Spring Semester Exam Content Review

DNA Replication Quiz

1. Single Strand Binding Proteins
2. DNA Polymerase
3. Helicase
4. RNA Primase
5. DNA Ligase

A. Unzips DNA

B. Links new nucleotides together

C. Holds DNA Apart

D. Initiates building of new DNA strand

E. Joins DNA Fragments Together

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DNA Replication VOCAB

1. Replication fork
2. Leading Strand
3. Lagging Strand
4. Okazaki Fragment
5. RNA Primer

A. Shorter pieces of DNA that are built in the 5'→3' on the antiparallel strand
B. Name for A
C. Beginning of both the leading and lagging strands
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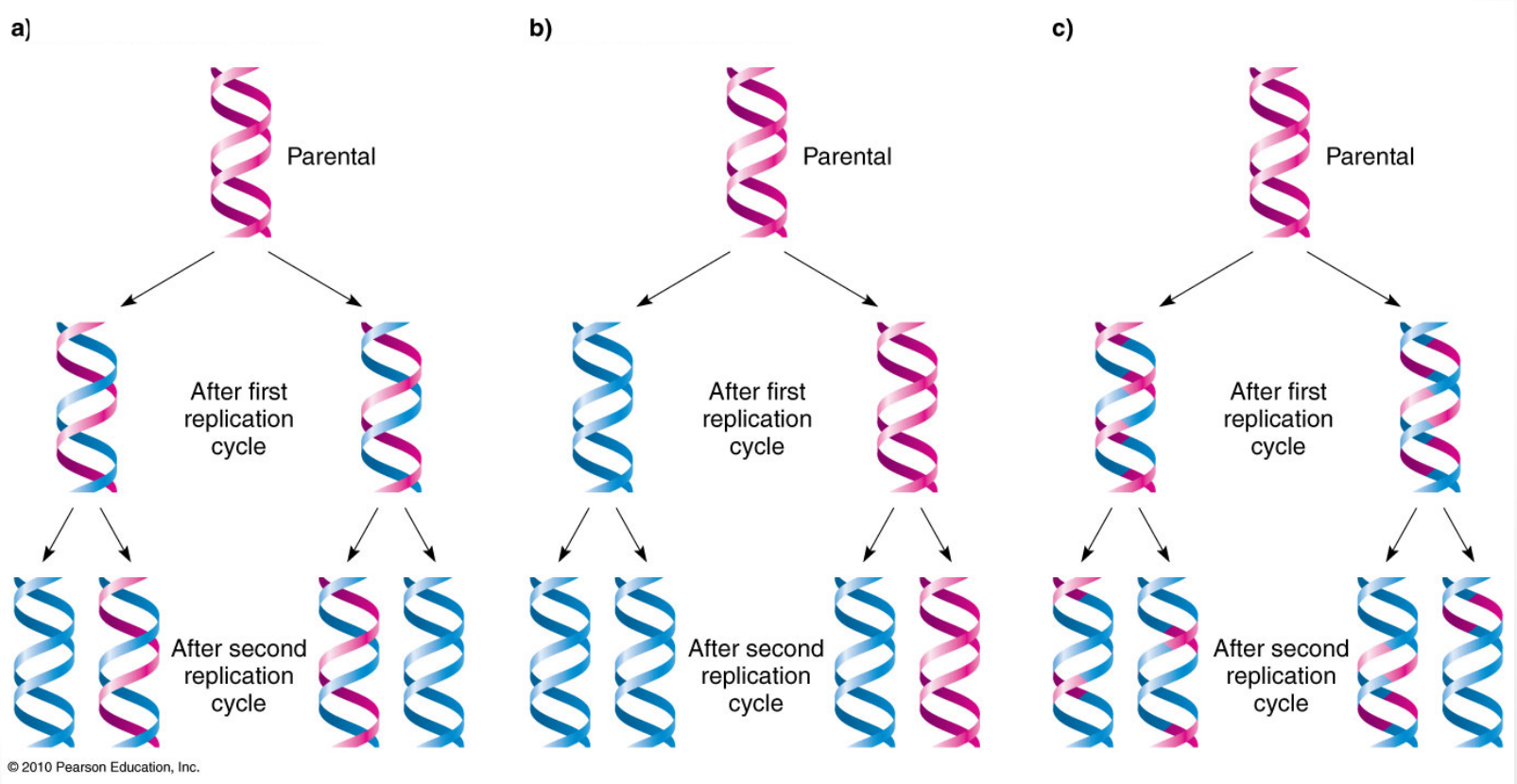
DNA Replication

Which of the following models of replication is the accurate portrayal of the method of replication? What is it called?



