Campbell's Biology, 9e **(Reece et al.)**
Chapter 32 An Overview of Animal Diversity

About 40% of the questions in this chapter are either scenario questions or art questions, which typically involve higher-order thinking. Among these are two new sets of scenario questions, each devoted to a single-species animal phylum. The first pertains to the (possibly) basal animal known as Trichoplax, and the second to the bizarre phylum found only on lobster lips, the Cycliophora.

Multiple-Choice Questions

1) Both animals and fungi are heterotrophic. What distinguishes animal heterotrophy from fungal heterotrophy is that only animals derive their nutrition by
A) preying on animals.
B) ingesting it.
C) consuming living, rather than dead, prey.
D) using enzymes to digest their food.
Answer: B
Topic: Concept 32.1
Skill: Knowledge/Comprehension

2) The larvae of some insects are merely small versions of the adult, whereas the larvae of other insects look completely different from adults, eat different foods, and may live in different habitats. Which of the following most directly favors the evolution of the latter, more radical, kind of metamorphosis?
A) natural selection of sexually immature forms of insects
B) changes in the homeobox genes governing early development
C) the evolution of meiosis
D) the development of an oxidizing atmosphere on Earth
E) the origin of a brain
Answer: B
Topic: Concept 32.1
Skill: Application/Analysis

3) Which of the following is (are) unique to animals?
A) cells that have mitochondria
B) the structural carbohydrate, chitin
C) nervous conduction and muscular movement
D) heterotrophy
E) Two of these responses are correct.
Answer: C
Topic: Concept 32.1
Skill: Knowledge/Comprehension

4) What do animals as diverse as corals and monkeys have in common?
A) body cavity between body wall and digestive system
B) number of embryonic tissue layers
C) type of body symmetry
D) presence of *Hox* genes
E) degree of cephalization
Answer: D
Topic: Concept 32.1
Skill: Knowledge/Comprehension

5) The *Hox* genes came to regulate each of the following in what sequence, from earliest to most recent?
1. identity and position of paired appendages in protostome embryos
2. anterior-posterior orientation of segments in protostome embryos
3. positioning of tentacles in cnidarians
4. anterior-posterior orientation in vertebrate embryos

A) 4 → 1 → 3 → 2
B) 4 → 2 → 3 → 1
C) 4 → 2 → 1 → 3
D) 3 → 2 → 1 → 4
E) 3 → 4 → 1 → 2
Answer: D
Topic: Concept 32.1
Skill: Synthesis/Evaluation

6) In individual insects of some species, whole chromosomes that carry larval genes are eliminated from the genomes of somatic cells at the time of metamorphosis. A consequence of this occurrence is that
A) we could not clone a larva from the somatic cells of such an adult insect.
B) such species must reproduce only asexually.
C) the descendents of these adults do not include a larval stage.
D) metamorphosis can no longer occur among the descendents of such adults.
E) Two of these responses are correct.
Answer: A
Topic: Concept 32.1
Skill: Application/Analysis

7) The last common ancestor of all animals was probably a
A) unicellular chytrid.
B) unicellular yeast.
C) multicellular algae.
D) multicellular fungus.
E) flagellated protist.
Answer: E
Topic: Concept 32.2
Skill: Knowledge/Comprehension

8) Evidence of which structure or characteristic would be most surprising to find among fossils of the Ediacaran fauna?
A) true tissues
B) hard parts
C) bilateral symmetry
D) cephalization
E) embryos
Answer: B
Topic: Concept 32.2
Skill: Knowledge/Comprehension

9) Which statement is most consistent with the hypothesis that the Cambrian explosion was caused by the rise of predator-prey relationships?
A) increased incidence of worm burrows in the fossil record
B) increased incidence of larger animals in the fossil record
C) increased incidence of organic material in the fossil record
D) increased incidence of fern galls in the fossil record
E) increased incidence of hard parts in the fossil record
Answer: E
Topic: Concept 32.2
Skill: Application/Analysis

10) Which of the following genetic processes may be most helpful in accounting for the Cambrian explosion?
A) binary fission
B) mitosis
C) random segregation
D) gene duplication
E) chromosomal condensation
Answer: D
Topic: Concept 32.2
Skill: Knowledge/Comprehension

11) Whatever its ultimate cause(s), the Cambrian explosion is a prime example of
A) mass extinction.
B) evolutionary stasis.
C) adaptive radiation.
D) All three of the responses are correct.
E) Only two of the responses are correct.
Answer: C
Topic: Concept 32.2
Skill: Knowledge/Comprehension

12) Fossil evidence indicates that the following events occurred in what sequence, from earliest to most recent?
1. Protostomes invade terrestrial environments.
2. Cambrian explosion occurs.
3. Deuterostomes invade terrestrial environments.
4. Vertebrates become top predators in the seas.

