

DNA Testing

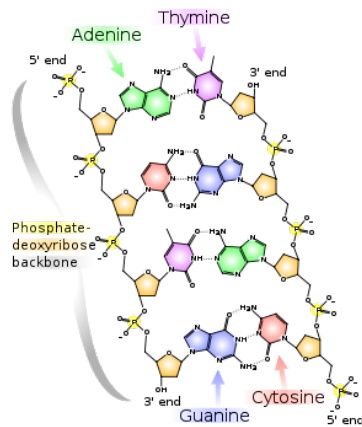
US275 Scientific Ethics
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The DNA molecule is a double helix.

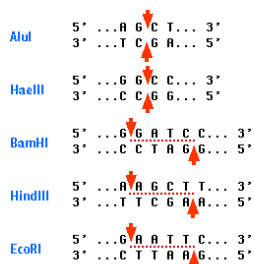
- “twisted ladder”
 - A bind to T
 - G bind to C
- information coded on the strand
 - in the sequence of
 - A’s, T’s, G’s, and C’s



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Restriction enzymes

- natural defense mechanism for bacteria
 - cut up foreign DNA to prevent infection
- cut DNA at specific sites
 - each recognizes a specific DNA sequence

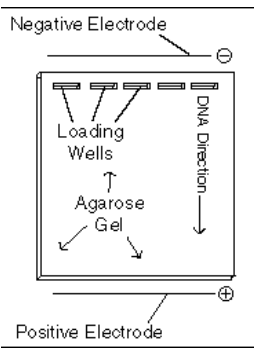


AluI and HaeIII produce blunt ends
BamHI HindIII and EcoRI produce “sticky” ends

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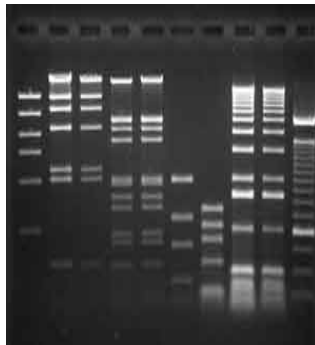
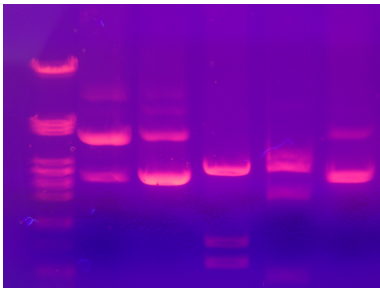
Gel Electrophoresis

- fragments move through a porous gel
- separate pieces by size
 - large pieces move slowly
 - small pieces move faster



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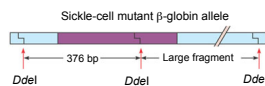
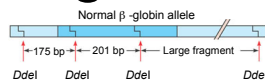
Stains are used to see DNA



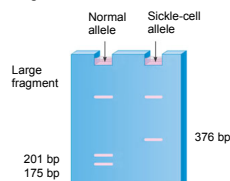
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Each individual has a unique pattern of DNA fragments.

- Restriction Fragment Length Polymorphism (RFLP)
 - differences in fragment sizes
 - often used as a marker to identify a nearby allele.



a) *Ddel* restriction sites in normal and sickle-cell alleles of β -globin gene.



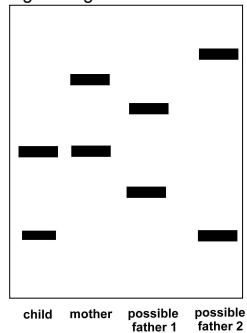
b) Electrophoresis of restriction fragments from normal and sickle-cell alleles.

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RFLP patterns can be used to determine paternity.

- different banding pattern (size) of DNA in each individual.
- size of fragments of parent will be inherited by the child

Agarose gel results:

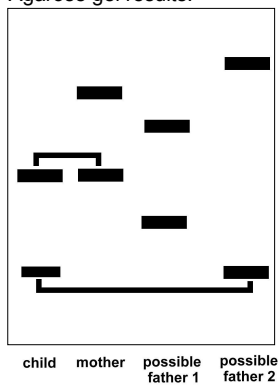


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RFLP patterns can be used to determine paternity (cont).

- Look for shared bands between parents and child

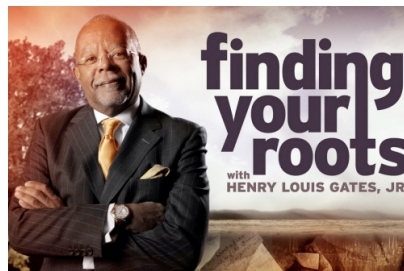
Agarose gel results:



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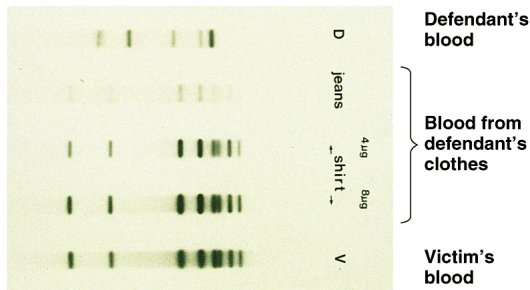
Similar DNA techniques can be used to trace ancestry.

- Genealogy
 - study of families
 - tracing a family's lineages and history



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Forensic DNA testing can help identify individuals

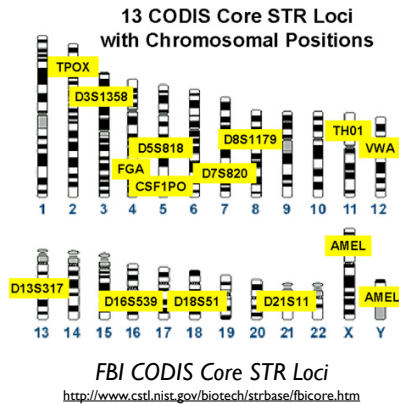


- DNA Fingerprinting
 - based on RFLP pattern
 - and statistics

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Short tandem repeats are used for forensic analysis.

- short segments of DNA with many polymorphisms
- FBI using 13 different loci (locations)
- probability of two people having the same 13-loci profile is 1 in 1 billion
 - unless identical twins



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The Combined DNA Index System (CODIS) is a criminal justice DNA database.

- National, state, and local forensic laboratory profiles of
 - convicted offender
 - arrestee profiles
 - unsolved crimes



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CODIS is used to find matches between crime scene evidence and perpetrators.

- Profile of DNA collected as evidence prepared
- evidence profile submitted to data base query
- database identifies potential match
- potential match is confirmed



<https://static.dna.gov/letraining/beg/images/dna/dna-5-5.jpg>
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Assignment

Assignment

When should information in a genetic census be used?

In your discussion group:

Discuss the following statement with your group: Assume for the sake of argument that a genetic census is completed and a national data base is created. Under what circumstances, if any, should the information be used? Does it matter if the databank is searched to identify a match for a bone marrow or blood transfusion, to identify potential donors for an organ transplant, or to identify the perpetrator of a violent crime?

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Readings

DNA Forensics (2009). Human Genome Project Information.

http://www.ornl.gov/sci/techresources/Human_Genome/elsi/forensics.shtml#technologies

About Forensic DNA. DNA Initiative: Advancing criminal justice through DNA technology.

<http://www.dna.gov/basics/>



Woman Reading
Pablo Picasso, 1932

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Any Questions?

Email me at:
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<http://www.vippitbullkennels.com/images/animated-question-mark.gif>