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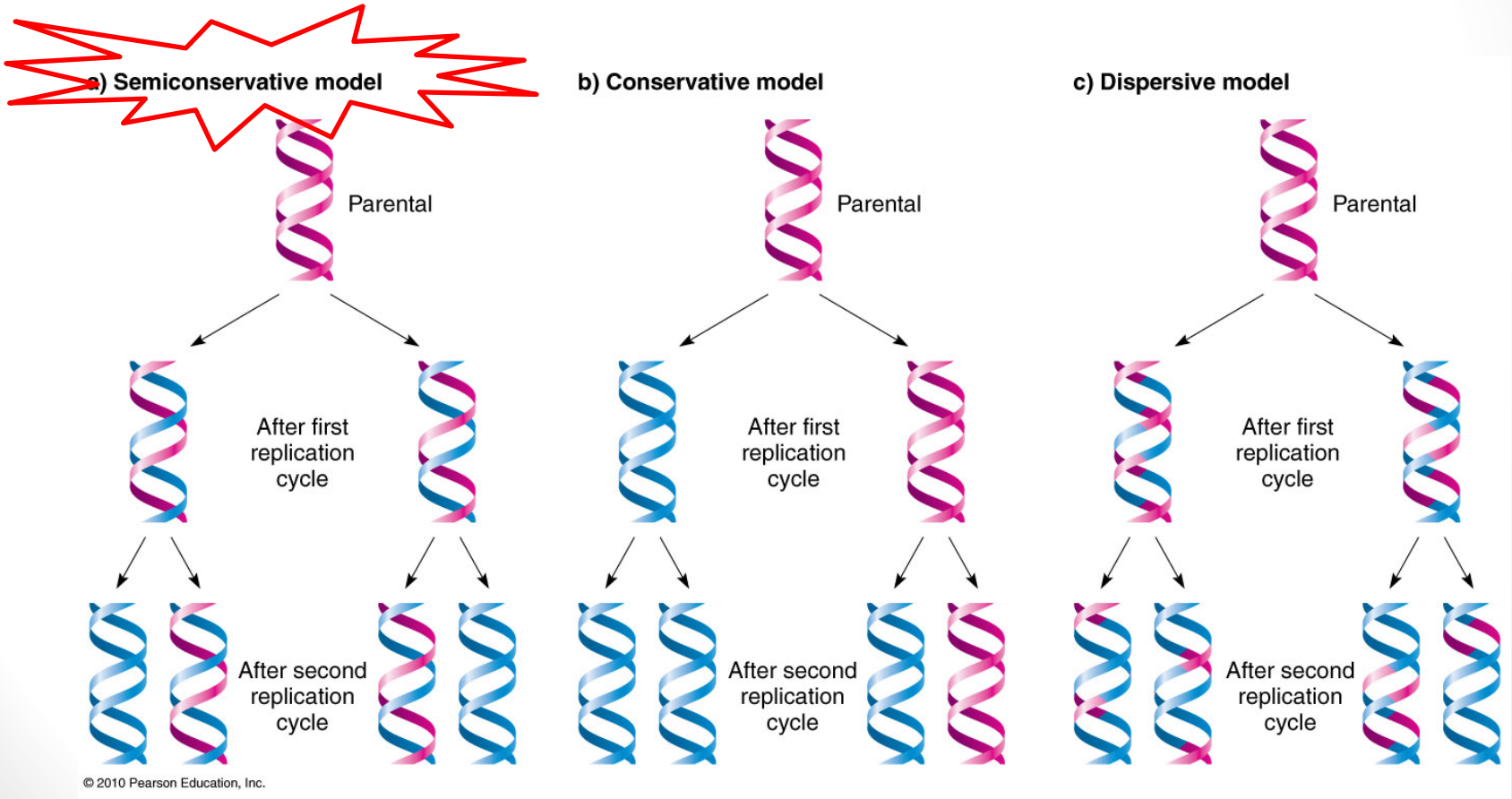

Protein Synthesis

- 5’ Cap and Poly A tail added
- DNA copied to RNA
- UAA, UAG, or UGA stop the process
- Thymine replaced with Uracil
- tRNA matches to mRNA
- Introns removed, Exons spliced
- Amino acid chains are built
- Start Codon AUG is recongized

- Transcription
- RNA Modification
- Translation

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Transcribe and Translate the Following Sequence of DNA

- **DNA CODE: TAC GCT TTC ATG CGT TGA ACT**
  mRNA CODON: _____ _____ _____ _____ _____ _____ _____
  AMINO ACID: _____ _____ _____ _____ _____ _____ _____

Codon Chart

First Position (5′)	Second Position: U	Second Position: C	Second Position: A	Second Position: G	Third Position (3′)
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	Stop	Stop	A
	Leucine	Serine	Stop	Tryptophan	G
C	Leucine	Proline	Histidine	Arginine	U
	Leucine	Proline	Histidine	Arginine	C
	Leucine	Proline	Glutamine	Arginine	A
	Leucine	Proline	Glutamine	Arginine	G
A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
	Isoleucine	Threonine	Lysine	Arginine	A
	Methionine	Threonine	Lysine	Arginine	G
G	Valine	Alanine	Aspartic acid	Glycine	U
	Valine	Alanine	Aspartic acid	Glycine	C
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A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
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DNA Mutations

- Original DNA
  - **TAC GCT TTC ATG CGT TGA ACT**

Which of the following is a Point Mutation, Insertion or Deletion?

TAC GCT TTA TGC GTT GAA CT

TAC GCT TTC ATG CGT TTG AAC T

TAC GCT TAC ATG CGT TGA ACT

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DNA Technology Terms

- Restriction Enzymes
- GMO
- PCR
- DNA Electrophoresis

- An organism that has been changed with the DNA of another organism: Golden rice, Bacteria that produce human insulin, Spider Goats
- Process of replicating DNA without cells
- Separating DNA fragments for analysis
- Cut DNA at specific nucleotide sequences to form sticky ends – allows for genetic recombination or analysis

