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| **Following the Big Ideas** | |
| **Big Idea 1** | The field of comparative genomics is yielding valuable insight into the relationships between species, impacting taxonomy and evolutionary biology |
| **Big Idea 3** | Genetic engineering allows beneficial changes to be made in DNA and RNA sequences, improving the products of the molecules. |

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| **Essential Questions** |
| * How can DNA analysis and genome comparisons allow us to better understand the evolution of species? * How can genetic engineering techniques be used to benefit human society? * How can the manipulation of DNA by humans affect the evolution of species, and what are the artificial, medical and social implications? |

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| **Vocabulary** | | |
| 1. Metogenomics 2. Bioinformatics 3. Proteomics | 1. Pseudogene 2. Receptive DNA 3. Transposable elements | 1. Copy and Paste transposon 2. Cut and paste transposon 3. Short tandem repeats |

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| **Chapter Outline and Reading Guide** | |
| **Section 1**   1. Craig Venter used an approach to genome sequencing termed the whole-genome shotgun approach. Explain how this concept can be used to sequence genomes. 2. How is metagenomics being used?   **Section 2**   1. Describe four important examples of information that is available through bioinformatics. 2. How might a human gene microarray chip be of medical importance?   **Section 3**   1. How do prokaryotic genomes of the two domains Bacteria and Archaea compare to eukaryotic genomes? 2. What relationship, if any, does a comparison of eukaryotic genomes indicate? Explain your response. 3. How are humans able to successfully compete in nature even though they have about the same number of genes as the nematode worm C. elegans? 4. What relationship does Chart 18.1 indicate for gene density comparisons between prokaryotes and eukaryotes? | **Section 4**   1. Retrotransposons move by means of an RNA intermediate. Explain how these common transposons accomplish this movement. 2. What is the role of reverse transcriptase? How might retroviruses be related to retrotransposons? 3. Transposons and retrotransposons comprise 20–50% of most mammalian genomes. What possible function might they have? 4. How is fetal hemoglobin different from adult hemoglobin? What is the selective advantage of these different β-globin genes?   **Section 5**  Summarize this section in your own words.  **Section 6**   1. What does it mean to say a gene is “highly conserved?” 2. What are SNPs and why are they important? 3. What is evo-devo, and how does it relate to understanding the evolution of genomes? 4. Explain what a homeobox is, and describe how it functions. 5. Homeoboxes are common to flies and mice. Given this similarity, explain why these animals are so different. |

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| **After You Have Read…** |

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