Figure 2-6 Brock Biology of Microorganisms 11/e
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<table>
<thead>
<tr>
<th>Organism</th>
<th>Sequence</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CGUAGACCCUGAC</td>
<td>For A → B, three differences occur out of a total of twelve; thus $\frac{3}{12} = 0.25$</td>
</tr>
<tr>
<td>B</td>
<td>CCUAGACGUGGCG</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>CCAAGACGUGGCG</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>GCUAGAUGUGGCC</td>
<td></td>
</tr>
</tbody>
</table>

**Sequence alignment and analysis**
6. Evolution

Cells contain genes and evolve to display new biological properties. Phylogenetic trees show the evolutionary relationships between cells.
Figure 2-14 Brock Biology of Microorganisms 11/e
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Chemotrophy

Chemicals

Organic chemicals
(glucose, acetate, etc.)

Inorganic chemicals
(H₂, H₂S, Fe²⁺, NH₄⁺, etc.)

Chemoorganotrophs
(glucose + O₂ → CO₂ + H₂O)

Chemolithotrophs
(H₂ + O₂ → H₂O)

Phototrophs
(light → ATP)

ATP

ATP
Chemoorganotrophic metabolism

Carbon flow

Electron transport/Proton motive force

Anaerobic respiration

S$^0$, NO$_3^-$, SO$_4^{2-}$, Organic e$^-$ acceptors, O$_2$, Aerobic

ATP

Organic compound

Biosynthesis

CO$_2$
Energized membrane

ADP + Pi → ATP

Less energized membrane

Oxidative phosphorylation

Figure 5-13b  Brock Biology of Microorganisms 11/e
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Figure 11-5  Brock Biology of Microorganisms 11/e
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