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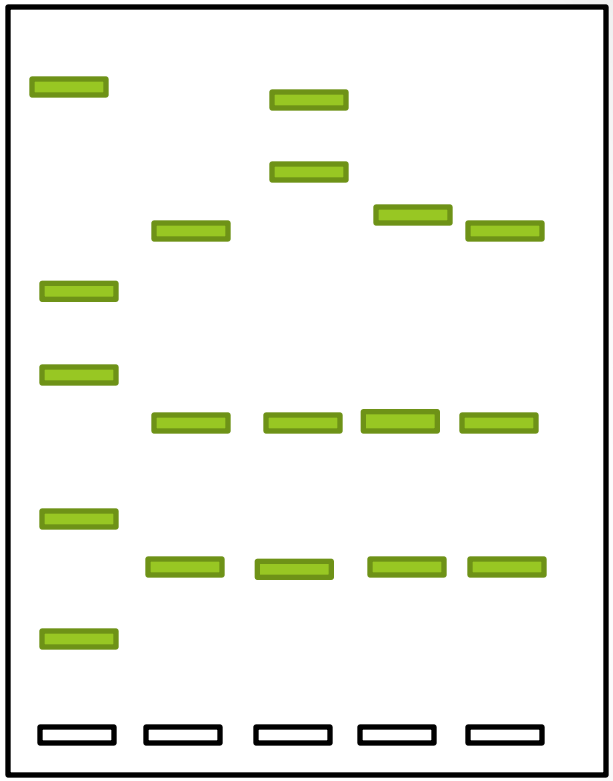
- Five samples of DNA were analyzed using DNA electrophoresis with the following results.



1) Which end of the gel was near the positive electrode?

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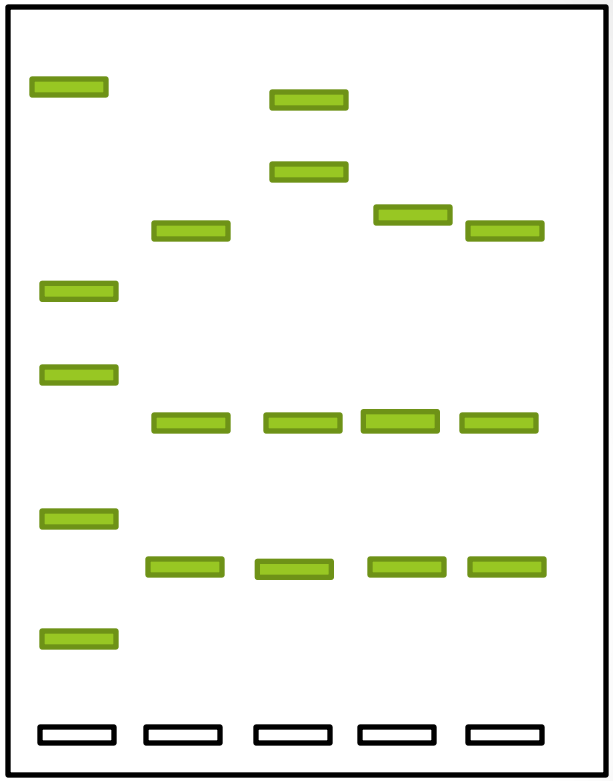

1) Which end of the gel was near the positive electrode?

Explanation: The wells(▭) are where the DNA is initially placed. The DNA is negatively charged due to the phosphates ($PO4^{-3}$) and therefore move toward the positive electrode.

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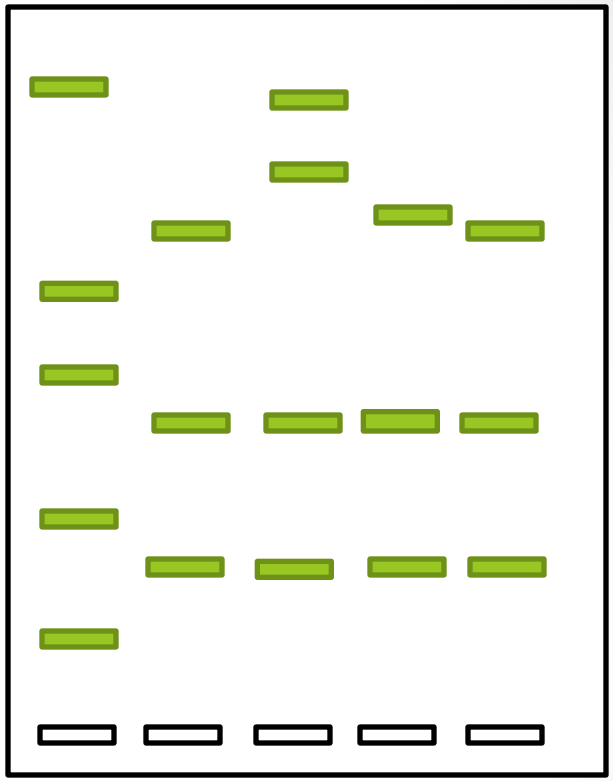

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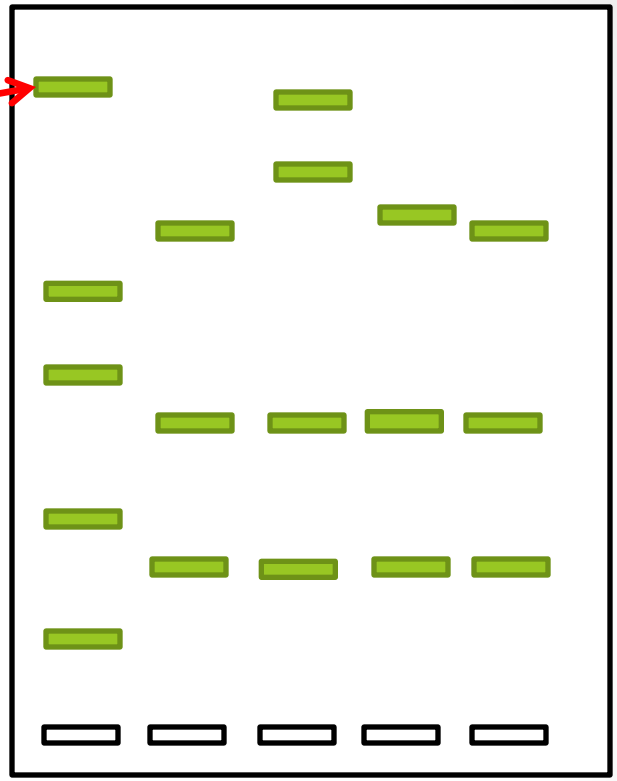

- The agarose gel is like a jungle of vines and plants. Smaller pieces are able to move faster and farther.