A) 2 → 4 → 3 → 1
B) 2 → 1 → 4 → 3
C) 2 → 4 → 1 → 3
D) 2 → 3 → 1 → 4
E) 2 → 1 → 3 → 4
Answer: C
Topic: Concept 32.2
Skill: Knowledge/Comprehension

13) What is the probable sequence in which the following clades of animals originated, from earliest to most recent?
1. tetrapods
2. vertebrates
3. deuterostomes
4. amniotes
5. bilaterians

A) 5 → 3 → 2 → 4 → 1
B) 5 → 3 → 2 → 1 → 4
C) 5 → 3 → 4 → 2 → 1
D) 3 → 5 → 4 → 2 → 1
E) 3 → 5 → 2 → 1 → 4
Answer: B
Topic: Concept 32.2
Skill: Knowledge/Comprehension

14) Arthropods invaded land about 100 million years before vertebrates did so. This most clearly implies that
A) arthropods evolved before vertebrates did.
B) extant terrestrial arthropods are better adapted to terrestrial life than are extant terrestrial vertebrates.
C) ancestral arthropods must have been poorly adapted to aquatic life, and thus experienced a selective pressure to invade land.
D) vertebrates evolved from arthropods.
E) arthropods have had more time to coevolve with land plants than have vertebrates.
Answer: E
Topic: Concept 32.2
Skill: Application/Analysis

15) An adult animal that possesses bilateral symmetry is most certainly also
A) triploblastic.
B) a deuterostome.
C) eucoelomate.
D) highly cephalized.
Answer: A
Topic: Concept 32.2
Skill: Knowledge/Comprehension

16) Soon after the coelom begins to form, a researcher injects a dye into the coelom of a deuterostome embryo. Initially, the dye should be able to flow directly into the
A) blastopore.
B) blastocoel.
C) archenteron.
D) pseudocoelom.
Answer: C
Topic: Concept 32.3
Skill: Application/Analysis

17) A researcher is trying to construct a molecular-based phylogeny of the entire animal kingdom. Assuming that none of the following genes is absolutely conserved, which of the following would be the best choice on which to base the phylogeny?
A) genes involved in chitin synthesis
B) collagen genes
C) β-catenin genes
D) genes involved in eye-lens synthesis
E) genes that cause radial body symmetry
Answer: B
Topic: Concepts 32.1, 32.3
Skill: Application/Analysis

18) At which developmental stage should one be able to first distinguish a diploblastic embryo from a triploblastic embryo?
A) fertilization
B) cleavage
C) gastrulation
D) coelom formation
E) metamorphosis
Answer: C
Topic: Concept 32.3
Skill: Knowledge/Comprehension

19) At which developmental stage should one be able to first distinguish a protostome embryo from a deuterostome embryo?
A) fertilization
B) cleavage
C) gastrulation
D) coelom formation
E) metamorphosis
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

20) What distinguishes a coelomate animal from a pseudocoelomate animal is that coelomates
A) have a body cavity, whereas pseudocoelomates have a solid body.
B) contain tissues derived from mesoderm, whereas pseudocoelomates have no such tissue.
C) have a body cavity completely lined by mesodermal tissue, whereas pseudocoelomates do not.
D) have a complete digestive system with mouth and anus, whereas pseudocoelomates have a digestive tract with only one opening.
E) have a gut that lacks suspension within the body cavity, whereas pseudocoelomates have mesenteries that hold the digestive system in place.
Answer: C
Topic: Concept 32.3
Skill: Knowledge/Comprehension

21) You have before you a living organism, which you examine carefully. Which of the following should convince you that the organism is acoelomate?
A) It is triploblastic.
B) It has bilateral symmetry.
C) It possesses sensory structures at its anterior end.
D) Muscular activity of its digestive system distorts the body wall.
Answer: D
Topic: Concept 32.3
Skill: Application/Analysis

22) The blastopore is a structure that first becomes evident during
A) fertilization.
B) gastrulation.
C) the eight-cell stage of the embryo.
D) coelom formation.
E) cleavage.
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

23) The blastopore denotes the presence of an endoderm-lined cavity in the developing embryo, a cavity that is known as the
A) archenteron.
B) blastula.
C) coelom.
D) germ layer.
E) blastocoel.
Answer: A
Topic: Concept 32.3
Skill: Knowledge/Comprehension

24) Which of the following is descriptive of protostomes?
A) spiral and indeterminate cleavage, blastopore becomes mouth
B) spiral and determinate cleavage, blastopore becomes mouth
C) spiral and determinate cleavage, blastopore becomes anus
D) radial and determinate cleavage, blastopore becomes anus
E) radial and determinate cleavage, blastopore becomes mouth
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

25) Which of the following characteristics generally applies to protostome development?
A) radial cleavage
B) determinate cleavage
C) diploblastic embryo
D) blastopore becomes the anus
E) archenteron absent
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

26) Protostome characteristics generally include which of the following?
A) a mouth that develops secondarily, and far away from the blastopore
B) radial body symmetry
C) radial cleavage
D) determinate cleavage
E) absence of a body cavity
Answer: D
Topic: Concept 32.3
Skill: Knowledge/Comprehension

27) The most ancient branch point in animal phylogeny is that between having
A) radial or bilateral symmetry.
B) a well-defined head or no head.
C) diploblastic or triploblastic embryos.
D) true tissues or no tissues.
E) a body cavity or no body cavity.
Answer: D
Topic: Concept 32.3
Skill: Knowledge/Comprehension

28) With the current molecular-based phylogeny in mind, rank the following from most inclusive to least inclusive.
1. ecdysozoan
2. protostome
3. eumetazoan
4. triploblastic
A) 4, 2, 3, 1
B) 4, 3, 1, 2
C) 3, 4, 1, 2
D) 3, 4, 2, 1
E) 4, 3, 2, 1
Answer: D
Topic: Concept 32.4
Skill: Knowledge/Comprehension

