

BIOTECH: DNA FINGERPRINTING

How can you see an individuals DNA Profile or 'Fingerprint'?

- ⦿ Special type of enzymes called Restriction Enzymes
 - Cut the DNA at specific locations
- ⦿ Cutting the DNA results in fragments
- ⦿ All fragments are not the same length
- ⦿ Everyone's DNA is different, so they cut at different locations, producing different size fragments

Restriction Enzymes are Specific!

- ⦿ E.g. *EcoR1* (a restriction enzyme) would only cut at the DNA sequence GAATTC
- ⦿ So, it would find that short sequence in the DNA and cut wherever it appeared

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5' ... C-C-T-A-G-C-G-A-A-T-T-C-G-T-C-T-T-A ... 3'
      : : : : : : : : : : : : : : : : : :
3' ... G-G-A-T-C-G-C-T-T-A-A-G-C-A-G-A-A-T ... 5'

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EcoRI

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5' ... C-C-T-A-G-C-G                                A-A-T-T-C-G-T-C-T-T-A ... 3'
      : : : : : : : :                               : : : : : : : :
3' ... G-G-A-T-C-G-C-T-T-A-A                                G-C-A-G-A-A-T ... 5'

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5' ... C-C-T-A-G-C-G A-A-T-T-C-G-T-C-T-T-A ... 3'
      : : : : : : : : : : : : : : : : : :
3' ... G-G-A-T-C-G-C-T-T-A-A G-C-A-G-A-A-T ... 5'

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So, we've made millions of copies of DNA...what now?

● VISUALIZE THE DNA PROFILE!!!

How??

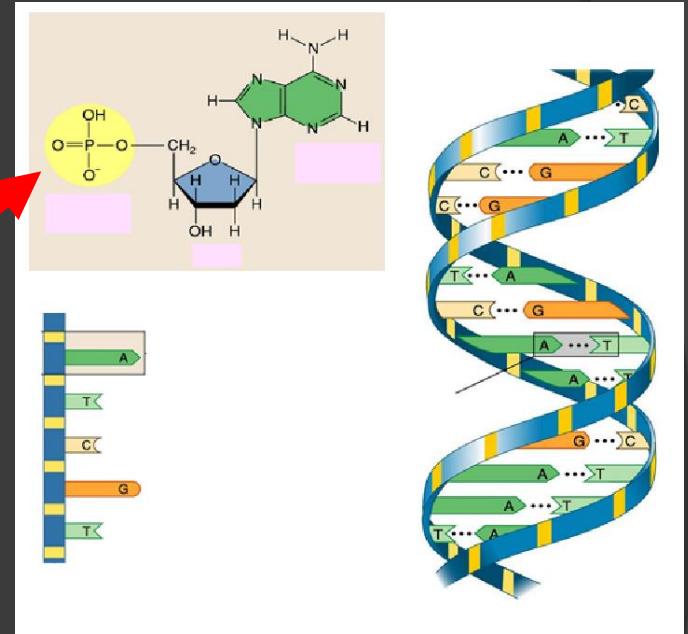
Electrophoresis

Electrophoresis

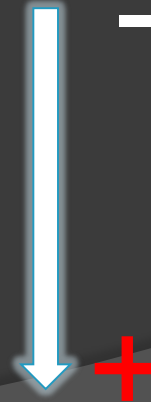
- ⦿ Charged molecules are driven through a solid matrix (gel) by an electrical current
 - “-” charged particles travel toward cathode (+)
 - “+” charged particles travel toward anode (-)
- Separation is based on molecular size (and shape)

Electrophoresis of DNA

- DNA is negatively charged due to the **phosphate groups in backbone** of the helix



- Will migrate toward **positive** electrode



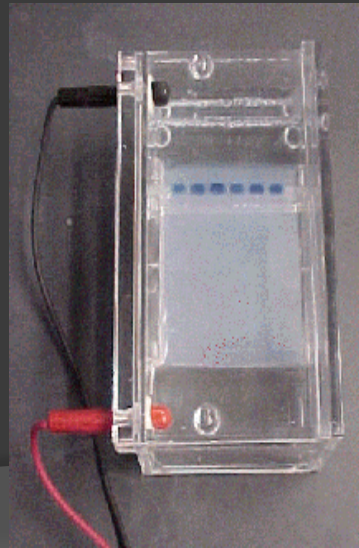
Electrophoresis of DNA

- Using agarose gels



Electrophoresis of DNA

- ⦿ Add “loading dye” to the samples
 - E.g. Bromophenol Blue
- ⦿ 3 purposes of loading dye:
 1. Helps sample sink into the wells
 2. Allows you to visualize the sample
 3. Tells you when to stop the current (dye front)



