
    c. scientific method.
    d. scientific theory.
    e. result.

    ANS: D PTS: 1 REF: Section 1.9 OBJ: Bloom's: knowledge

43. Which statement could be considered a scientific theory?
    a. Beauty pageant contestants are becoming increasingly more beautiful.
    b. Chemistry and physics are more exact sciences than biology.
    c. Radioactive isotopes can be used as tracers because radioactive isotopes behave the same way chemically as other isotopes of the same element.
    d. The growth of a plant is faster in a growth chamber than in a greenhouse.
    e. Leaves bend toward the light because they know light is needed to grow.

    ANS: C PTS: 1 REF: Section 1.9 OBJ: Bloom's: application
    NOT: Modified

Selecting the Exception

44. Four of the five answers listed below are necessary characteristics to the life of an individual. Select the exception.
    a. energy use
    b. homeostasis
    c. development
    d. response to stimuli
    e. diversity

    ANS: E PTS: 1 REF: Section 1.3 OBJ: Bloom's: knowledge
    MSC: Selecting the Exception

45. Four of the five answers listed below are names of kingdoms. Select the exception.

a. Animalia
b. Protista
c. Eukarya
d. Fungi
e. Plantae

ANS: C PTS: 1 REF: Section 1.4 OBJ: Bloom's: knowledge
MSC: Selecting the Exception

46. Four of the five answers listed below are aspects of systematic study. Select the exception.
a. observation
b. hypothesis
c. experimentation
d. philosophy
e. conclusion

ANS: D PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge
MSC: Selecting the Exception

47. Four of the five answers listed below are terms associated with the systematic study. Select the exception.
a. truth
b. theory
c. observation
d. experimentation
e. hypothesis

ANS: A PTS: 1 REF: Section 1.6 OBJ: Bloom's: knowledge
MSC: Selecting the Exception

MATCHING

Answer the question(s) by matching the statement to the most appropriate function, process, or trait listed below.

a. metabolism
b. reproduction
c. photosynthesis
d. growth
e. homeostasis

1. A process found only in producers
2. Most organisms exhibit this characteristic, which tends to buffer the effects of environmental change
3. The capacity to acquire, store, and use energy
4. Process in which one generation replaces another

1. ANS: C PTS: 1 REF: Section 1.3 OBJ: Bloom's: comprehension
MSC: Classification Questions
2. ANS: E PTS: 1 REF: Section 1.3 OBJ: Bloom's: comprehension
MSC: Classification Questions
3. ANS: A PTS: 1 REF: Section 1.3 OBJ: Bloom's: comprehension
MSC: Classification Questions
4. ANS: B PTS: 1 REF: Section 1.3 OBJ: Bloom's: comprehension
MSC: Classification Questions

Answer the question(s) by matching the statement with one or more of the kingdoms listed below.

a. Bacteria
b. Protista
c. Plantae
d. Fungi
e. Animalia

5. Multicellular producers
6. No nucleus
7. Unicellular organisms of considerable internal complexity
8. Multicellular consumers
9. First living organisms
10. Unicellular producers
11. Unicellular decomposers
12. Multicellular decomposers

5. ANS: C PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
   MSC: Classification Questions
6. ANS: A PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
   MSC: Classification Questions
7. ANS: B PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
   MSC: Classification Questions NOT: D also correct
8. ANS: E PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
   MSC: Classification Questions NOT: D also correct
9. ANS: A PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
   MSC: Classification Questions
10. ANS: A PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
    MSC: Classification Questions NOT: B also correct
11. ANS: A PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
    MSC: Classification Questions NOT: B & D also correct
12. ANS: D PTS: 1 REF: Section 1.4 OBJ: Bloom's: comprehension
    MSC: Classification Questions

SHORT ANSWER

1. What are some of the places where the natural and manmade worlds interface? What problems could this cause?

   ANS:
   A dam on a river is such an interface that can drastically alter the environment by creating lakes and can block migration of fish and other aquatic animals. Adding fertilizers and pesticides to lawns is another interface. Fertilizers can cause increased algal growth when the runoff migrates to streams. Pesticides may damage other nontarget organisms.

   PTS: 1 REF: Section 1.1 OBJ: Bloom's: synthesis

2. Can a scientist prove the existence or nonexistence of God? Why or why not?

   ANS:
   Scientists can only test disprovable hypotheses in the natural world. By definition, God is supernatural.

   PTS: 1 REF: Section 1.6 OBJ: Bloom's: analysis