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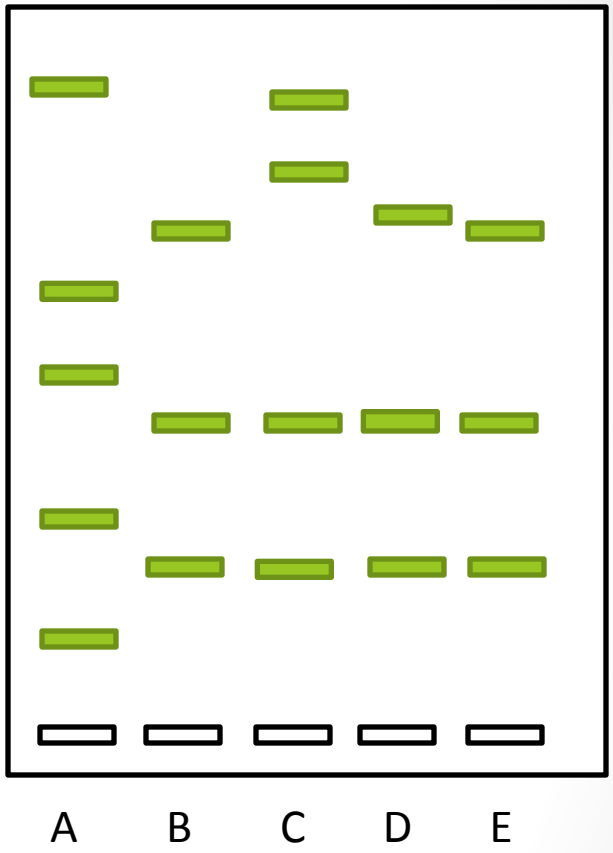

If the five samples are from a domesticated dog, a wolf, a coyote, a cat, and a pig, which sample most likely belongs to the organisms?
(Hint: Domesticated Dogs are descended from Wolves, not coyotes, although all three species can successfully interbreed)

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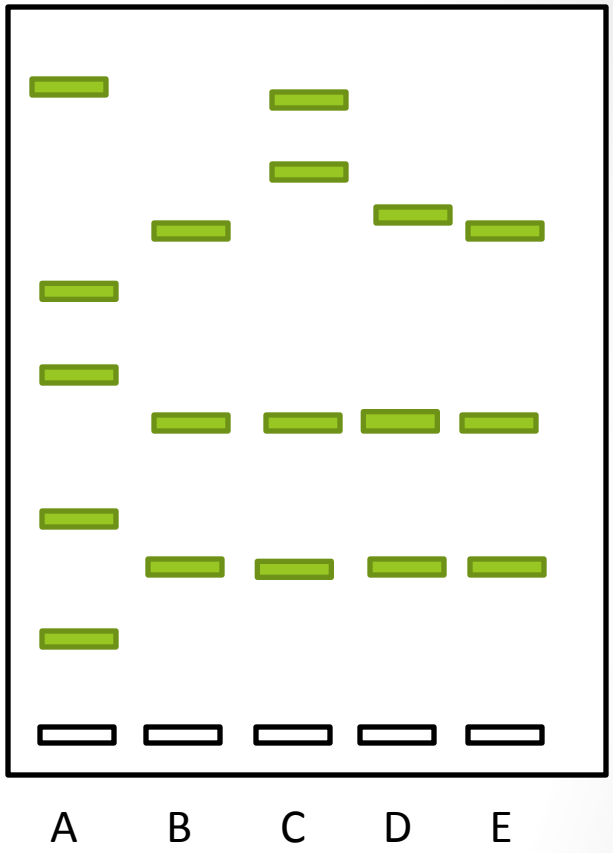

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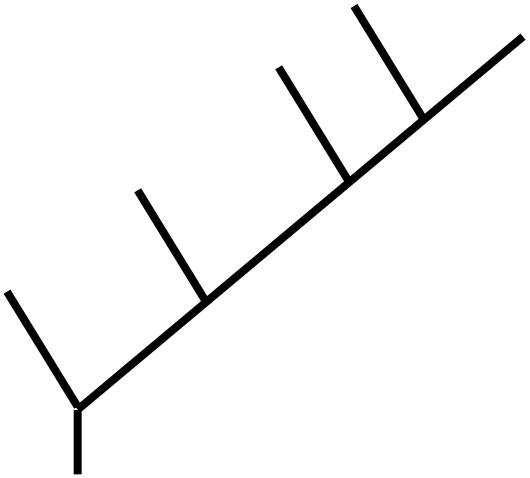
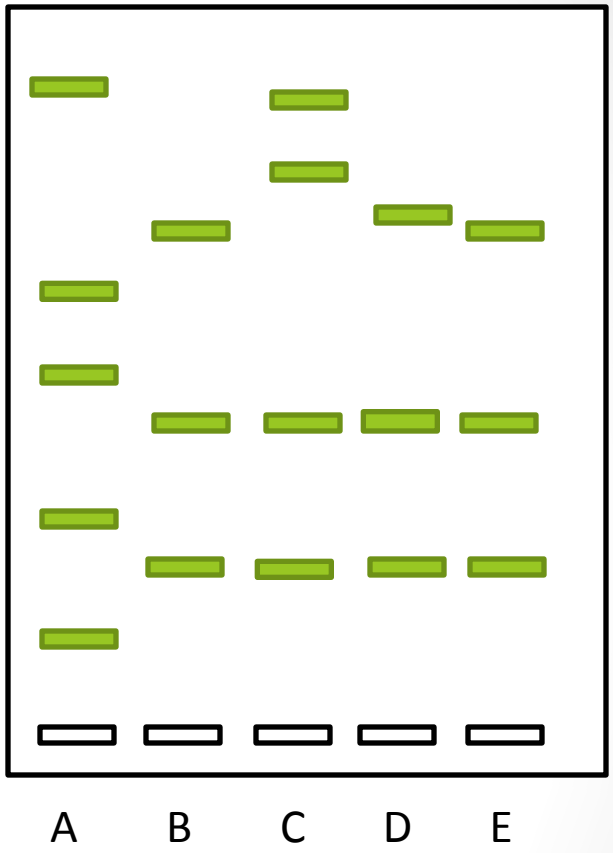
A = Pig – herbivore, most different from other four
B & E = Wolf and Dog – Basically the same thing
D = Coyote – slight difference, but almost the same as wolf and dog
C = Cat, not because cat starts with “c” but because it is similar to the other carnivore profiles. Cats are more like dogs than they are like pigs.