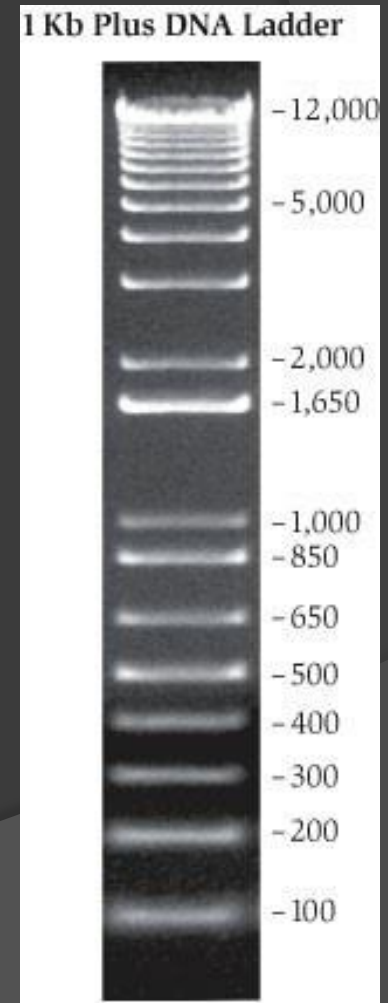
Visualizing DNA

- Stain the gels (DNA)
 - Use **Ethidium Bromide** - **Strong mutagen!**
 - Intercalates between basepairs in the DNA
 - fluoresces under UV light

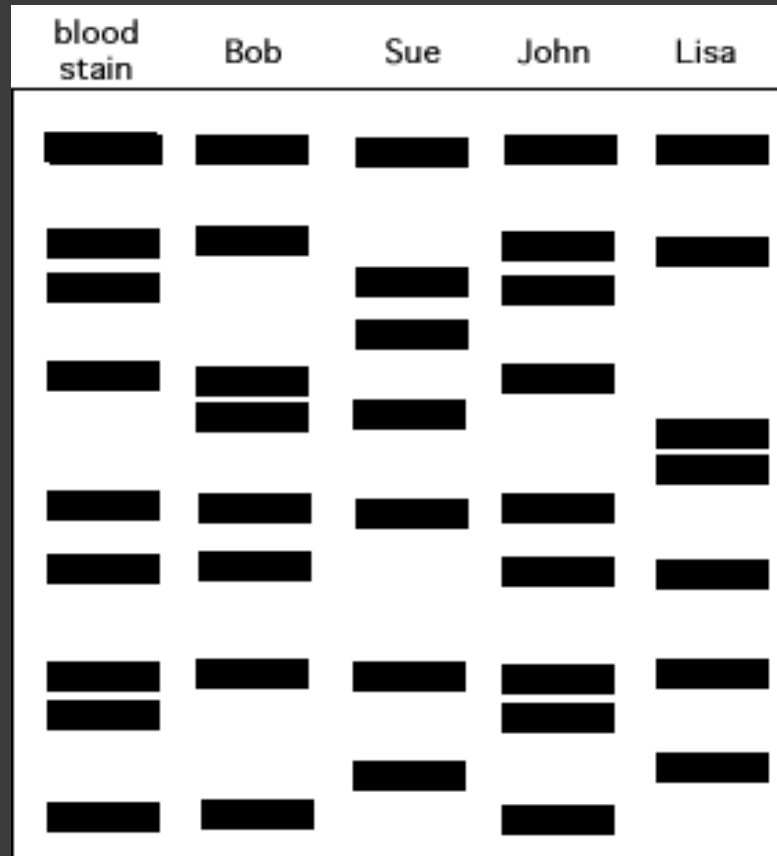


How do you tell sizes of fragments?

- Run a sample with fragments of known size
 - =Marker lane, Ladder etc.



DNA Fingerprint



Example Gel

- Restriction enzyme *BamH1* cuts at GGAATCC
- Individual #1 – GGAATCCGTAGG
- Individual #2 - AGCTACGGAATCCAG