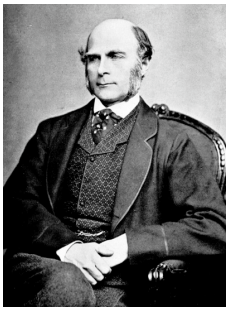
Outline

Eugenics

Forensics

History of Eugenics



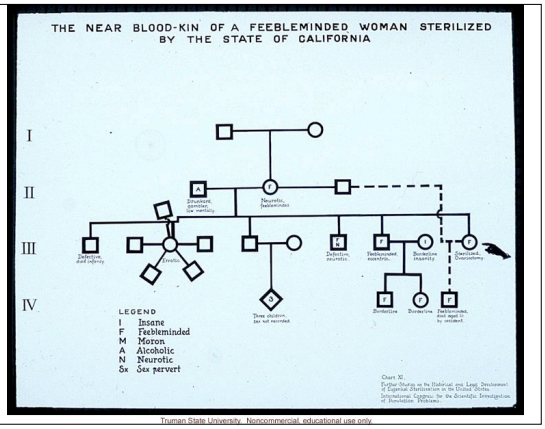
Started in England by Sir Francis Galton

"the more suitable races or strains of blood a better chance of prevailing speedily over the less suitable."

History of Eugenics

Charles Davenport started the Eugenics Records Office; directed by Harry Laughlin 1910-1939

In 1910, Davenport published *Eugenics: The Science of Human Improvement though Better Breeding*



History of Eugenics

In Congress, Laughlin testified that Southern and Eastern Europeans inferior to Northern Europeans. Led to National Origins Act (Immigration Act of 1924) that restricted immigration

By 1935, 30 states had eugenic sterilization laws
21,000 people had been sterilized
50% in California

Mental patients and epileptics could be sterilized

1942 Supreme Court struck down law allowing forced sterilizations of criminals.

Some sterilizations continued into the 1970s

History of Eugenics

2002 Virginia Governor apologizes for the Buck vs Bell case

"The eugenics movement was a shameful effort in which state government never should have been involved."

Mark Warner

History of Eugenics

Science behind eugenics discredited by 30s

Eugenics Records Office closed in 1939

1927 Rockefeller Foundation provides funds for Kaiser Wilhelm Institute of Anthropology, Human Genetics, and Eugenics

Directed by Eugen Fischer, author of *Principles of Human Heredity and Race Hygiene*

History of Eugenics

1933 Hitler charged the medical profession with the task of implementing a national program of race hygiene.

Passage of an act permitting sterilization of feebleminded, mentally ill, epileptics, and alcoholics.

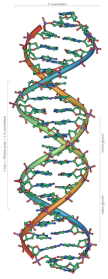
Within a year, more than 50,000 sterilizations were ordered.

1939 400,000 people had been sterilized.

"If they [eugenicists] want to do this sort of thing, well and good...but I think it is just as well for some of us to set a better standard, and not appear as participators in the show. I have no desire to make any fuss."
Thomas Hunt Morgan, 1915

"People keep asking me why I do not rebut *The Bell Curve*. The answer is because it is so stupid, it is not rebuttable."
David Botstein, 1997

DNA Forensics



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

How does it work?

99.9% of DNA sequences identical among individuals.

Look at sequences that differ.

Isolate DNA

From suspect: cheek swab

From crime scene

What type of analysis is used?

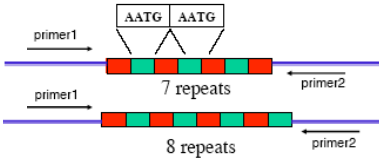
PCR is the basis for most current analysis Because it is so sensitive!!!!

PCR can be used to detect:

Single Nucleotide Polymorphisms (SNPs)
Difference detected by DNA sequencing

Short Tandem Repeats (STRs)
Differences detected by observing the sizes of the PCR products.

Short Tandem Repeats (STRs)



the repeat region is variable between samples while the flanking regions where PCR primers bind are constant

Homozygote = both alleles are the same length
Heterozygote = alleles differ and can be resolved from one another

Primer positions define PCR product size

How do we calculate probabilities?

We have a DNA sample from a crime scene, and it matches the suspect's DNA for a single STR. What is the likelihood of this happening by chance?