29) What does recent evidence from molecular systematics reveal about the relationship between grades and clades?
A) There is no relationship.
B) Some, but not all, grades reflect evolutionary relatedness.
C) Grades have their basis in, and flow from, clades.
D) Each branch point on a phylogenetic tree is associated with the evolution of a new grade.
Answer: B
Topic: Concept 32.4
Skill: Knowledge/Comprehension

30) Phylogenetic trees are best described as
A) true and inerrant statements about evolutionary relationships.
B) hypothetical portrayals of evolutionary relationships.
C) the most accurate representations possible of genetic relationships among taxa.
D) theories of evolution.
E) the closest things to absolute certainty that modern systematics can produce.
Answer: B
Topic: Concept 32.4
Skill: Knowledge/Comprehension

31) According to the evidence collected so far, the animal kingdom is
A) monophyletic.
B) paraphyletic.
C) polyphyletic.
D) euphyletic.
E) multiphyletic.
Answer: A
Topic: Concept 32.4
Skill: Knowledge/Comprehension

32) If a multicellular animal lacks true tissues, then it can properly be included among the
A) eumetazoans.
B) metazoans.
C) choanoflagellates.
D) lophotrochozoans.
E) bilateria.
Answer: B
Topic: Concept 32.4
Skill: Knowledge/Comprehension

33) Which of the following statements concerning animal taxonomy is (are) true?
1. Animals are more closely related to plants than to fungi.
2. All animal clades based on body plan have been found to be incorrect.
3. Kingdom Animalia is monophyletic.
4. Only animals reproduce by sexual means.
5. Animals are thought to have evolved from flagellated protists similar to modern choanoflagellates.
A) 5 only
B) 1 and 3
C) 3 and 5
D) 3, 4, and 5
Answer: C
Topic: Concept 32.4
Skill: Knowledge/Comprehension

34) If the current molecular evidence regarding animal origins is well-substantiated in the future, then what will be true of any contrary evidence regarding the origin of animals derived from the fossil record?
A) The contrary fossil evidence will be seen as a hoax.
B) The fossil evidence will be understood to have been incorrect because it is incomplete.
C) The fossil record will henceforth be ignored.
D) Phylogenies involving even the smallest bit of fossil evidence will need to be discarded.
E) Only phylogenies based solely on fossil evidence will need to be discarded.
Answer: B
Topic: Concept 32.4
Skill: Synthesis/Evaluation

35) What is true of the clade Ecdysozoa?
A) It includes all animals that molt at some time during their lives.
B) It includes all animals that undergo metamorphosis at some time during their lives.
C) It includes all animals that have body cavities known as pseudocoeloms.
D) It includes all animals with genetic similarities that are shared with no other animals.
E) It includes all animals in the former clade Protostomia that truly do have protostome development.
Answer: D
Topic: Concept 32.4
Skill: Application/Analysis

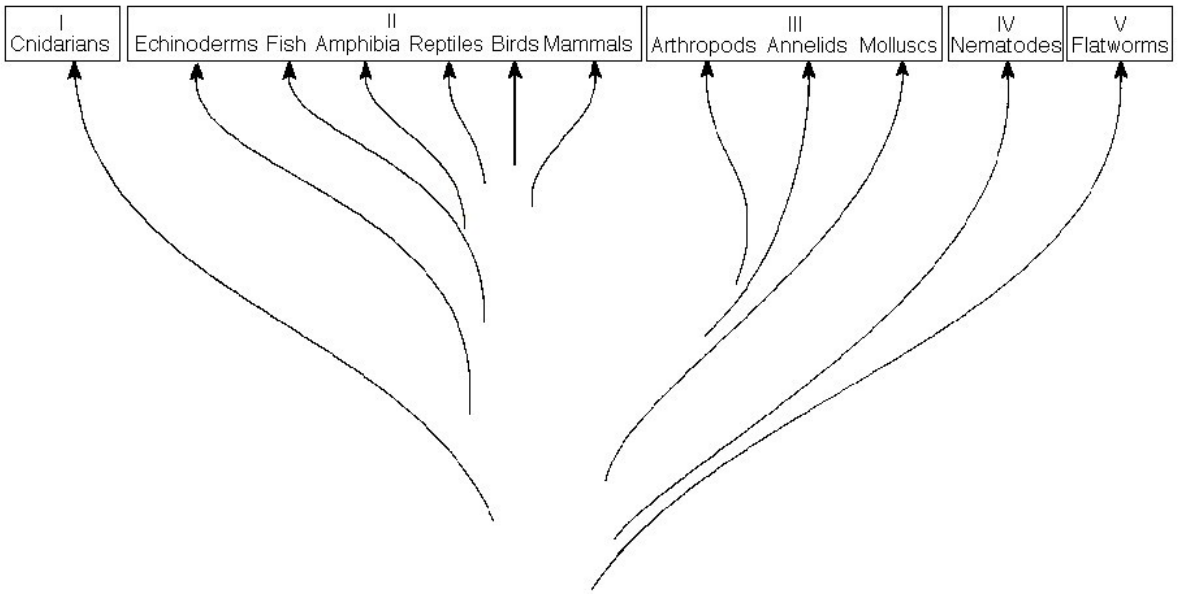
36) Which distinction is given more emphasis by the morphological phylogeny than by the molecular phylogeny?
A) metazoan and eumetazoan
B) radial and bilateral
C) true coelom and pseudocoelom
D) protostome and deuterostome
E) molting and lack of molting
Answer: D
Topic: Concept 32.4
Skill: Knowledge/Comprehension

