

Q# 1) This question will assess your understanding of the evolution of flight.

- a) Please briefly explain the two different “theories” for the origin of flight (arboreal vs. cursorial)

arboreal –
cursorial –

- b) Please list at least three different “ecological” reasons for why flight may have evolved (i.e. the question in (a) ask ‘how’ flight evolved, but here the question asks ‘why’)?

- c) Please list three different “types” of flight, and offer at least two very distantly related taxa that fly using EACH of the flight modes you list.

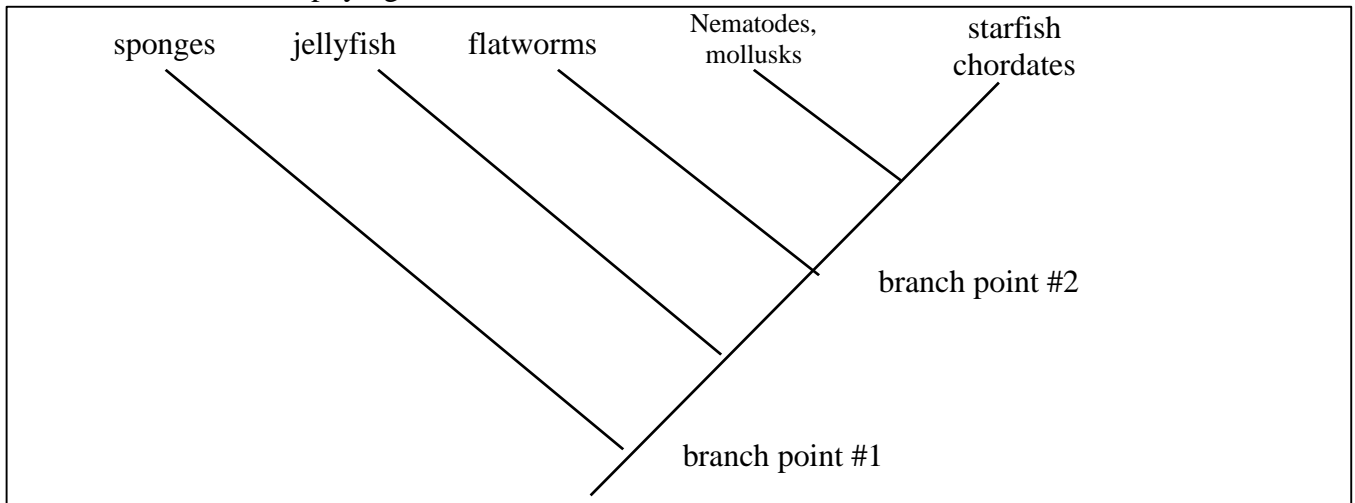


Q# 2) This question will assess your understanding of the evolution of flight.

Please why flight is an example of “convergent evolution”. In your response, define “convergent evolution”, and explain using several diverse examples of flying organisms why “convergent evolution” must have occurred.

Q# 3) This question will assess your understanding of the evolution of feeding mechanisms.

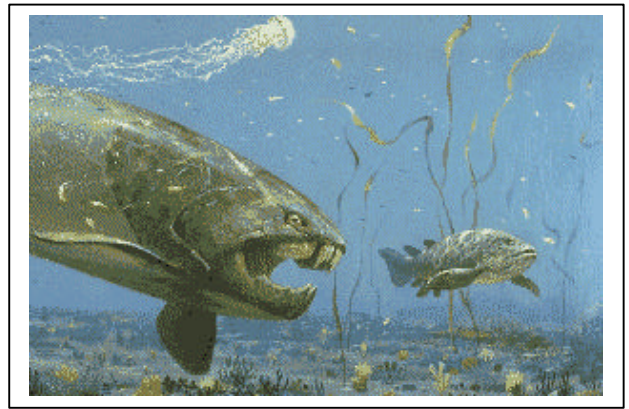
Consider the phylogenetic tree of animals:



- a) Please explain the feeding mode of the original animal species (from which sponges/porifera are directly descended today)
- b) What were some of the major adaptations to feeding that evolved at branch point #1 (i.e. and to date are found in the jellyfish, hydra, and other cnidarians)?
- c) What were some of the major adaptations to feeding that evolved at branch point #2 (i.e. and to date are found in the so-called higher taxa)? Please list several different adaptations so as to cover a wide range of feeding mechanisms found in these taxa.

Q# 4) Since the early Devonian period (400 million years ago) jaws have been the dominant feeding mechanism of vertebrates.

- a) List AND briefly describe the major types of jaw designs and associated soft tissues found in vertebrates?
- b) Briefly compare and contrast the above with the major types of feeding mechanisms and associated tissues found in the “higher” invertebrate protostomes (e.g. arthropods).



Q# 5) This question will assess your understanding of the evolution of endothermy.

- a) Please list some of the major characteristics (physiological, morphological, and behavioral) of a homeothermic endotherm (such as a giant panda).
- b) How do these characteristics differ for an animal that is a “regional heterotherm”? What major characteristics (physiological, morphological, and behavioral) do homeotherms and regional heterotherms have in common AND do not have in common?



Q# 6) This question will assess your understanding of the evolution of endothermy.

- a) What are the ecological ADVANTAGES of being endothermic versus being ectothermic (such as the lizard at right)?
- b) What are the ecological DISADVANTAGES of being endothermic versus being ectothermic?



Q# 7) This question will assess your understanding of the evolution of viviparity.

