

From DNA to Protein: Genotype to Phenotypes

1. Genes and the Synthesis of Polypeptides

- A. Some hereditary diseases feature defective enzymes
- B. The one-gene, one-polypeptide hypothesis

2. DNA, RNA, and the Flow of Information

- A. RNA differs from DNA
- B. Information flows in one direction when genes are expressed
- C. RNA viruses modify the central dogma

3. Transcription: DNA-Directed RNA Synthesis

- A. Initiation of transcription requires a promoter and an RNA polymerase
- B. RNA polymerases elongate the transcript
- C. Transcription terminates at particular base sequences

4. The Genetic Code

- A. The genetic code is degenerate but not ambiguous
- B. Biologists broke the genetic code by translating artificial messengers

5. The Key Players in Translation

- A. Transfer RNAs carry specific amino acids
- B. Activating enzymes link the right tRNAs and amino acids
- C. The ribosome is the staging area for translation

6. Translation: RNA-Directed Polypeptide Synthesis

- A. Translation begins with an initiation complex
- B. The polypeptide elongates from N terminus
- C. Elongation continues and the polypeptide grows
- D. A release factor terminates translation

7. Regulation of Translation

- A. Some antibiotics work by inhibiting translation
- B. Polysome formation increases the rate of protein synthesis
- C. A signal sequence leads a protein through the ER

8. Mutations: Heritable Changes in Genes

- A. Point mutations may be silent, missense, nonsense, or frame-shift
- B. Chromosomal mutations are extensive changes
- C. Some chemicals induce mutations and cancer
- D. Mutations are the raw material of evolution