Baton Rouge Serial Home Invasions and Use of Forensic DNA

Joanie Brocato, Ph.D., MT (ASCP)
LSU Health NEW ORLEANS
School of Allied Health Professions

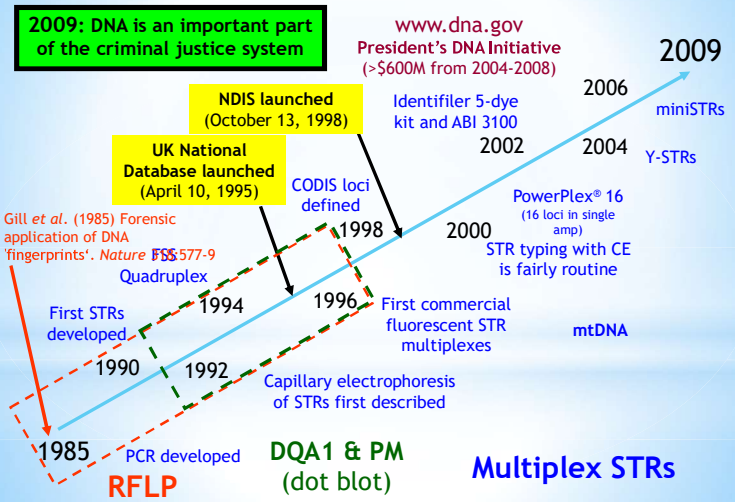
www.strbase.com

Methods for Human Identification

Fingerprints have been used since 1901

DNA since 1986

Historical Perspective on DNA Typing



Basis of DNA Profiling

The genome of **each individual is unique** (with the exception of identical twins) and **is inherited from parents**

Probe subsets of genetic variation in order to differentiate between individuals (statistical probabilities of a random match are used)

DNA typing must be **performed efficiently and reproducibly** (information must hold up in court)

Current standard DNA tests **DO NOT look at genes** - little/no information about race, predisposal to disease, or phenotypical information (eye color, height, hair color) is obtained

Human Identity Testing

- Forensic cases -- **matching suspect with evidence**
- Paternity testing -- **identifying father**
- Mass disasters -- **putting pieces back together**
- Historical investigations
- Missing persons investigations
- Military DNA "dog tag"
- DNA databases

Involves generation of DNA profiles usually with the same core STR (short tandem repeat) markers

Some Basic Principles of DNA

DNA = **D**eoxyribo-**N**ucleic **A**cid

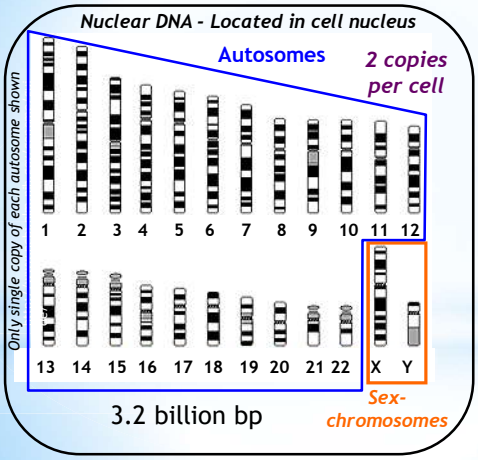
- It is in almost every cell of our bodies
- Found in a long strand, like a piece of rope
- Made up of a simple alphabet containing four letters: A, T, C, G
- The order of these letters is what makes everyone different
- Over 99% of human DNA is the same from person-to-person

Forensic DNA Review

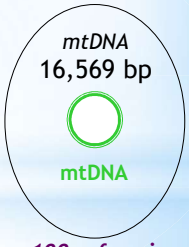
Forensics

- Analyzes biological material found at a crime scene or associated with a criminal investigation
- Analyst compares potential suspects and/or victims as the source of the biological material

The Human Genome

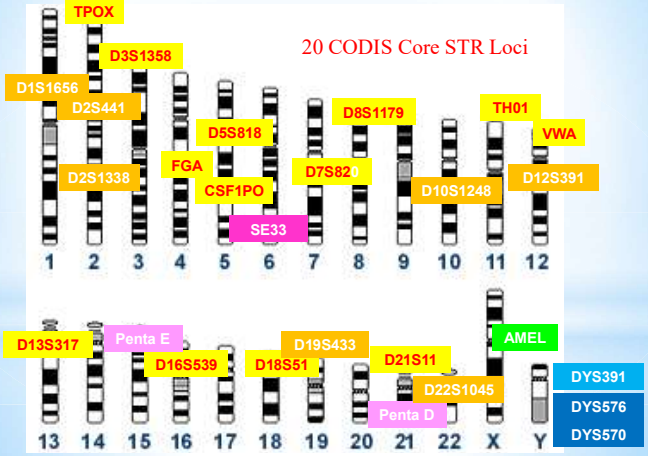


Located in mitochondria (multiple copies in cell cytoplasm)