- Five samples of DNA were analyzed using DNA electrophoresis with the following results.

Draw a cladogram for the pig, wolf, cat, coyote, dog data.





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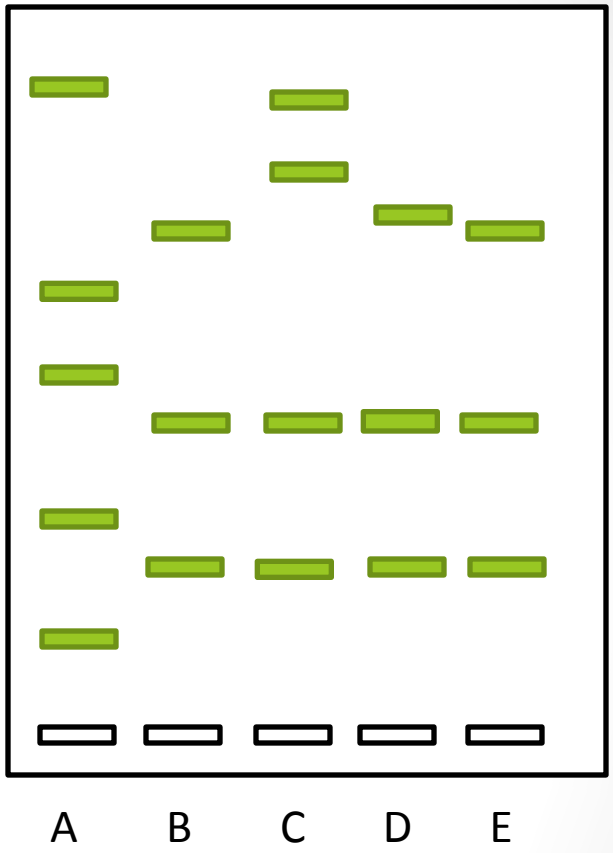

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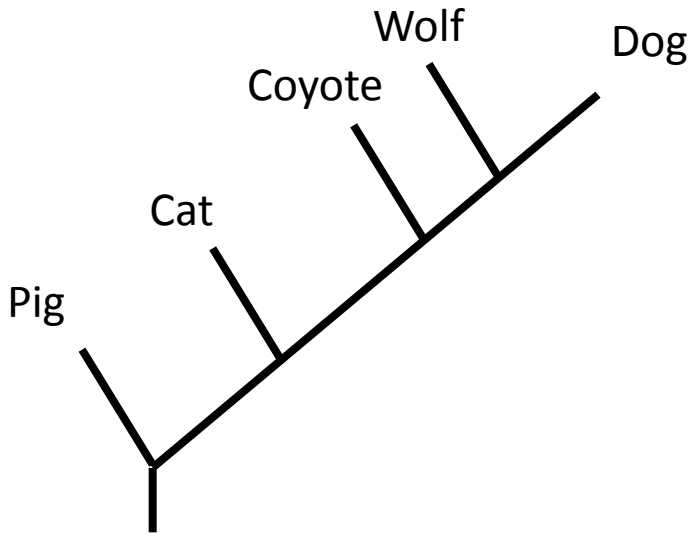
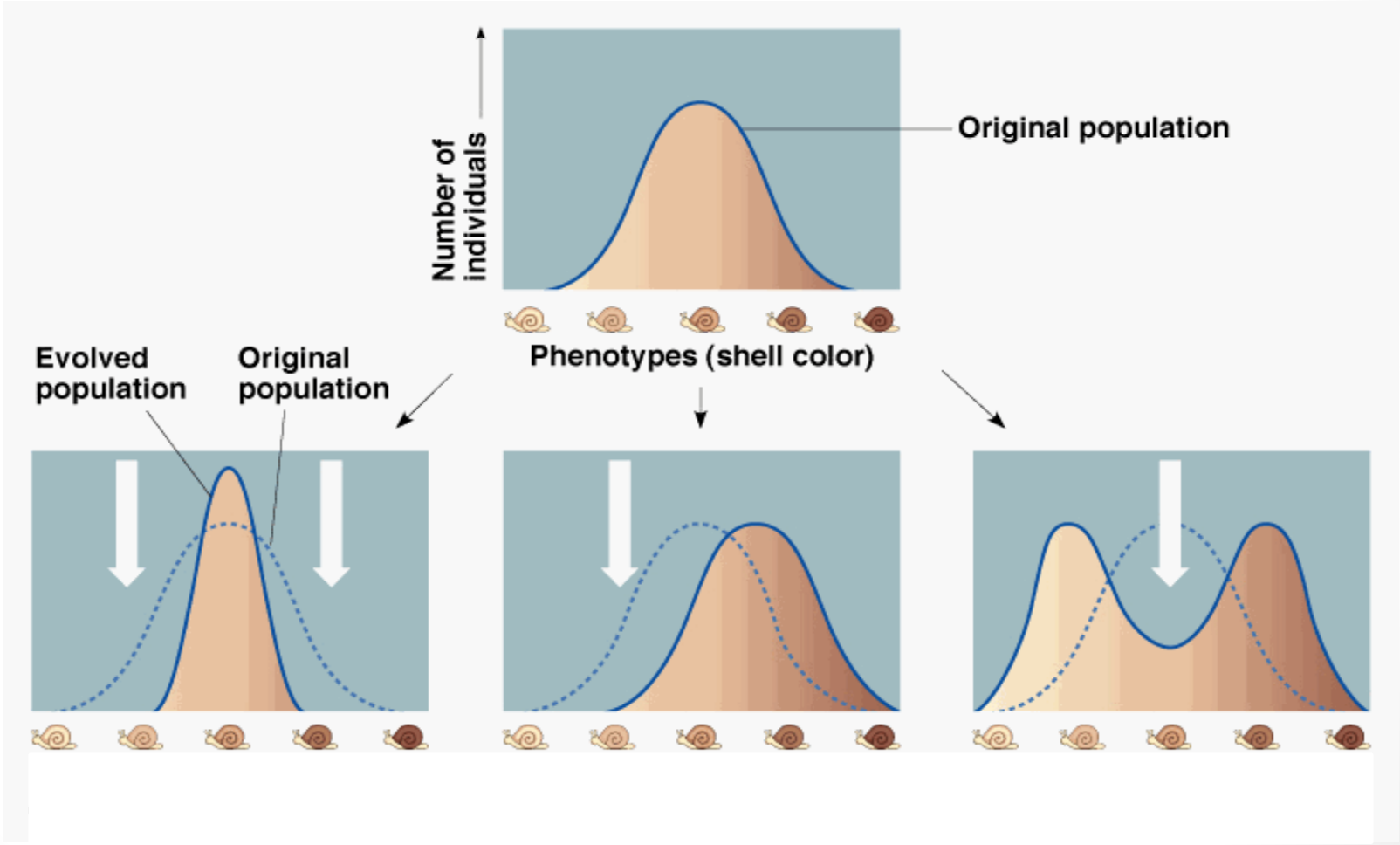


