

Chapter 18: Genomes and Their Evolution***Concept 18.1 The Human Genome Project fostered development of faster, less expensive sequencing techniques***

1. How did the Human Genome Project result in more rapid, less expensive DNA sequencing technology?

Concept 18.2 Scientists use bioinformatics to analyze genomes and their functions

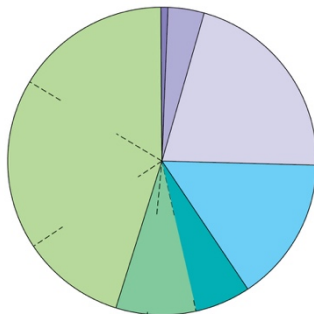
2. What is *bioinformatics*?
3. What is the goal of scientists who study *proteomics*?
4. How might a human gene microarray chip be of medical importance?

Concept 18.3 Genomes vary in size, number of genes, and gene density

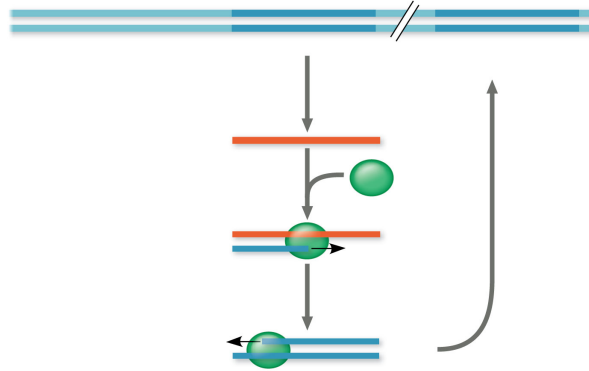
5. How do prokaryotic genomes of the two domains Bacteria and Archaea compare to eukaryotic genomes?
6. What relationship, if any, does a comparison of eukaryotic genome sizes, gene density, and number of genes indicate?

Concept 18.4 Multicellular eukaryotes have much noncoding DNA and many multigene families

7. Define the following terms:
 - a. *pseudogene*
 - b. *repetitive DNA*
8. What are *transposable elements*, and what percentage of our genome is made of them?
9. Using figure in your text as a guide, **label** the types of DNA sequences in the human genome and **give** their percentages.



10. What is the difference between a “copy and paste” transposon and a “cut and paste” transposon? Which enzyme is required by both mechanisms?
11. *Retrotransposons* move by means of an RNA intermediate. Use the figure in your text to **label** *DNA*, *RNA*, *reverse transcriptase*, *retrotransposon*, *new copy of retrotransposon*, and *insertion site*. **Explain** how these common transposons accomplish this movement.



12. What is the role of *reverse transcriptase*? How might retroviruses be related to retrotransposons?
13. What are *short tandem repeats (STRs)*? How is STR analysis being used in forensic science?
14. How do *multigene families* benefit an organism? Give an example of a human multigene family.

Concept 18.5 Duplication, rearrangement, and mutation of DNA contribute to genome evolution

15. Describe how the chromosome banding pattern may explain why there are different haploid chromosome numbers for humans ($n=23$) and chimpanzees ($n=24$).
16. Transposable elements contribute to genome evolution in several ways. Describe three.

Concept 18.6 Comparing genome sequences provides clues to evolution and development

17. When comparing genomes, we find the more _____ in sequence the genes and genomes of two species are, the more closely related those species are in their _____ history.
18. What does it mean to say that a gene is *highly conserved*?
19. What are *SNPs*?
20. What is *evo-devo*, and how does it relate to understanding the evolution of genomes?
21. Explain what a *homeobox* is, and describe how it functions.