100s of copies per cell

Forensic STR Markers on Chromosomes (Now testing 23 markers)



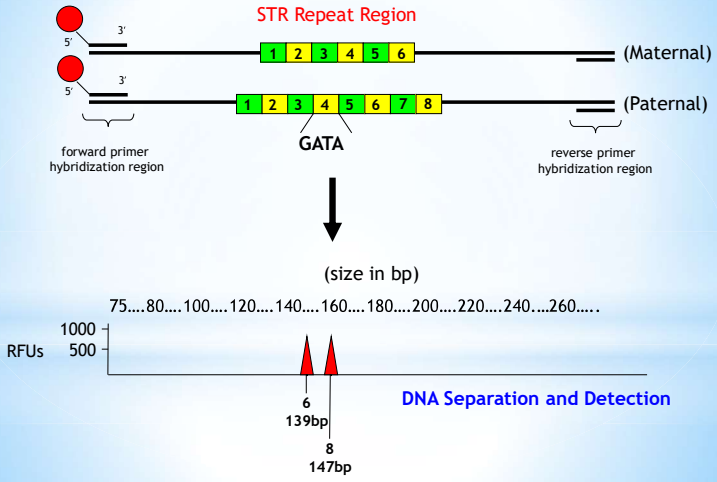
Short Tandem Repeats (STRs)

- Short tandem repeats (STRs) describe regions of DNA where DNA sequences are repeated over and over
- STRs are much easier to analyze because they are small and easy to amplify using PCR
- STR analysis can be automated
- Degraded DNA can to some extent be amplified (good for mass disasters)
- Several loci containing STRs can be analyzed at the same time (Multiplex kits)

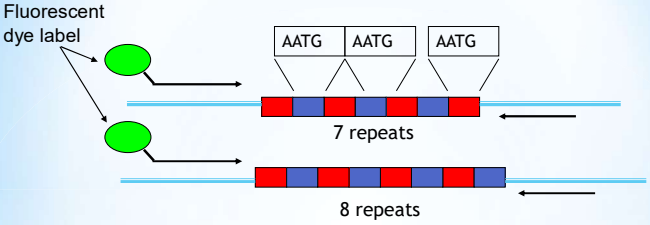
http://www.healforce.com/en/index.php?ac=article&at=read&did=439

Fluorescent dye-labeled primer

Short Tandem Repeat (STR) Typing



Short Tandem Repeats (STRs)



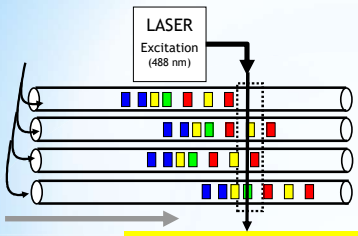
the repeat region is variable between samples while the flanking regions where PCR primers bind are constant

Homozygote = both alleles are the same length

Heterozygote = alleles differ and can be resolved from one another

Primer positions define PCR product size

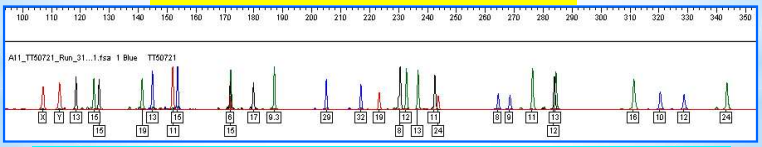
* A DNA Profile is Produced by Separating DNA Molecules by Size and Dye Color



The labeled fragments are separated (based on size) and detected on a gel or capillary electrophoresis instrument

~2 hours or less

Fragment size ranges from 100 - 350 base pairs



Peaks represent labeled DNA fragments separated by electrophoresis
This 'profile of peaks' is unique for an individual - a DNA type

Advantages for STR Markers

*Small product sizes are generally **compatible with degraded DNA** and PCR enables recovery of information from **small amounts of material**

