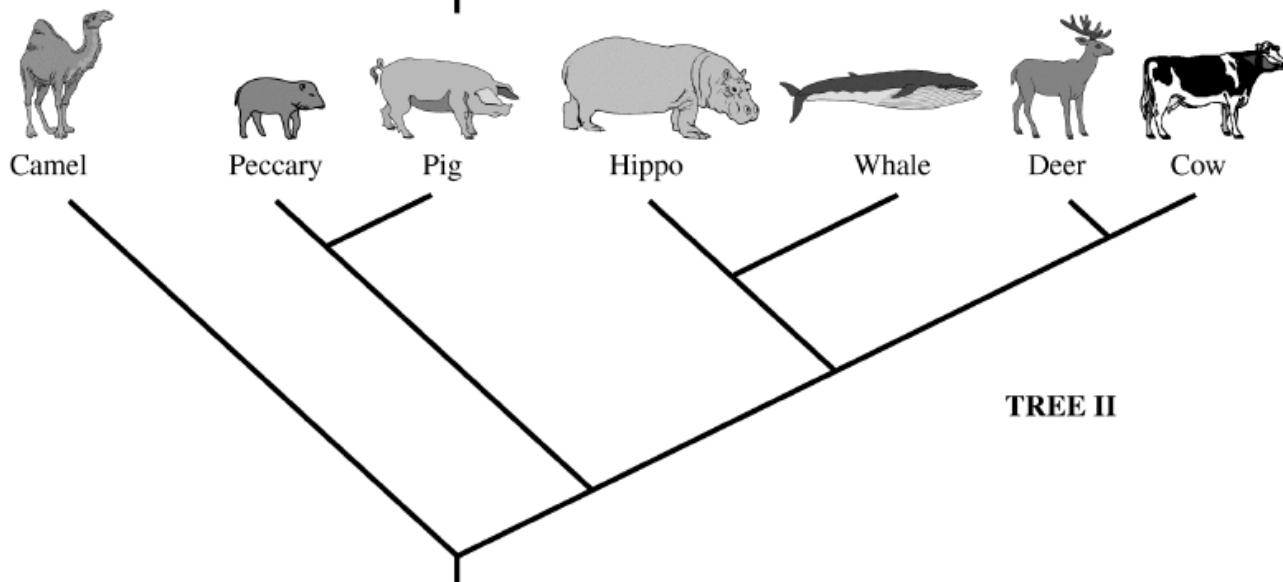
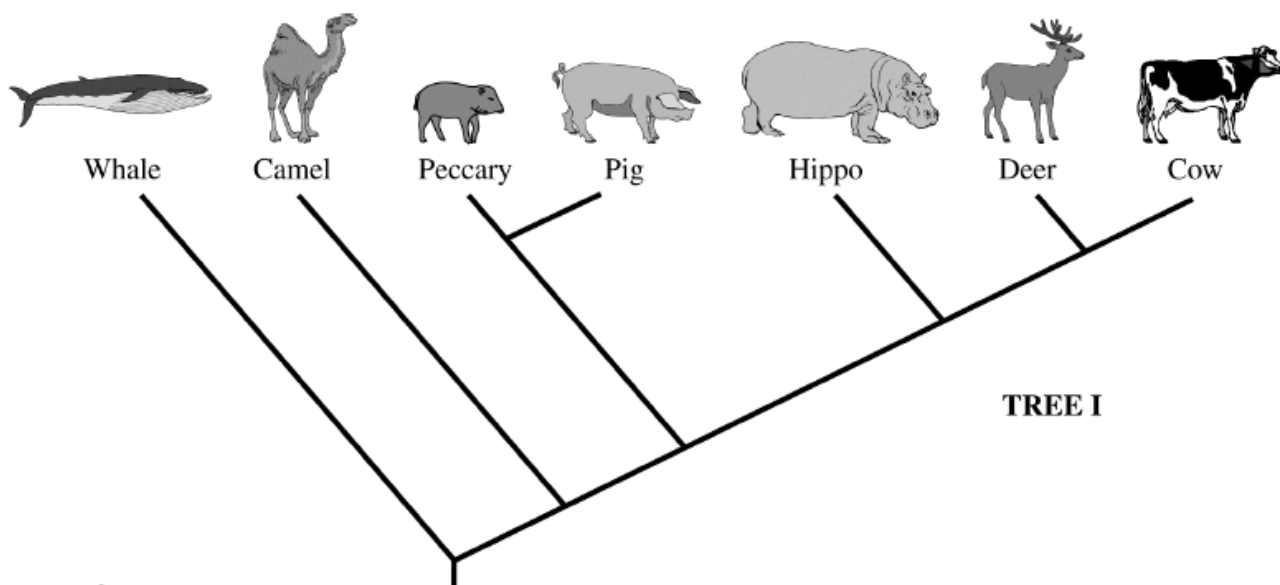


2011 AP[®] BIOLOGY FREE-RESPONSE QUESTIONS (Form B)

4. Phylogeny reflects the evolutionary history of organisms.

- (a) **Discuss TWO** mechanisms of speciation that lead to the development of separate species from a common ancestor.
- (b) **Explain THREE** methods that have been used to investigate the phylogeny of organisms. **Describe** a strength or weakness of each method.
- (c) The two phylogenetic trees represent the relationship of whales to six other mammals. All of the organisms shown have a pulley-shaped astragalus bone in the ankle except for the whale.
- For each tree, **describe** a monophyletic group, the closest relative to the whale, and the point at which the pulley astragalus was lost or gained.
 - Based on the principle of parsimony (the simplest explanation is the best) and the genomic information in the table shown, **identify** which tree is the best representation of the evolutionary relationship of these animals, and **justify** your answer.



2011 AP[®] BIOLOGY FREE-RESPONSE QUESTIONS (Form B)

DATA ON PRESENCE
OF SPECIFIC DNA SEQUENCES

+ sequence present

– sequence absent

? undetermined

| Locus | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| Cow | – | – | – | – | – | + | + | + | + | + | + | + | – |
| Deer | – | – | – | – | – | + | ? | + | + | + | + | + | – |
| Whale | + | + | + | + | + | – | ? | + | + | – | ? | + | – |
| Hippo | ? | – | + | + | + | – | + | + | + | – | ? | + | – |
| Pig | – | – | ? | – | – | – | ? | – | ? | – | – | + | + |
| Peccary | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | + |
| Camel | – | – | – | – | – | – | – | – | – | – | – | – | – |

END OF EXAM