37) The last common ancestor of all bilaterians is thought to have had four *Hox* genes. Most extant cnidarians have two *Hox* genes, except Nematostella (of β-catenin fame), which has three *Hox* genes. On the basis of these observations, some have proposed that the ancestral cnidarians were originally bilateral and, in stages, lost *Hox* genes from their genomes. If true, this would mean that
A) Radiata should be a true clade.
B) the radial symmetry of extant cnidarians is secondarily derived, rather than being an ancestral trait.
C) *Hox* genes play little actual role in coding for an animal's "body plan."
D) Cnidaria may someday replace Acoela as the basal bilaterians.
E) Two of the responses above are correct.
Answer: E
Topic: Concept 32.4
Skill: Synthesis/Evaluation

38) Which of these, if true, would support the claim that the ancestral cnidarians had bilateral symmetry?
1. Cnidarian larvae possess anterior-posterior, left-right, and dorsal-ventral aspects.
2. Cnidarians have fewer *Hox* genes than bilaterians.
3. All extant cnidarians, including Nematostella, are diploblastic.
4. β-catenin turns out to be essential for gastrulation in all animals in which it occurs.
5. All cnidarians are acoelomate.
A) 1 only
B) 1 and 4
C) 2 and 3
D) 2 and 4
E) 4 and 5
Answer: B
Topic: Concept 32.4
Skill: Synthesis/Evaluation

39) Some researchers claim that sponge genomes have homeotic genes, but no *Hox* genes. If true, this finding would
A) strengthen sponges' evolutionary ties to the Eumetazoa.
B) mean that sponges must no longer be classified as animals.
C) confirm the identity of sponges as "basal animals."
D) mean that extinct sponges must have been the last common ancestor of animals and fungi.
E) require sponges to be reclassified as choanoflagellates.
Answer: C
Topic: Concept 32.4
Skill: Application/Analysis

Art Questions



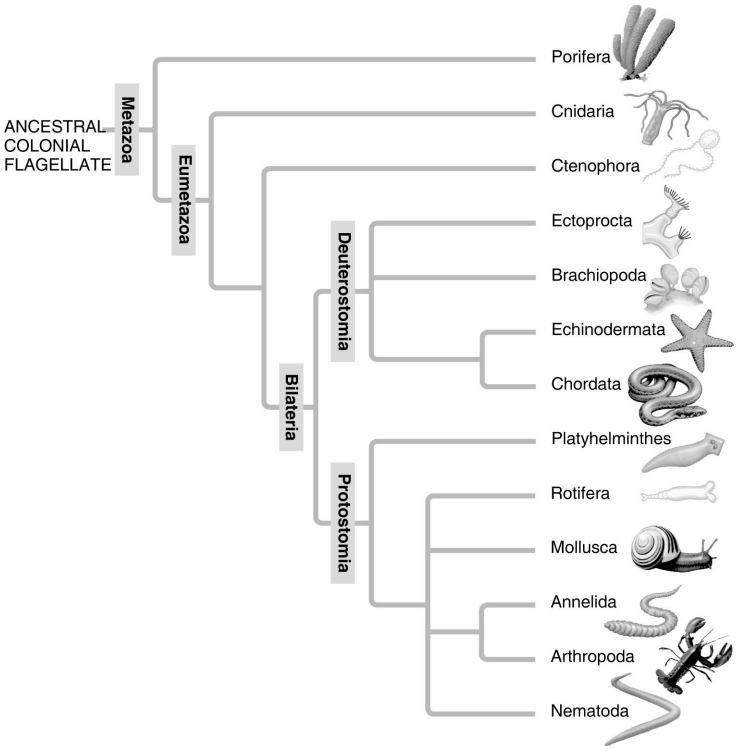
The previous figure shows a chart of the animal kingdom set up as a modified phylogenetic tree. Use the diagram to answer the following questions.

40) Which group contains diploblastic organisms?
A) I
B) II
C) III
D) IV
E) V
Answer: A
Topic: Concepts 32.2-32.4
Skill: Knowledge/Comprehension

