

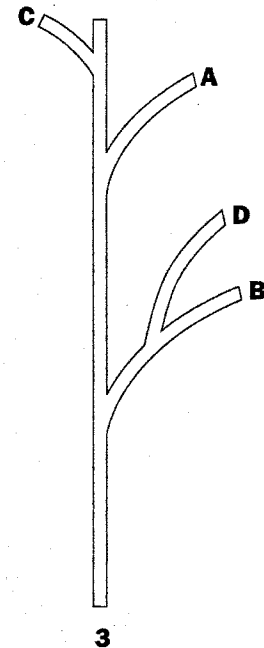
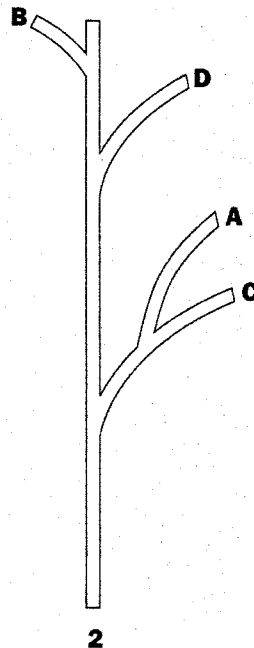
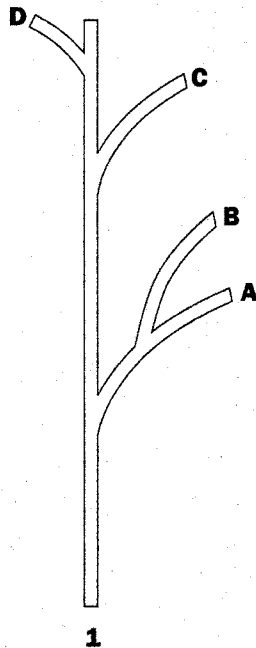
8 How Genes Work

Thinking Skills

How closely related are various species of living things? Evolutionary trees, such as the ones below, can provide clues. The branches of evolutionary trees show the evolutionary patterns of related species. The tree trunk represents time, with the top being the most recent point. The place where a branch splits off from the trunk or another branch indicates the time when a species evolved. The closer branches are to one another, the more closely related are the species.

Today, confirmation of such a tree's structure often comes from DNA analysis. The evolutionary trees below show three possible evolutionary relationships for species A, B, C, and D. Also below are the DNA nucleotide sequences that code for a type of protein found in each species. Your task is to determine which tree best represents the evolutionary relationship among the four species. Study the evolutionary trees and the DNA segments. Then respond to the following questions.

Hypothetical Evolutionary Trees



Nucleotide sequences of a type of protein found in each of the four species	
Species A:	ACTGTTGCTTGGACTGAAATCCGAGGGTTTACTGTACCGCCTAGGTTAGTTGAT
Species B:	ACTGTTGATTCCGACAGAAACCCGAGGCTTTACTGTACTGCCAAGGTTAGGTGAT
Species C:	ACTGTTGATTGGACTGAAATCCGAGGGTTTACTGTACTGCCTAGGTTAGTTGAT
Species D:	ACTGTTGATTCCGACTGAAATCCGGGGCTTTACTGTACTGCCAAGGTTAGGTGAT

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Critical Thinking

1. For the data to be relevant, what must you assume about the proteins? Explain your answer. _____

2. What must you look for in the DNA data to determine how closely the four species are related? _____

Analytical Thinking

3. Compare each nucleotide sequence with the others. How many nucleotides differ when you compare species A and B? A and C? A and D? B and C? B and D? C and D? _____

4. Which of the three evolutionary trees is most likely to represent the evolutionary relationship among the four species? Explain. Use a separate sheet of paper if you need more space. _____

