

Forensic DNA Analysis: The Real *CSI*

Susan Hart Johns

Television



How ~~Who~~ Dunit?

- Popular TV series created by Anthony Zucker
- Chronicles the investigations of a team of Las Vegas forensic scientists
- Focuses on how the crime is solved rather than who did it
- Advice
 - The show will not be successful
 - Crime lab work and chemists are far too dull to be interesting

Laboratory Staff: TV



Specialties

- | | |
|---------------------|-----------------|
| ■ Gil Grissom | Entomology |
| ■ Catherine Willows | Blood Spatter |
| ■ Warrick Brown | Ballistics |
| ■ Nick Stokes | Trace |
| ■ Sara Sidle | Materials/Trace |

CSI Effect

- War of the Worlds effect
 - October 30, 1938
 - Confusion about what is fiction
- Increased expectations for public, juries
- Forensic identity confusion
 - Criminalistics and forensic science
 - Criminology (a branch of sociology)

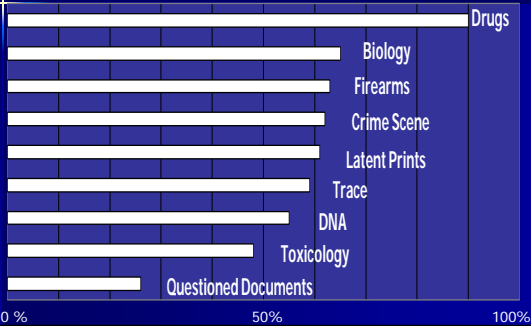
Reality

- 351 publicly funded labs
 - 203 state labs
 - 65 county labs
 - 50 municipal labs
 - 33 federal labs
- 5,800 scientific personnel employed
- 1900 additional personnel needed

Typical Laboratory

- Personnel
 - 12 analysts
 - 4 support
 - 2 managers
- Case load
 - Receives 4900 requests/completes 4600
- Accredited (71%)
- Resources dedicated to training (52%)
- Resources dedicated to research (12%)

Services Offered



Crime Scene Investigations

- 62% of CSIs are not part of the laboratory
- 14% of CSIs have offices in the laboratory
- 25% of laboratory analysts are also assigned to process crime scenes

Biological Evidence

- 1983
 - 15 year old school girl was raped and murdered
 - Body fluids taken from the body were tested
 - Blood typing (ABO)
 - Enzyme/protein markers
 - 10% of the adult male population not eliminated
- 1986
 - Another 15 year old girl was raped and murdered
 - Body fluids recovered from the body had the same blood type as the 1983 murder

DNA Testing

- Prime suspect confessed to the second murder – but denied the first
- Alec Jeffreys conducts DNA testing
- Links the two crimes
- Eliminates the suspect
- Differential extraction key to isolating DNA from evidence sample

Mass Screening

- All adult males in the areas (5,000) were asked to volunteer a blood or saliva sample
- Forensic Science Service analyzed samples
- No suspect identified

*"Three may keep a Secret
if two of them are dead."*

Benjamin Franklin

Colin Pitchfork

- Convinced a friend to give a sample
- Friend was overheard in a pub talking about giving the sample
- Pitchfork arrested
- Sample matched evidence
- Pitchfork no longer making a living as a baker



DNA Firsts

- First suspect eliminated
- First mass screening (5,000 men) foreshadows DNA database
- First use of DNA in a conviction (1988)

Current DNA Testing

- Based on DNA amplification of Short Tandem Repeats (STRs)
- Mitochondrial DNA testing for single source samples
- Y chromosome testing for male/female mixtures

www.DNA.gov

- State by State information
 - Funding
 - Legislation
 - Media Reports
 - Success Stories



DNA R&D

- Field applications
- Reduce time, cost and labor (faster, better cheaper)
 - Robotics
 - Expert Systems
 - Automated sperm searches
 - Improve separation techniques
- Improve the success rate on small and/or damaged evidence
 - DNA repair
 - SNPs
- Identify new genetic markers