

Thought Lab 18.4: Recreating the First Chimera Answer Key

Answers to Analysis Questions

1. Your answer is completely dependent on the simulation that you planned. You should clearly demonstrate how the action of an endonuclease and ligase was illustrated in the simulation.
2.
 - a) Cohen and Boyer inserted an amphibian gene encoding rRNA into pSC101 (a bacterial plasmid). The plasmid contains a single site cleaved by the restriction endonuclease EcoRI; it also contains *tetr*, a gene which confers resistance to the antibiotic tetracycline. The rRNA-encoding gene was inserted in pSC101 by cleaving the amphibian DNA and the plasmid by EcoRI and allowing the complementary sequences to pair. There were two phenotypes produced:
 - Some of the bacterial cells immediately became resistant to tetracycline, indicating that they had incorporated the pSC101 plasmid with its antibiotic-resistant gene.
 - Some of these pSC101-containing bacteria also began to produce frog ribosomal RNA. Boyer concluded that the frog rRNA gene must have been inserted into the pSC101 plasmids in those bacteria. In other words, the two ends of the pSC101 plasmid, produced by cleavage with EcoRI, had joined to the two ends of a frog DNA fragment that contained the rRNA gene, also cleaved with EcoRI.
 3.
 - a) Scientists are using genetic engineering to produce hormones such as human insulin (to treat diabetes) or human growth hormone (to treat pituitary dwarfism). You may also refer to genetically modified foods, which may or may not be a benefit to society, depending on your personal point of view.
 - b) The following are some questions that you might raise:
 - What are the potential costs and dangers associated with genetic engineering?
 - Many people, including influential activists and members of the scientific community, have expressed concern that genetic engineers are “playing God” by tampering with genetic material.
 - For instance, what would happen if one fragmented the DNA of a cancer cell, and then incorporated the fragments at random into vectors that were propagated in bacterial cells? Would these cells transmit an infective form of cancer?
 - Could genetically engineered products administered to plants and animals turn out to be dangerous for consumers after several generations?
 - What kind of unforeseen impacts on the ecosystem might genetically “improved” crops have?
 - Is it ethical to create “genetically superior” organisms, including humans?