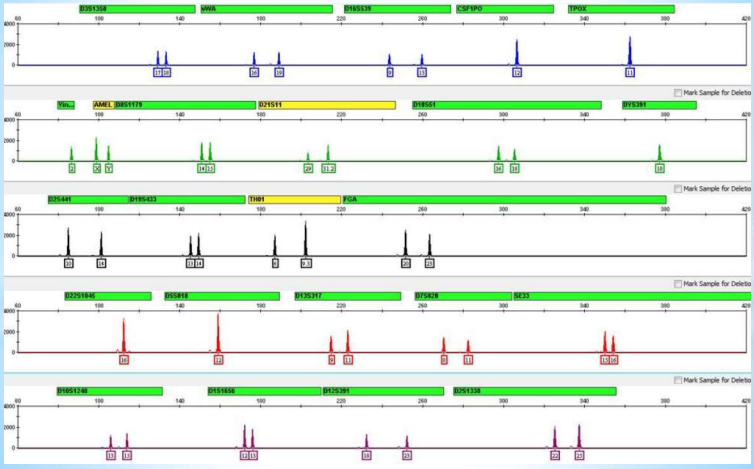
*Numerous alleles per locus aid **mixture interpretation**

*Multiplex amplification with fluorescence detection enables **high power of discrimination** in a single test

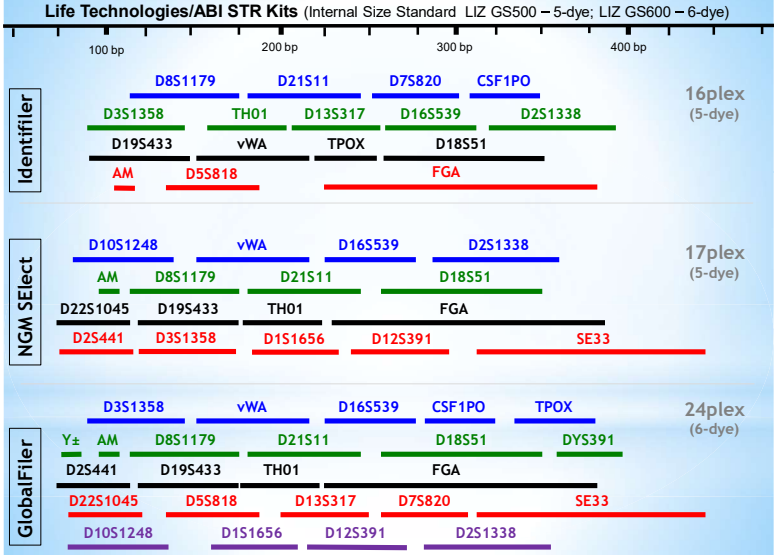
*Commercially available in an **easy to use kit format**

*Uniform set of **core STR loci** provide capability for national (and international) sharing of criminal DNA profiles

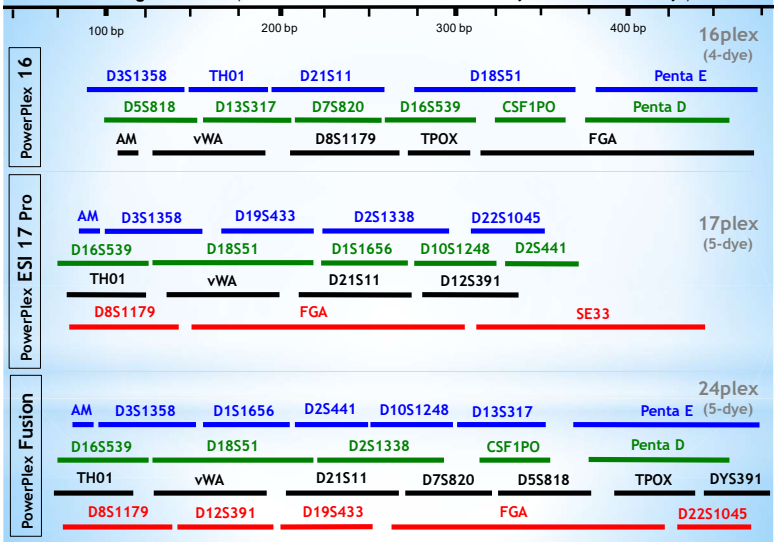
Typical DNA Profile



Life Technologies/ABI STR Kits (Internal Size Standard LIZ GS500 – 5-dye; LIZ GS600 – 6-dye)



Promega STR Kits (Internal Size Standard CXR ILS600 – 4-dye; CXR ILS 550 – 5-dye)



DNA Testing Requires a Reference Sample

A DNA profile by itself is fairly useless because it has no context…

DNA analysis for identity only works by comparison - **you need a reference sample**

Crime Scene Evidence compared to **Suspect(s)** (Forensic Case)
Child compared to **Alleged Father** (Paternity Case)
Victim's Remains compared to **Biological Relative** (Mass Disaster ID)
Soldier's Remains compared to **Direct Reference Sample** (Armed Forces ID)