Note: This cladogram doesn't actually represent the evolutionary lineage of dogs and cats. Cats actually would be farther down the line on the cladogram since they have a more specialized diet and retractable claws. But the limited data from the DNA analysis supports this tree. Any cladograms you must draw on the exam must represent the data you are given, not necessarily the actual reality.

Identify the following types of natural selection as stabilizing, directional, or diversifying (disruptive).



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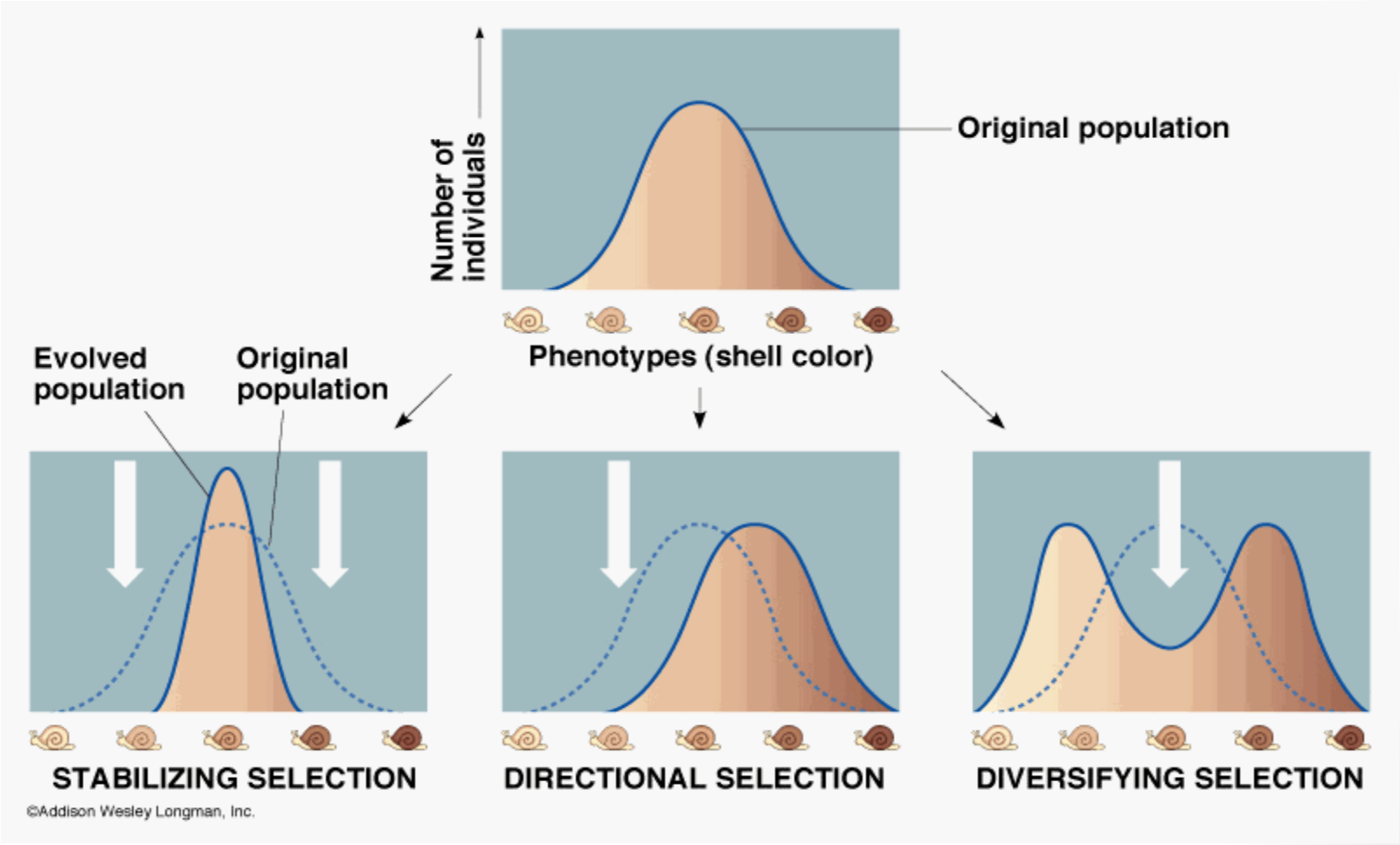

