The blood found on the fence could belong to one of the suspects. Help the police in determining who was at the crime scene by conducting a DNA profiling experiment.
## Procedures

<table>
<thead>
<tr>
<th>Tube</th>
<th>DNA Source</th>
<th>DNA with Buffer</th>
<th>EcoRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Crime Scene</td>
<td>5 µl</td>
<td>5 µl</td>
</tr>
<tr>
<td>B</td>
<td>Metter Tiger</td>
<td>5 µl</td>
<td>5 µl</td>
</tr>
<tr>
<td>C</td>
<td>Cavalry Cavalier</td>
<td>5 µl</td>
<td>5 µl</td>
</tr>
<tr>
<td>D</td>
<td>Tattnall County Warrior</td>
<td>5 µl</td>
<td>5 µl</td>
</tr>
</tbody>
</table>

1) Add 5 µl of EcoRI to each tube.

2) Incubate at room temperature for 5-10 minutes.

3) While the tubes are incubating, place the agarose gel into the chamber and add enough 0.25X TAE to completely cover the gel.

4) After the incubation, add 5 µl 6X loading dye to each tube.

5) Load each sample into a well.

6) Run at 100 V for 30 minutes.

7) After 30 minutes, remove the gel and stain with 5X FastBlast solution for 5-10 minutes. Destain by placing the gel in tap water for 10-15 minutes.
Questions

1. What is a restriction enzyme?

3. The restriction enzyme *SmaI* recognizes the DNA sequence `CCCGGG` and cuts it into halves between the *C* and *G* bases (see below).

How many fragments would be produced if *SmaI* is used to cut the two DNA sequences below and what is the size of each fragment?

Sequence 1

5' ATGCTATCCC GGGTACCCGG GATTCCCTAAT 3'
3' TACGATAGGG CCCATGGGCC CTAAGGATTA 5'

Sequence 2

5' GCTCCCGGGC ATCGATCGAC ATCATGGCTC 3'
3' CGAGGGCCCG TAGCTAGCTG TAGTACCGAG 5'
Use the diagram below to illustrate how the two DNA sequences would look on an agarose gel if you cut each with *SmaI* and perform an electrophoresis.

![Diagram](image.png)

DNA size standards  |  Seq. 1  |  Seq. 2
--- | --- | ---
30 bp  |  |  |
20 bp  |  |  |
10 bp  |  |  |
Answers to Student Handouts

1) What is a restriction enzyme?
   A restriction enzyme is an enzyme that cuts DNA at specific recognition sites.

2) How many fragments would be produced if SmaI is used to cut the two DNA sequences below and what is the size of each fragment?
   Sequence 1: 3 fragments 10 base pairs, 8 base pairs, and 12 base pairs
   Sequence 2: 2 fragments 6 base pairs and 24 base pairs