The Three Possible Outcomes of Evidence Examination

	"Suspect" Known (K) Sample	"Evidence" Question (Q) Sample
* **Exclusion** (no match)	11 12	13
* **Non-exclusion** * "Match" or "inclusion"	11 12	11 12
* **Inconclusive result**	11 12	No result (or a complex mixture)

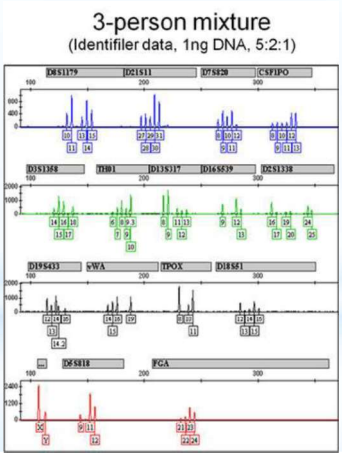
Compare Evidence Profile to Reference Profiles

STR	Evidence	Reference
D3S1358	14,15	14,15
vWA	16,17	16,17
FGA	22,23	22,23
Amelogenin	XY	XY
D8S1179	14,15	14,15
D21S11	28,30	28,30
D18S51	16,18	16,18
D5S818	10,12	10,12
D13S317	12	12
D7S820	10	10
D16S539	11,13	11,13
THO1	7	7
TPOX	8,9	8,9
CSF1PO	9,11	9,11

MATCH!

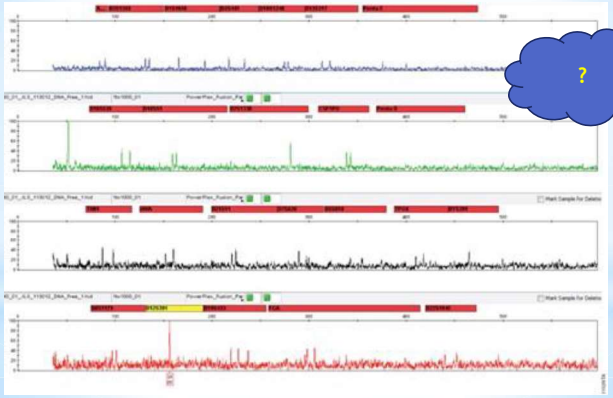
Because Far more Complex with Mixtures

3-person mixture
(Identifiler data, 1ng DNA, 5:2:1)



?

And with Low Levels



?

Forensic DNA Review

- CODIS
  - Combined DNA Index System (CODIS)
  - Combines computer and DNA technologies into a powerful tool to generate investigative leads
  - Used for linking serial crimes and unsolved cases with repeat offenders

CODIS
COmbined DNA Index System

* Database containing DNA profiles from known (references) and unknown (evidence) samples
* Can make case to case connections
* Managed by the Local, State Administrators and the FBI
* Regulated by the FBI
* Match unknown DNA profiles to known DNA profiles
* Generate investigational leads
* Provide support to law enforcement

How Searches are Conducted:

*Locally
*Statewide
*Nationally

What does the CODIS Unit Do?

*Samples are collected from
- Persons arrested and/or convicted of all felony crimes
- Persons arrested and/or convicted of certain Misdemeanors

*Samples are accessioned & processed
*Profiles are uploaded into CODIS
*Searches take place daily at state level & twice a week at the national level
*Confirm CODIS hits (matches)
*Release CODIS hit information

Size of the CODIS Database

Number of Samples @ SDIS

- Convicted Offenders – 154,090
- Arrestees – 430,351
- Forensic Profiles – 19,644
- Louisiana Investigations Aided - 10,429

Number of Samples @ NDIS

- Convicted Offenders – > 14 million
- Arrestees – > 3.99 million
- Forensic Profiles – > 1 million
- CODIS Hits - ~ 514,982

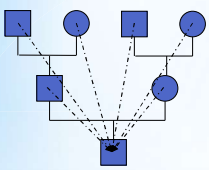
Almost 20 million profiles in the CODIS Database

Makes for a VERY Powerful Investigative Tool!!

