**DNA Fingerprinting**

**Purpose:** To identify individuals and to show genetic relationships.

**Steps:**

1. Extract the DNA from cells:
   - Saliva (cheek cells)
   - Semen & Vaginal fluid
   - Blood (white blood cells)
   - Hair follicles (need the root)

2. Amplify (copy) your DNA sample using **PCR** (Polymerase Chain Reaction)
   - Highly variable regions of DNA are copied.

   \[
   \text{Variable region} \overset{\text{PCR}}{\rightarrow} \underbrace{\& \& \& \& \& \&} \times \text{millions}
   \]

3. Add a restriction enzyme to cut the DNA at a specific palindrome sequence:
   - Reads the same forward & backward

   Ex: Words: RACE CAR

   DNA: \[
   \begin{array}{c}
   \text{G} \quad A \quad A \quad T \quad T \quad C \\
   \text{C} \quad T \quad T \quad A \quad A \quad G
   \end{array}
   \]

   \[
   \begin{array}{c}
   \text{G} \quad T \quad T \quad A \quad A \quad G \\
   \text{C} \quad T \quad T \quad A \quad A \\
   \text{G} \quad A \quad A \quad T \quad T \quad C
   \end{array}
   \]
3. Continued... Different size fragments are created due to different base sequences in the variable DNA. Each DNA sample will have different locations where the restriction enzyme cuts.

**Ex:**

<table>
<thead>
<tr>
<th>Bill</th>
<th>Ted</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>E</td>
</tr>
</tbody>
</table>

4. Run the DNA fragments through gel electrophoresis to separate the fragments based on size. Larger fragments run slower than smaller ones.

5. Look for matches in fragments.
   - Exact match – their DNA
   - Some fragments – could be related