

COMPARISON OF EVOLUTION MECHANISMS: SUMMARY

2.2.2: Describe the differences between two scientific articles, which give competing information or accounts.

2.3.3: Evaluate data, hypothesis, and/or conclusions in scientific literature when given competing information or accounts.

Lamarck’s Hypothesis: The Inheritance of Acquired Characteristics

1. A changing environment creates a need for certain features to be developed in order to survive. \*
2. “Acquired Characteristics”: Through use and/or non-use, those features needed for survival are developed in each individual.
3. Inheritance: Those characteristics developed (“acquired”) by individuals are somehow passed on to their offspring, who can continue that development...
4. New species: Eventually, over many generations, enough differences have developed that we can say we have a new species.

Darwin’s Hypothesis: Natural Selection

1. Overproduction: More offspring produced than will ultimately survive and reproduce
2. Variation: Inheritable features vary from individual to individual.
3. Change in environment: Changes in climate, topography, food supply, predators, etc.
4. “Struggle for existence”: Mainly competition within the species, for food, habitat, survival from being eaten
5. “Survival of the fit” (not necessarily the strongest): Those with more adaptive traits tend to survive longer and/or produce the most offspring; these are the “naturally selected”.
6. Inheritance of “selected” features: Traits involved are already inheritable, but may involve new combinations.
7. New species, better adapted to the new environment: When the collective traits of the population differ significantly from the earlier population, and can no longer reproduce with the earlier population.

QUICK COMPARISON

	<u>LAMARCK</u>	<u>DARWIN</u>
Effect of Environment?		
Variation of Traits?		
Inheritance of Traits?		
End Result?		

1. What differences exist between Lamarck’s theory and Darwin’s theory?
  
2. What are similarities between Lamarck’s theory and Darwin’s theory?

EVOLUTION MECHANISMS: COMPARISON SAMPLES

Consider the long legs of wading birds such as herons and egrets, birds that are common around rivers and marshes. How could such a bird evolve such long legs? Read the following scenarios and discuss each with your partner. Use the questions at the bottom to help in this discussion.

Assume that the species ancestral to these birds had short legs, and could only wade into very shallow water along the shoreline, eating snails and small fish.

SCENARIO A. A change in the environment increased competition between the birds, and resulted in a depletion of the food supply in the shallow waters. This created a need for the short-legged birds to wade into deeper water in order to survive, which forced them to stretch their legs, because they didn't want to get knocked over by the little waves. This stretching caused their legs to get a little longer.

When these birds produced chicks, the baby birds grew up with the slightly longer legs inherited from their parents. These offspring birds needed to wade out even further, so they stretched their legs even more, and made them a little bit longer yet. And their chicks grew up with even longer legs inherited from their parents. And so on...

Eventually, after many generations of this, the legs of the birds were so much longer than the ancestral birds that the new birds could be described as a new species.

SCENARIO B. Within the species of ancestral short-legged shore birds, there is a range of leg lengths, from a little bit shorter to a little bit longer than the average leg length, and these leg lengths tended to run in families (i.e., leg length was hereditary).

A change in the environment increased competition between the birds, depleting the food supply in the shallow waters. The birds with slightly longer legs, of course, could wade out a little farther. As a result, they got more food, lived a little longer, and therefore produced more chicks. Those with the shorter legs would tend to starve to death. Since the tendency for leg length was already inheritable, the surviving "long-leggers" tended to have more long-legged chicks, which likewise tended to get more food and produce more chicks. And so on...

Eventually, after many generations of this, the average leg length of these birds was so much longer than in the ancestral birds (along with other connected changes) that the new birds could be described as a new species.

DISCUSSION:

1. Summarize Darwin's hypothesis in one to two sentence(s).
2. Summarize Lamarck's hypothesis in one to two sentence(s).
3. Which scenario sounds like an explanation Darwin might give? Why?
4. Which scenario sounds like an explanation Lamarck might give? Why?
5. What are the specific clues that most clearly distinguish a Darwinian explanation from a Lamarckian explanation?
6. Which explanation is most likely correct based upon the evidence available to scientists? Support your answer with specific evidence.