Different Types of DNA used in Forensic and Inheritance Patterns

Autosomal Markers

13 CODIS STR Loci

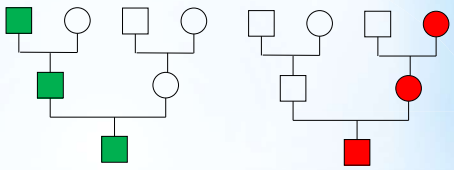


22 pairs of autosomes (passed on in part, from all ancestors)

Lineage Markers

12 or 17 Y-STRs

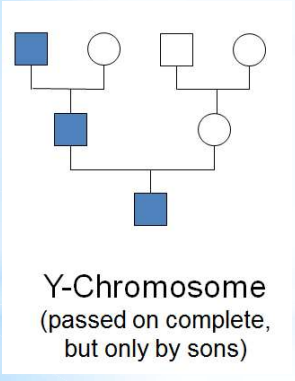
mtDNA control region



Y-Chromosome (passed on complete, but only by sons)

Mitochondrial (passed on complete, but only by daughters)

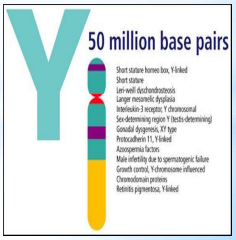
Y-STR Hierarchy



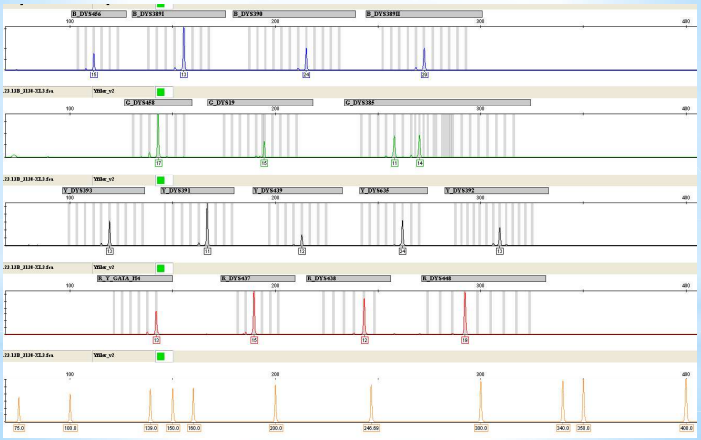
Y-Chromosome (passed on complete, but only by sons)

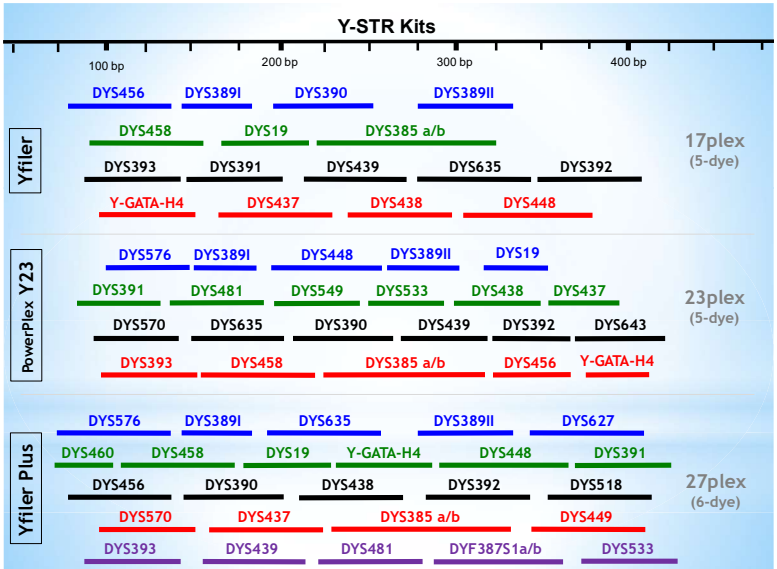
Y-STR passed from father to son as a haplotype (group of genes inherited together from a single parent)

Limitations: unable to differentiate between males within a family as they will have the same Y profile



Y-STR Profile





Uses of Y-STR Analysis

* May be useful in cases where autosomal STR data is limited, i.e., mixtures with high female DNA but low male DNA
* Y-STR profile not specific to individual, but to paternal lineage – can narrow down to a family group
* Need a Suspect Reference to make comparison – No Y CODIS database

No Suspect DNA Cases

* These cases rely on victim testimony (memory) under duress, thus the most prone to wrongful conviction
* These cases have suspect DNA present a substantial proportion of the time (seminal fluid)
* These cases make use of available tools in the forensic DNA arsenal (crime scene DNA, Y STR, DNA databases)
* No suspect cases are virtually unsolvable prior to the age of forensic DNA

Sexual Assault Victims

* 366,460 sexual assaults are reported per year in the U.S. (1992-2000 average)
* That is 1000 per day, 42 per hour, or one sexual assault reported every 86 seconds
* Only 1/3 to 1/20 of sexual assaults are reported to police; therefore, this number is very conservative