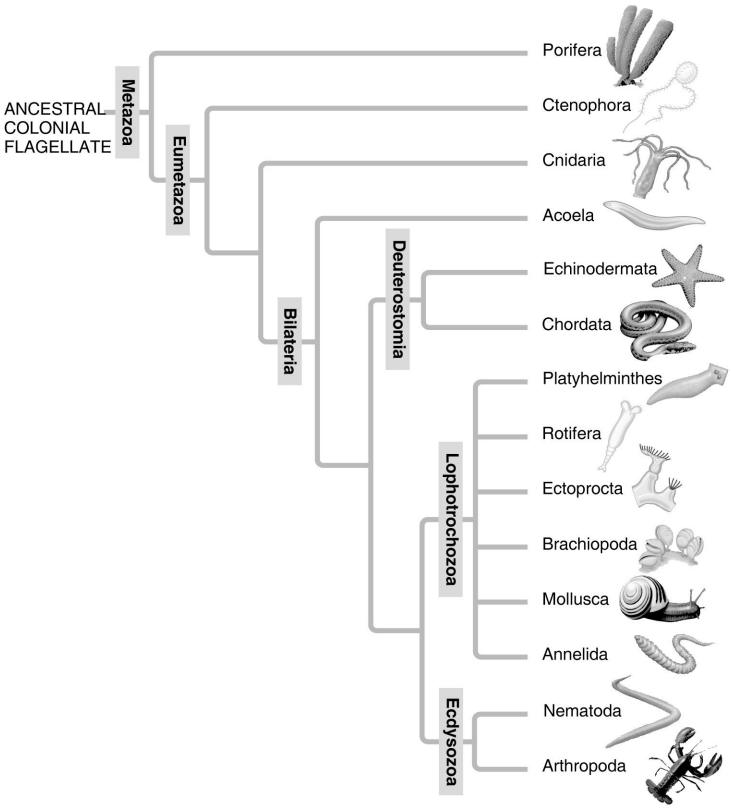
41) Which two groups are most clearly represented in the Ediacaran fauna?
A) I and II
B) I and III
C) II and IV
D) II and V
E) IV and V
Answer: B
Topic: Concepts 32.2-32.4
Skill: Knowledge/Comprehension

42) Which of these is the basal group of the Eumetazoa?
A) I
B) II
C) III
D) IV
E) V
Answer: A
Topic: Concepts 32.2-32.4
Skill: Knowledge/Comprehension

43) Which two groups have members that undergo ecdysis?
A) I and II
B) II and III
C) III and IV
D) III and V
E) IV and V
Answer: C
Topic: Concepts 32.2-32.4
Skill: Knowledge/Comprehension



A: Morphological phylogeny.



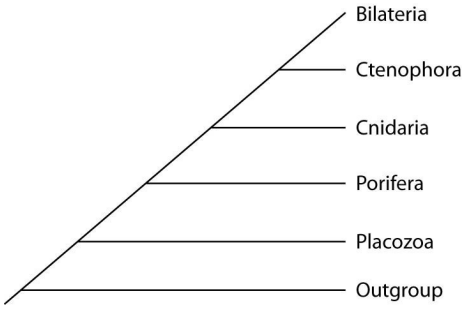
B: Molecular phylogeny.

44) According to the phylogenies depicted in the previous pair of figures, if one were to create a taxon called Radiata that included all animal species whose members have true radial symmetry, then such a taxon would be
A) paraphyletic.
B) polyphyletic.
C) monophyletic.
D) a clade.
E) More than one of these responses are correct.
Answer: A
Topic: Concept 32.4
Skill: Application/Analysis

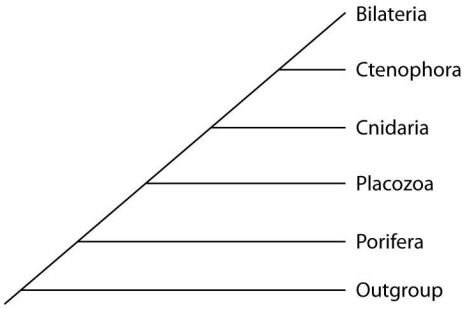
45) What is true of the deuterostomes in the molecular phylogeny (B) that is *not* true in the traditional phylogeny (A)?
A) Deuterostomia is a clade.
B) To maintain Deuterostomia as a clade, some phyla had to be removed from it.
C) Deuterostomia now includes the Acoela.
D) It is actually a grade, rather than a clade.
E) It diverged from the rest of the Bilateria earlier than did the Acoela.
Answer: B
Topic: Concept 32.4
Skill: Application/Analysis

46) In the traditional phylogeny (A), the phylum Platyhelminthes is depicted as a sister taxon to the rest of the protostome phyla, and as having diverged earlier from the lineage that led to the rest of the protostomes. In the molecular phylogeny (B), Platyhelminthes is depicted as a lophotrochozoan phylum. What probably led to this change?
A) Platyhelminthes ceased to be recognized as true protostomes.
B) The removal of the acoel flatworms (Acoela) from the Platyhelminthes allowed the remaining flatworms to be clearly tied to the Lophotrochozoa.
C) All Platyhelminthes must have a well-developed lophophore as their feeding apparatus.
D) Platyhelminthes' close genetic ties to the arthropods became clear as their *Hox* gene sequences were studied.
Answer: B
Topic: Concept 32.4
Skill: Synthesis/Evaluation

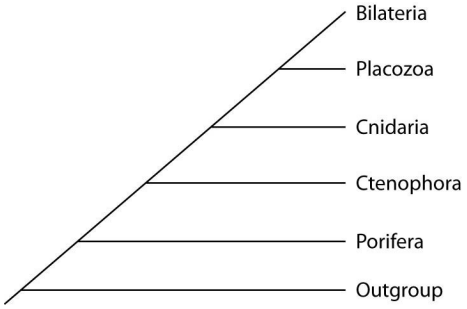
Placozoan evolutionary relationships to other animals are currently unclear, and different phylogenies can be created, depending on the character used to infer relatedness. Sponges have no tissues, but about 20 cell types. Tp (*Trichoplax adhaerens*) produces a neuropeptide almost identical to one found in cnidarians. The genome of Tp, though the smallest of any known animal, shares many features of complex eumetazoan (even human!) genomes. The next three questions refer to the phylogenetic trees that follow.