Let's say that there are 7-44 repeats at this STR locus or 38 possible alleles.

Both the DNA sample and the suspect have 22 and 31 repeats at this locus. In other words, one chromosome has 22 copies of the repeat; the other 31.

If we spin the roulette wheel twice, the probability of getting a 22 and a 31 is:
2 x 1/38 x 1/38 = 1/722

How do we calculate probabilities?

The chance of obtaining this DNA profile if the DNA in the forensic sample came from an individual other than the defendant is 1 in a 722.

If there was a second STR locus with a match, and it also contained 38 alleles, the likelihood of this happening by chance is 1/722 x 1/722 = 1/521,284

With more STR loci, we can be more confident that we have the right person. The lack of a match means the suspect cannot be the person that left the DNA sample.

Qualifiers

Not all alleles have an equal probability, so the frequencies of each allele is estimated by measuring its frequency in a sample of the population.

Different groups will have different allele frequencies.

CODIS: forensic science and computer technology

CODIS began as a pilot project in 1990 serving 14 state and local laboratories

The DNA Identification Act of 1994 formalized the FBI's authority to establish a national DNA index for law enforcement

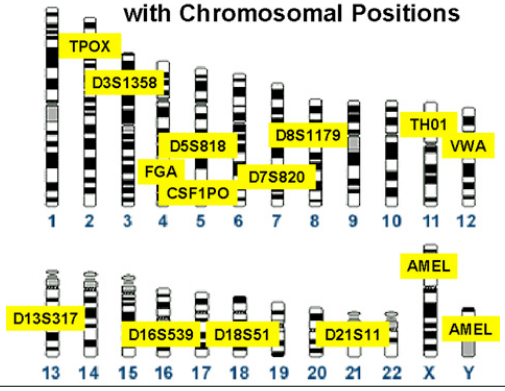
The National DNA Index System (NDIS) became operational in 1998

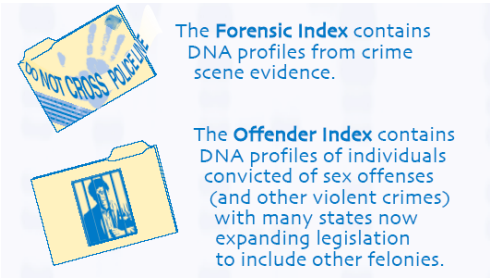
CODIS is used for

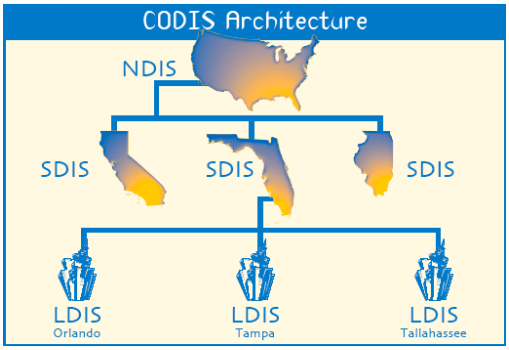
Identification of criminals

Identification of family members

Identification in certain fatality cases

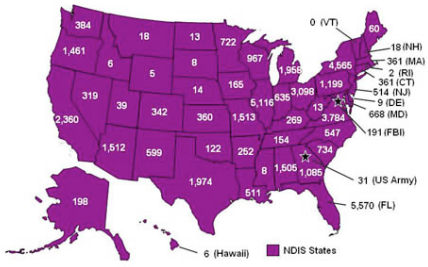






Through February 2007
46,325 (80,948 through 2008) Investigations Aided in 49 States and 2 Federal Laboratories.

"Investigations Aided" is a metric that tracks the number of criminal investigations where CODIS has added value to the investigative process.



California

Statistical Information	Total
Offender Profiles	1,102,554
Forensic Samples	19,626
Number of CODIS Labs	20
Investigations Aided	7,557

Clark McMillan

Year of Incident: 1979

Jurisdiction: TN

Charge: Rape, Robbery

Conviction: Aggravated Rape, Robbery With A Deadly Weapon

Sentence: 119 Years

Year of Conviction: 1980

Year of Exoneration: 2002

Sentence Served: 22 Years

Real perpetrator found? Yes

Contributing Causes: Eyewitness Misidentification

http://www.innocenceproject.org/