Sexual Assaults by Strangers

* 34% of sexual assaults are committed by a stranger (termed a “no suspect” sexual assault, therefore these cases are normally unsolved without DNA)
* Both puzzle pieces of crime scene and database DNA working together
* These are the cases where forensic DNA really shines

Solving Cases

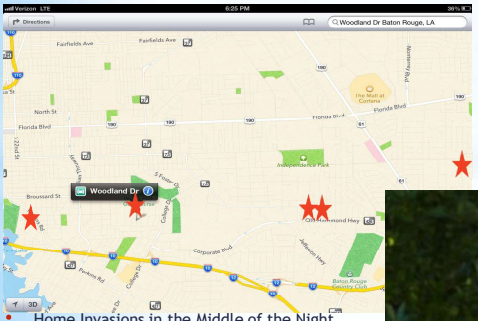
* What level of success can we expect when we put the puzzle pieces of crime scene DNA together with a DNA database?

* 42% DNA database success rate
  * % of cases where a hit is made to a known offender
* 69% if case to case hits are included

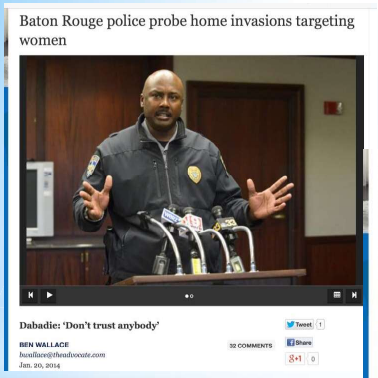
(Forensic Science Service - Britain)

Ray Wickenheiser (AAFS 2004 talk) The Business Case for Using Forensic DNA Technology to Solve and Prevent Cr

Baton Rouge Serial Home Invasions 2013 - 2014

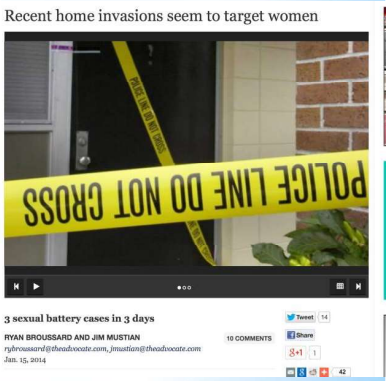


- Home Invasions in the Middle of the Night
- Mostly Elderly Females
- Dark Clothes, Masked, Wearing Gloves
- Becoming More Frequent
- Sexual Contact Increasing


Baton Rouge police probe home invasions targeting women

Dabadie: 'Don't trust anybody'

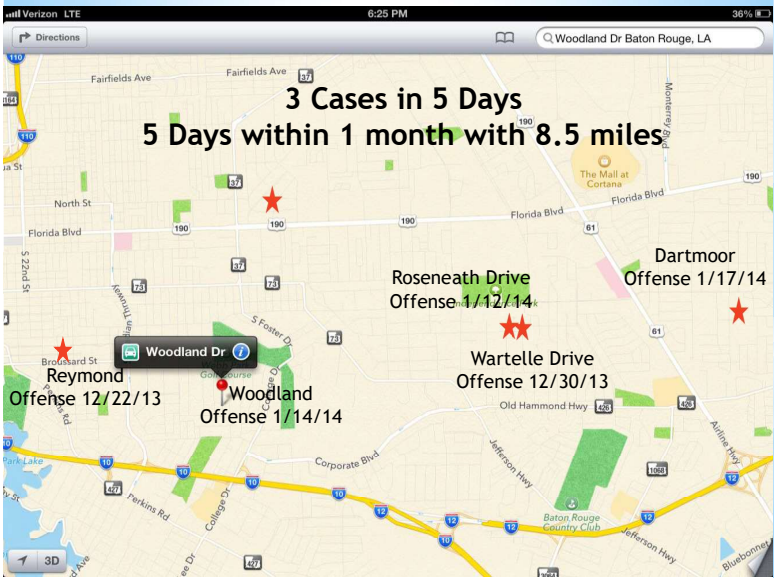
BEN WALLACE
bwallace@theadvocate.com
Jan. 20, 2014



Recent home invasions seem to target women

3 sexual battery cases in 3 days

RYAN BROUSSARD AND JIM MUSTIAN
rybroussard@theadvocate.com, jmustian@theadvocate.com
Jan. 15, 2014

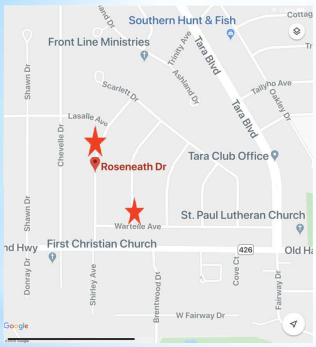


So We Called In Rush Team After Rush Team

-

Worked Day and Night

And I Carried This Notebook Around for Days!!!!