I



II



III

47) Which phylogeny has been created by emphasizing genomic features of placozoans?
A) I
B) II
C) III
Answer: C
Topic: Concepts 26.3, 32.4
Skill: Application/Analysis

48) Which phylogeny has been created by emphasizing the structural simplicity of placozoans?
A) I
B) II
C) III
Answer: A
Topic: Concepts 26.3, 32.4
Skill: Application/Analysis

49) Which phylogeny has been created by emphasizing a protein found in placozoans?
A) I
B) II
C) III
Answer: B
Topic: Concepts 26.3, 32.4
Skill: Application/Analysis

Scenario Questions

50) Cycliophorans have two types of larvae. One type of larvaÃthe Prometheus larvaÃ£develops into a male. The male, which lacks a digestive system, attaches to the outside of a feeding stage (a female) and impregnates her digestive system, which develops into a different type of larva. What must be true of the digestive system of the feeding-stage female while she is still a virgin?
1. At least some of its cells are haploid.
2. It consists only of highly specialized cells.
3. It is the same size as the male.
A) 1 only
B) 2 only
C) 3 only
D) 1 and 3
E) 2 and 3
Answer: A
Topic: Concepts 13.2, 32.1
Skill: Synthesis/Evaluation

Trichoplax adhaerens (Tp) is the only living species in the phylum Placozoa. Individuals are about 1 mm wide and only 27 μm high, are irregularly shaped, and consist of a total of about 2,000 cells, which are diploid ($2n = 12$). There are four types of cells, none of which are nerve or muscle cells, and none of which have cell walls. They move using cilia, and any "edge" can lead. Tp feeds on marine microbes, mostly unicellular green algae, by crawling atop the algae and trapping it between its ventral surface and the substrate. Enzymes are then secreted onto the algae, and the resulting nutrients are absorbed. Tp sperm cells have never been observed, nor have embryos past the 64-cell (blastula) stage.

51) If Tp sperm are observed by future researchers, how many chromosomes should be found in a Tp sperm nucleus?
A) 2
B) 3
C) 6
D) 12
Answer: C
Topic: Concepts 13.2, 32.1
Skill: Application/Analysis

52) In how many of the following ways is Tp *unlike* the typical animal?
1. Tp is multicellular.
2. Tp lacks muscle and nerve cells.
3. Tp has cilia.
4. Tp has a different place where digestion of food occurs.
5. Tp lacks cell walls.

A) only one way
B) two ways
C) three ways
D) four ways
E) all five ways
Answer: B
Topic: Concept 32.1
Skill: Synthesis/Evaluation

53) On the basis of information in the previous paragraph, which of these should be able to be observed in Tp?
A) the act of fertilization
B) the process of gastrulation
C) eggs
D) All three of the responses above are correct.
E) Two of the responses above are correct.
Answer: C
Topic: Concept 32.3
Skill: Application/Analysis

54) In its native environment, a Tp cell neither gains nor loses water. What should one expect to occur when Tp is placed into fresh water?
A) no change from the above, as fresh water is its native environment
B) lysis
C) plasmolysis
D) slight shrinkage
Answer: B
Topic: Concepts 7.3, 32.1
Skill: Application/Analysis

55) Tp's body symmetry seems to be most like that of
A) most sponges.
B) cnidarians.
C) worms.
D) tetrapods.
E) Two of the responses above are correct.
Answer: A
Topic: Concept 32.3
Skill: Application/Analysis

56) In an experiment, several Tp individuals were stained different colors. The stained individuals were then passed through a strainer, disaggregated to the level of single cells, and collected into a common container of seawater. Which subsequent finding would be most surprising if the Tp individuals used in this experiment had been produced by sexual, rather than asexual, means?
A) If all of the cells from a given individual reaggregated to form the same individual, and if each cell had retained its original identity, as far as cell type goes.
B) If all of the cells from a given individual reaggregated to form the same individual, but if each cell had a different identity than it had before disaggregation.
C) If cells from different original individuals reaggregated together to form new individual organisms.
D) If cells from different original individuals reaggregated together to form new species.
Answer: C
Topic: Concept 32.1
Skill: Synthesis/Evaluation

A student encounters an animal embryo at the eight-cell stage. The four smaller cells that comprise one hemisphere of the embryo seem to be rotated 45 degrees and to lie in the grooves between larger, underlying cells (i.e., spiral cleavage).

57) This embryo may potentially develop into a(n)
A) turtle.
B) earthworm.
C) sea star.
D) fish.
E) sea urchin.
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

58) If we were to separate these eight cells and attempt to culture them individually, then what is most likely to happen?
A) All eight cells will die immediately.
B) Each cell may continue development, but only into a nonviable embryo that lacks many parts.
C) Each cell may develop into a full-sized, normal embryo.
D) Each cell may develop into a smaller-than-average, but otherwise normal, embryo.
Answer: B
Topic: Concept 32.3
Skill: Knowledge/Comprehension

The most recently discovered phylum in the animal kingdom (1995) is the phylum Cycliophora. It includes three species of tiny organisms that live in large numbers on the outsides of the mouthparts and appendages of lobsters. The feeding stage permanently attaches to the lobster via an adhesive disk, and collects scraps of food from its host's feeding by capturing the scraps in a current created by a ring of cilia. The body is sac-like and has a U-shaped intestine that brings the anus close to the mouth. Cycliophorans are eucoelomate, do not molt (though their host does), and their embryos undergo spiral cleavage.