At right are photos of two very different reproductive strategies – egg laying in platypus and viviparity in killer whales (and humans). What are the **ADVANTAGES** and **DISADVANTAGES** of viviparity?

- a) **ADVANTAGES** -
- b) **DISADVANTAGES** -
- c) Briefly, why might it be that viviparity is commonly found in lizards living in cool environments (high altitude or latitude)?



Q# 8) This question will assess your understanding of the evolution of viviparity.

- a) Please list three totally different taxa of animals (**OTHER THAN MAMMALS**) in which viviparity evolved. In addition, for each **briefly** describe how their particular form of viviparity occurs.
- b) Briefly, why might it be that viviparity **DID NOT EVOLVE** in birds and turtles?



Q# 9) This question will assess your understanding of the evolution of bipedalism.

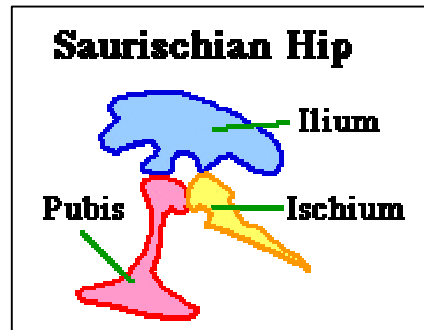
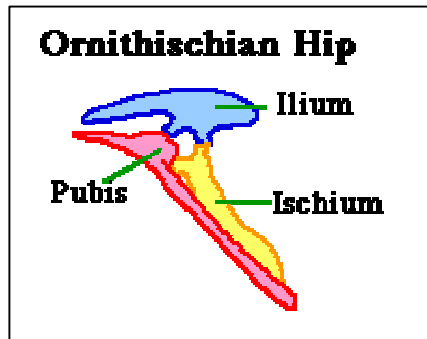
- a) Regarding the evolutionary origin of bipedalism: does bipedalism show convergence or divergence between humans and birds? Explain your choice and you must use the terms **homoplastic** and **homologous** correctly in your answer.

Q# 10) This question will assess your understanding of the evolution of bipedalism.

- a) List and briefly explain some of the **ADVANTAGES** and **DISADVANTAGES** of bipedalism.
ADVANTAGES –
DISADVANTAGES –



- b) Consider the diagrams of Saurischian and Ornithischian hip structure. In each of these, which way is toward the head of the animal? (draw an arrow **toward the head**)



- c) From which lineage did birds evolve?

Q# 11) This question will assess your understanding of the evolution of Pollination..

- Compare and contrast pollination between angiosperms and gymnosperms.
- Explain in general, what are the advantages and disadvantages pollination?

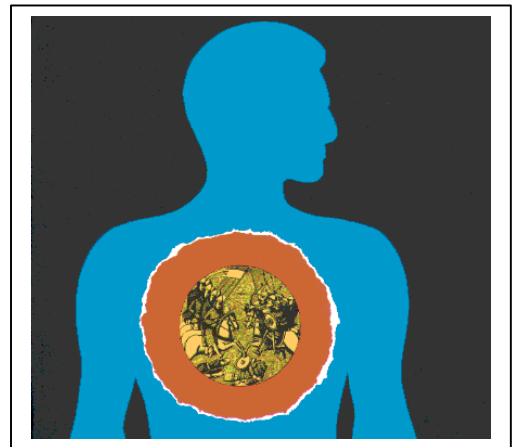


Q# 12) This question will assess your understanding of the evolution of Pollination.

Explain how coevolutionary mutualism has played an important role in the evolution of pollination by animals. Please use at least two specific examples from class.

Q# 13) This question will assess your understanding of the evolution of the immune system.

- What are the general characteristics and components of the human immune system? Please list and explain the major molecules, cell, organs, etc. In particular, describe what are the major functional differences between the T-cells and B-cells?
- What are cytokines and what role(s) do they play in immunity?

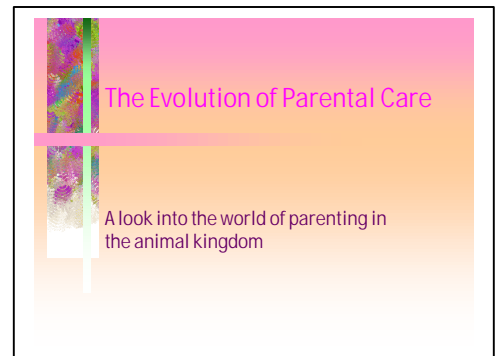


Q# 14) This question will assess your understanding of the evolution of the immune system.

- Briefly, how does the vertebrate immune system differ from the immune system found in invertebrates such as insects? To what extent are vertebrate and invertebrate immune systems homologous? Please explain.
- Briefly, how does the vertebrate immune system differ from the “immune system” found in plants? To what extent are vertebrate and plant “immune” systems homologous? Please explain.

Q# 15) This question will assess your understanding of the evolution of “parental care”.

- a) Please offer a brief definition of “parental care”.
- b) Please list and briefly explain three totally different examples of “parental care”:
- c) If an individual other than a parent cares for an offspring, is this an example of “parental care”? Please explain why or why not?



Q# 16) This question will assess your understanding of the evolution of “parental care”.

- a) In Masked boobies (*Sula dactylata*), the first hatched chick always kills the second chick at the time of its hatching. This act is called “obligate siblicide” and occurs while the parent passively watches but does nothing to stop it.

Given your knowledge of the evolution of parental care speculate on the evolutionary origin of siblicide. Why does the parent only care for its first offspring and do nothing to save its second offspring?