Tara Area

Wartelle Drive
Offense 12/30/13

Roseneath Drive
Offense 1/12/14

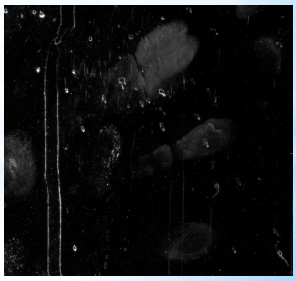
Wartelle Drive
Offense 12/30/13

Wartelle Drive
Offense 12/30/13

Suspect breaking into window wearing a mask
Suspect stole purse and left

Glove – No DNA

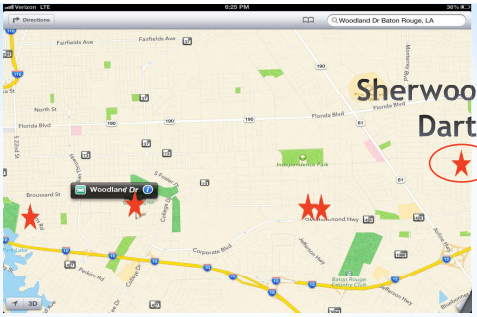
Later linked a smudge from window



Roseneath Drive
Offense 1/12/14

No DNA

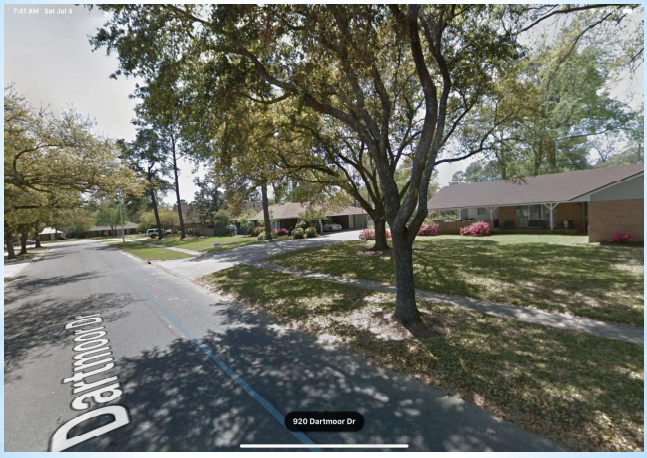
Case Linked via Non-DNA evidence



Sherwood Forest - Dartmoor

January 17, 2014

Sherwood Forest - Dartmoor



Sherwood Forest - Dartmoor

Grabbed her and blindfolded her with a T-shirt before groping her

Suspect fled with an unknown amount of money

Swab taken of point of entry – rear door

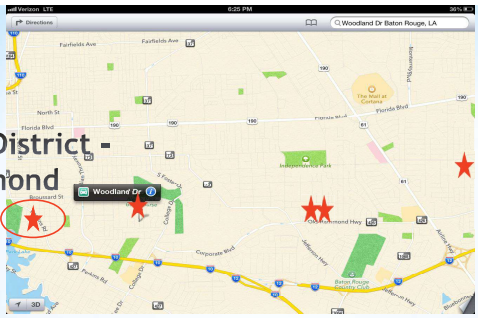
The victim is now deceased

*Exhibit 11 - Swab from Rear Entry Door

*Mixture Obtained

*Foreign DNA too Low to Search - Only Few Calls

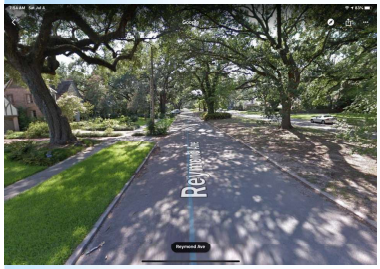
Garden District - Reymond



74 year old

Offense Date 12/22/13

Reymond Drive



Entered Home

Threatened to Kill Victim

Demanded Money out of Safe

Brief Struggle Occurred

Reymond Drive

Swab taken of office door where struggle took place

*Exhibit 5 - Swab from Office Door

*Mixture - Low Level

*But this time we went for the CODIS search!!!!

HOLY COW ! NOW WHAT!!

Need D2 and D19 on Convicted Offender sample

Need Y on both

Release or Not Release in Meantime??