59) Which of these features is *least* useful in assigning the phylum Cycliophora to a clade of animals?
A) having a true coelom as a body cavity
B) having a body symmetry that permits a U-shaped intestine
C) having embryos with spiral cleavage
D) lacking ecdysis (molting)
Answer: A
Topic: Concept 32.3
Skill: Application/Analysis

60) Basing your inferences on information in the previous paragraph, to which clade(s) should cycliophorans belong?
1. Eumetazoa
2. Deuterostomia
3. Bilateria
4. Ecdysozoa
5. Lophotrochozoa

A) 1 only
B) 1 and 3
C) 1, 3, and 5
D) 2, 3, and 4
E) 2, 3, and 5
Answer: C
Topic: Concepts 32.3, 32.4
Skill: Application/Analysis

61) If harboring large populations of cycliophorans neither helps nor harms their lobster hosts, then cycliophorans can be properly considered to be
1. parasites.
2. mutualists.
3. commensals.
4. symbionts.
5. endosymbionts.

A) 1 and 4
B) 2 and 4
C) 3 and 4
D) 2 and 5
E) 3 and 5
Answer: C
Topic: Concepts 27.5, 32.4
Skill: Application/Analysis

62) On the basis of the cleavage pattern of cycliophoran embryos, which of these should be true?
A) It has determinate development.
B) The blastopore becomes the anus.
C) They are deuterostomes.
D) A cell separated from a four-cell embryo should develop into a complete organism.
Answer: A
Topic: Concept 32.3
Skill: Application/Analysis

63) Using similarities in embryonic development, body symmetry, and other anatomical features to assign an organism to a clade involves
1. cladistics based on body plan.
2. molecular-based phylogeny.
3. morphology-based phylogeny.
A) 1 only
B) 2 only
C) 3 only
D) 1 and 2
E) 1 and 3
Answer: E
Topic: Concept 32.4
Skill: Application/Analysis

64) Which of these, if discovered among cycliophorans, would cause the most confusion concerning our current understanding of cycliophoran taxonomy?
A) if the ciliated feeding ring is a lophophore
B) if embryos are diploblastic
C) if the body cavity is actually a pseudocoelom
D) if the organisms show little apparent cephalization
Answer: B
Topic: Concepts 32.3, 32.4
Skill: Application/Analysis

65) What is true of the feeding stage of cycliophorans?
1. It is chemoheterotrophic.
2. It is sessile.
3. It captures food in a manner similar to that of animals with lophophores.
4. It has radial symmetry.
A) 1 and 2
B) 1 and 3
C) 2 and 4
D) 1, 2, and 3
E) 2, 3, and 4
Answer: D
Topic: Concept 32.3
Skill: Application/Analysis

66) Cycliophorans have two types of larvae. One type of larva is produced when the digestive system of a female is impregnated by a male. The digestive system then collapses and develops into a larva, which swims away in search of a new host after the surrounding female dies. Which is the embryonic tissue that is apparently most important in forming this type of larva?
A) mesohyl
B) mesoderm
C) ectoderm
D) endoderm
E) mesoglea
Answer: D
Topic: Concept 32.3
Skill: Application/Analysis

Table 32.1. Proposed Number of *Hox* Genes in Various Extant and Extinct Animals

Last Common Ancestor of Bilateria	Last Common Ancestor of Insects and Vertebrates	Ancestral Vertebrates	Mammals
4	7	14	38-40

67) What conclusion is apparent from the data in the table?
A) Land animals have more *Hox* genes than do those that live in water.
B) All bilaterian phyla have had the same degree of expansion in their numbers of *Hox* genes.
C) Acoel flatworms should be expected to contain seven *Hox* genes.
D) The expansion in number of *Hox* genes throughout vertebrate evolution cannot be explained merely by three duplications of the ancestral vertebrate *Hox* cluster.
E) Extant insects all have seven *Hox* genes.
Answer: D
Topic: Concept 32.4
Skill: Application/Analysis

68) All things being equal, which of these is the most parsimonious explanation for the change in the number of *Hox* genes from the last common ancestor of insects and vertebrates to ancestral vertebrates, as shown in the table?
A) The occurrence of seven independent duplications of individual *Hox* genes.
B) The occurrence of two distinct duplications of the entire seven-gene cluster, followed by the loss of one cluster.
C) The occurrence of a single duplication of the entire seven-gene cluster.
Answer: C
Topic: Concept 32.4
Skill: Application/Analysis

69) Two competing hypotheses to account for the increase in the number of *Hox* genes from the last common ancestor of bilaterians to the last common ancestor of insects and vertebrates are: (1) a single duplication of the entire four-gene cluster, followed by the loss of one gene, and (2) three independent duplications of individual *Hox* genes. To prefer the first hypothesis on the basis of parsimony requires the assumption that
A) the duplication of a cluster of four *Hox* genes is equally likely as the duplication of a single *Hox* gene.
B) there is an actual process by which individual genes can be duplicated.
C) genes can exist is spatial groupings called *clusters*.
D) clusters of genes can undergo disruption, with individual genes moving to different chromosomes during evolution.
Answer: A
Topic: Concept 32.4
Skill: Synthesis/Evaluation