Evolution Terms

- Fitness
- Speciation
- Genetic Drift
- Bottle Neck Effect
- Founder Effect

- The formation of a new species
- Loss of genetic diversity due to separation of a few individuals from the main population
- The loss of genetic diversity due to random chance (Ex: Wind pollination)
- Loss of genetic diversity due to a natural disaster
- The ability to survive and reproduce to make viable offspring.

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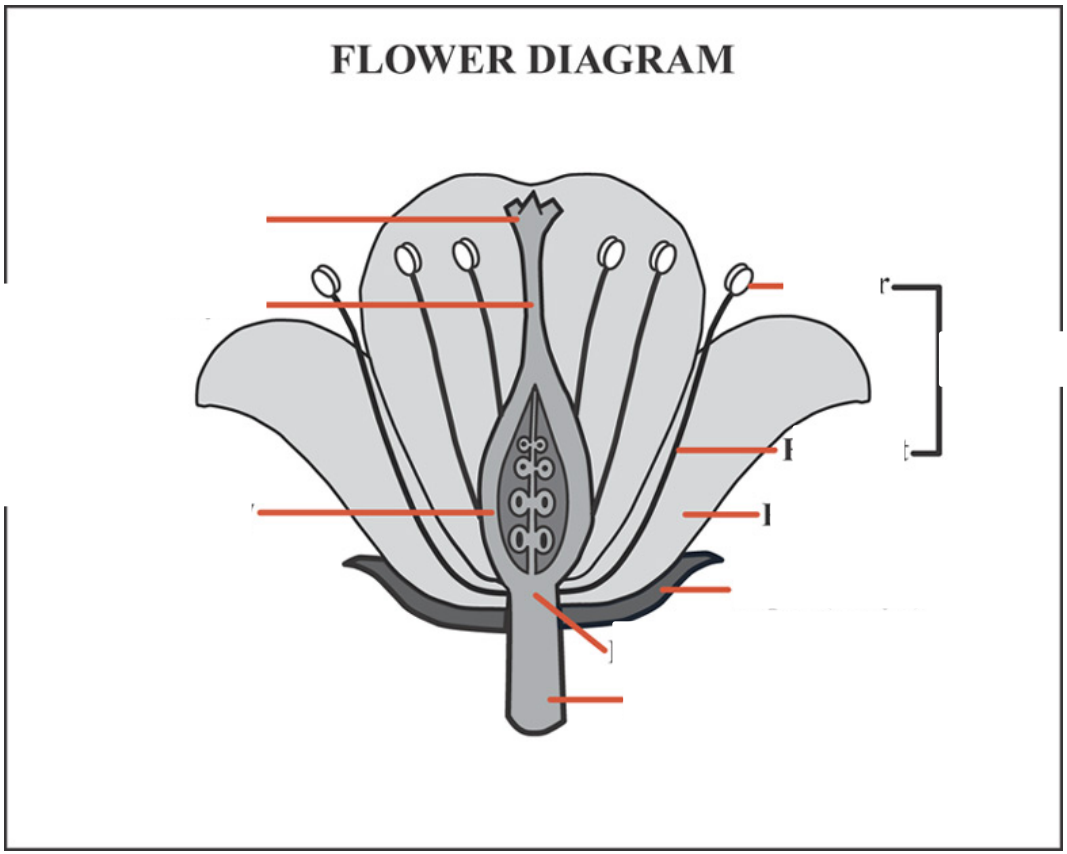
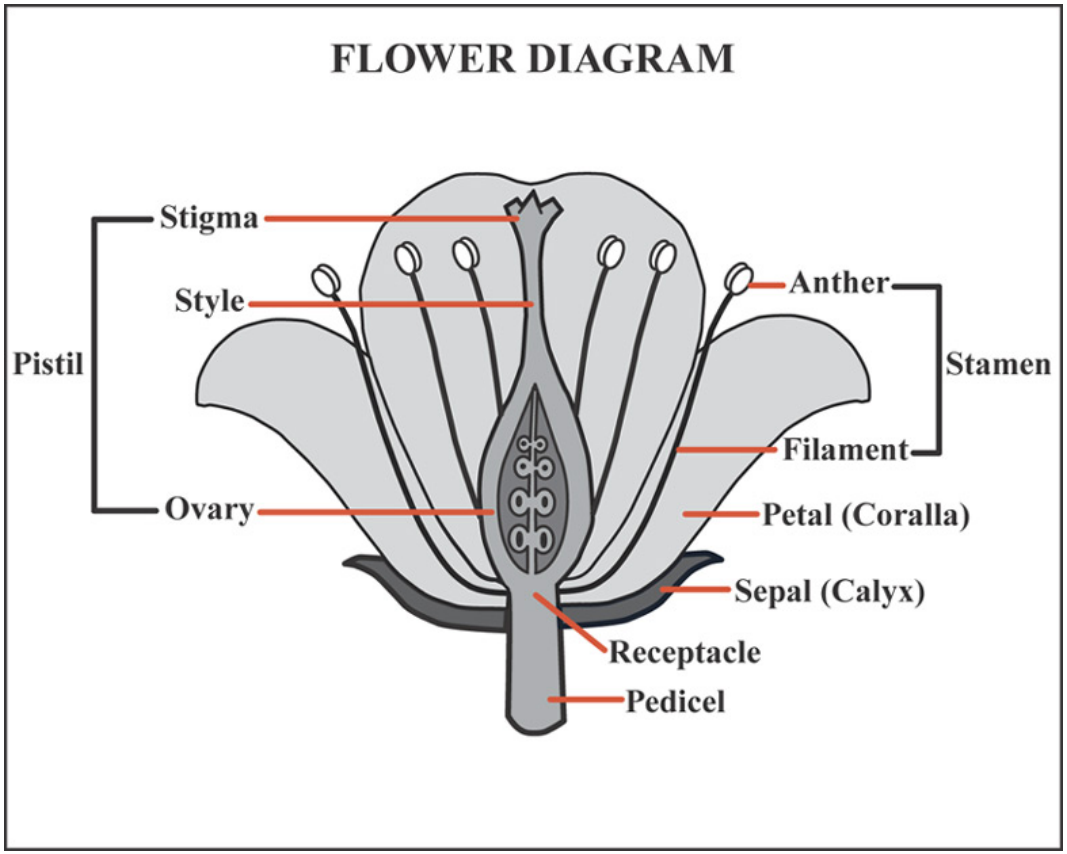
Label the following diagram:



Label the following diagram:



Plant Group Characteristics

Plant Group	Spore Producing	Motile Sperm (Need Water)	Vascular Tissue	Seed Producing	Seeds Covered with Fruit
Bryotphytes					
Ferns					
Gymnosperms					
Angiosperms					

Plant Group Characteristics

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Bryotphytes	✓	✓			
Ferns	✓	✓	✓		
Gymnosperms			✓	✓	
Angiosperms			✓	✓	✓

- Complete the following charts for the animal characteristics.

- Hint: Rather than trying to remember a bunch of facts, remember what these animals look like. Pictures are easier to remember and carry more information than individual points of information.
- If you don’t remember what they look like go to the Animal Powerpoint or use the Google Box.

Group	Radial Symmetry	Bilateral Symmetry	Gastrovascular Cavity	Complete Digestive System	Gills	Lungs	Exoskeleton	Cartilagenous Skeleton	Bony Skeleton
Sponges									
Cnidarians									
Acoelomate									
Pseudocoelomate									
Coelomate									
Annelids									
Mollusks									
Arthropods									
Echinoderms									
Agnatha									
Chondrichthes									
Osteoichthes									
Amphibians									
Reptiles									
Birds									
Mammals									

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Cnidarians	+	-	+	-	-	-	-	-	-
Acoelomate	-	+	+	-	-	-	-	-	-
Pseudocoelomate	-	+	-	+	-	-	-	-	-
Coelomate	-	+	-	+	-	-	-	-	-
Annelids	-	+	-	+	-	-	-	-	-
Mollusks	-	+	-	+	+	-	-	-	-
Arthropods	-	+	-	+	+	-	+	-	-
Echinoderms	+	-	-	+	+	-	-	-	-
Agnatha	-	+	-	+	+	-	-	+	-
Chondrichthes	-	+	-	+	+	-	-	+	-
Osteoichthes	-	+	-	+	+	-	-	-	+
Amphibians	-	+	-	+	+/-	-/+	-	-	+
Reptiles	-	+	-	+	-	+	-	-	+
Birds	-	+	-	+	-	+	-	-	+
Mammals	-	+	-	+	-	+	-	-	+

Group	Leathery Egg	Hard Shelled Egg	2 Chambered Heart	3 Chambered Heart	4 Chambered Heart	Endotherm	Exotherm	Hair	Nurse Young
Sponges									
Cnidarians									
Acoelomate									
Pseudocoelomate									
Coelomate									
Annelids									
Mollusks									
Arthropods									
Echinoderms									
Agnatha									
Chondrichthes									
Osteoichthes									
Amphibians									
Reptiles									
Birds									
Mammals									

Group	Leathery Egg	Hard Shelled Egg	2 Chambered Heart	3 Chambered Heart	4 Chambered Heart	Endotherm	Exotherm	Hair	Nurse Young
Sponges	-	-	-	-	-	-	+	-	-
Cnidarians	-	-	-	-	-	-	+	-	-
Acoelomate	-	-	-	-	-	-	+	-	-
Pseudocoelomate	-	-	-	-	-	-	+	-	-
Coelomate	-	-	-	-	-	-	+	-	-
Annelids	-	-	-	-	-	-	+	-	-
Mollusks	-	-	-	-	-	-	+	-	-
Arthropods	-	-	-	-	-	-	+	-	-
Echinoderms	-	-	-	-	-	-	+	-	-
Agnatha	-	-	+	-	-	-	+	-	-
Chondrichthes	-	-	+	-	-	-	+	-	-
Osteoichthes	-	-	+	-	-	-	+	-	-
Amphibians	-	-	-	+	-	-	+	-	-
Reptiles	+	-	-	+	-	-	+	-	-
Birds	-	+	-	-	+	+	-	-	-
Mammals	+	-	-	-	+	+	-	+	+