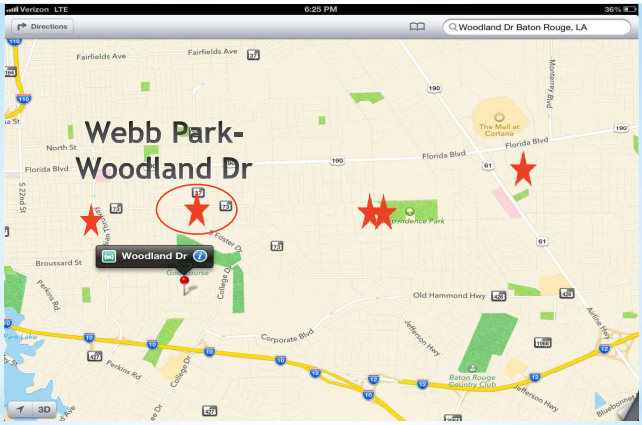
Office Door Swab

So Y's Make Us Feel Much Better!

* Go Back and Relook at 1st Profile from Rear Entry Door
* Exhibit 11 – Swab from Rear Entry Door
* Too Low to Search – Only Few Calls

Reamp – Reinjects and Ys Payoff

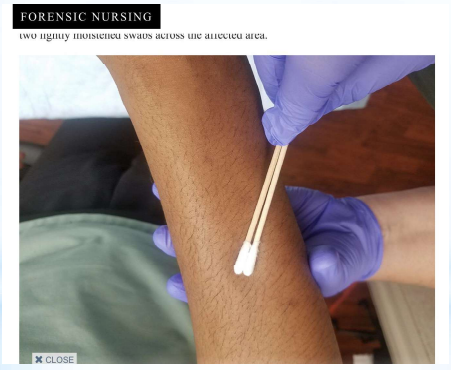
* Exhibit 11 – Swab from Rear Entry Door
* Y-STR profile better



January 14, 2014

Webb Park-
Woodland Dr
January 14, 2014

Webb Park-
Woodland Dr
January 14, 2014



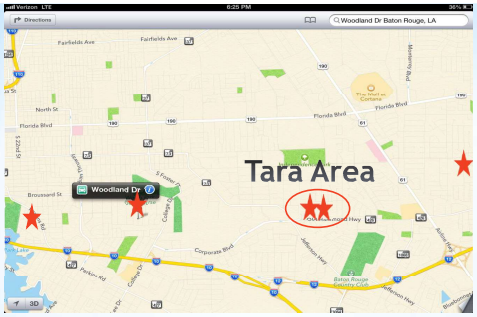
Swab of wrist collected from victim

*Exhibit 1E - Swab from Left Wrist
*Three Person Mixture - Two Minors
*Second Look realized looked like same suspect

*So.....Hmmm

*So.....Hmmm

*Reamp - Reinject
*Sent to TrueAlleles for Probablistic Genotype analysis
*Y-STR eventually matched



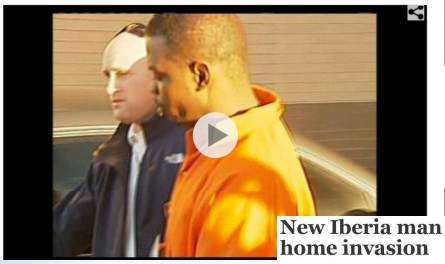
Roseneath Drive
Offense 1/12/14

Wartelle Drive
Offense 12/30/13

Smudge From Window

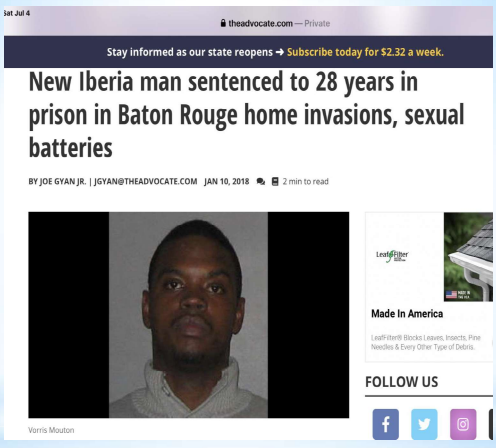
DNA connects suspect to multiple home invasions in Baton Rouge

Posted: Jan 21, 2014 12:01 PM CST
Updated: Jan 21, 2014 6:07 PM CST
By Amber Stegall - email



New Iberia man linked to third Baton Rouge home invasion

January 10, 2018



Vorris Mouton pleaded guilty before state District Judge Bonnie Jackson to four counts of aggravated burglary, three counts of sexual battery, two counts of simple kidnapping, and single counts of aggravated battery, simple burglary of an inhabited dwelling and unauthorized entry of a place of business.

Questions?

jbroc3@lsuhsc.edu

CLPC

PIN