End-of-Chapter Questions

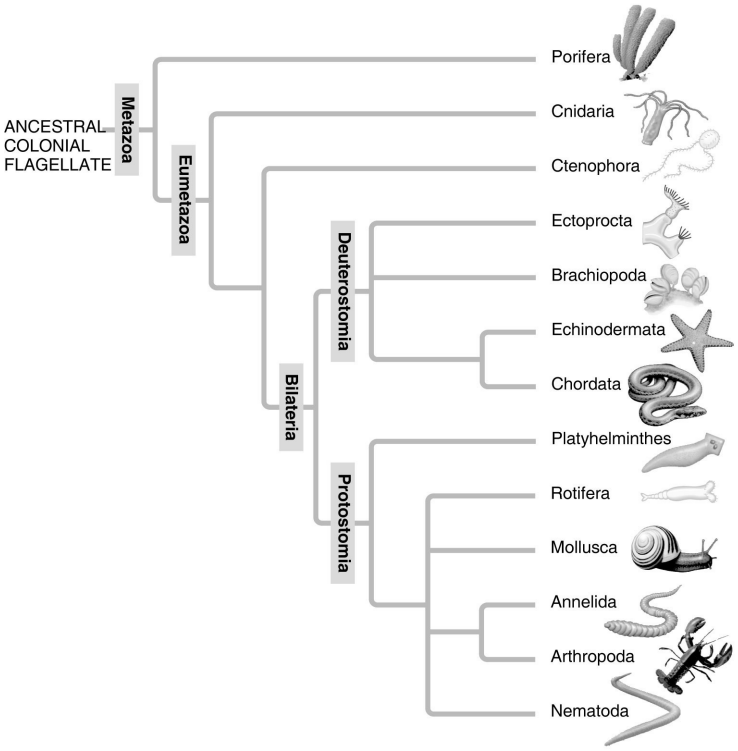
The following questions are from the end-of-chapter "Test Your Understanding" section in Chapter 32 of the textbook.

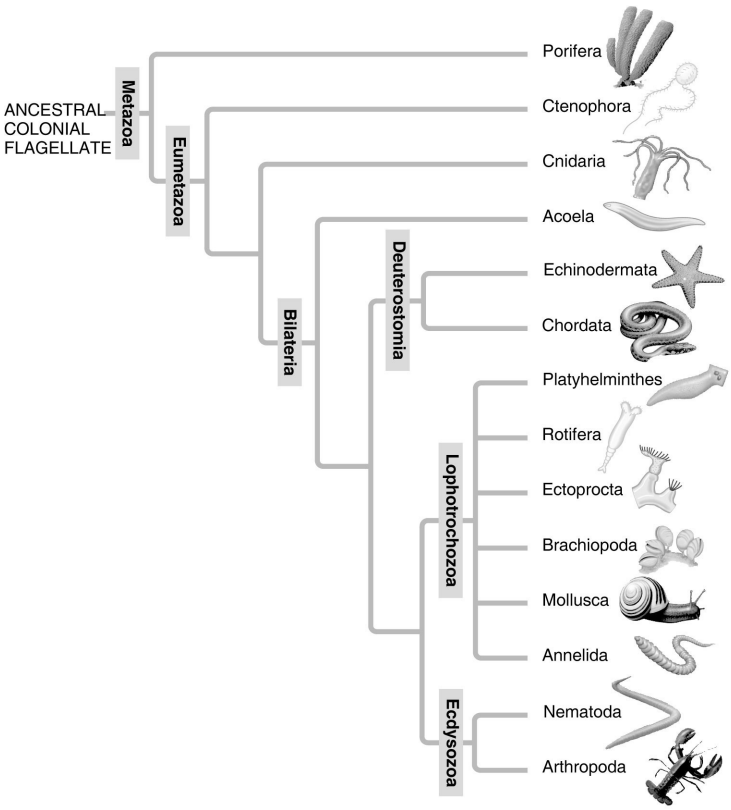
70) Among the characteristics unique to animals is
A) gastrulation.
B) multicellularity.
C) sexual reproduction.
D) flagellated sperm.
E) heterotrophic nutrition.
Answer: A
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

71) The distinction between sponges and other animal phyla is based mainly on the absence versus the presence of
A) a body cavity.
B) a complete digestive tract.
C) a circulatory system.
D) true tissues.
E) mesoderm.
Answer: D
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

72) Acoelomates are characterized by
A) the absence of a brain.
B) the absence of mesoderm.
C) deuterostome development.
D) a coelom that is not completely lined with mesoderm.
E) a solid body without a cavity surrounding internal organs.
Answer: E
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

73) Which of the following was probably the *least* important factor in bringing about the Cambrian explosion?
A) the emergence of predator-prey relationships among animals
B) the accumulation of diverse adaptations, such as shells and different modes of locomotion
C) the movement of animals onto land
D) the origin of *Hox* genes and other genetic changes affecting the regulation of developmental genes
E) the accumulation of sufficient atmospheric oxygen to support the more active metabolism of mobile animals
Answer: C
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension





74) Which of the following is a point of conflict between the phylogenetic analyses presented in these two figures?
A) the monophyly of the animal kingdom
B) the relationship of taxa of segmented animals to taxa of nonsegmented animals
C) that sponges are basal animals
D) that chordates are deuterostomes
E) the monophyly of the bilaterians
Answer: B
Topic: End-of-Chapter Questions
Skill: Application/Analysis