

# TEXAS FAMILIAL SEARCH POLICY

Gary Molina, CODIS Program Manager  
AFDAA Meeting July 7, 2011

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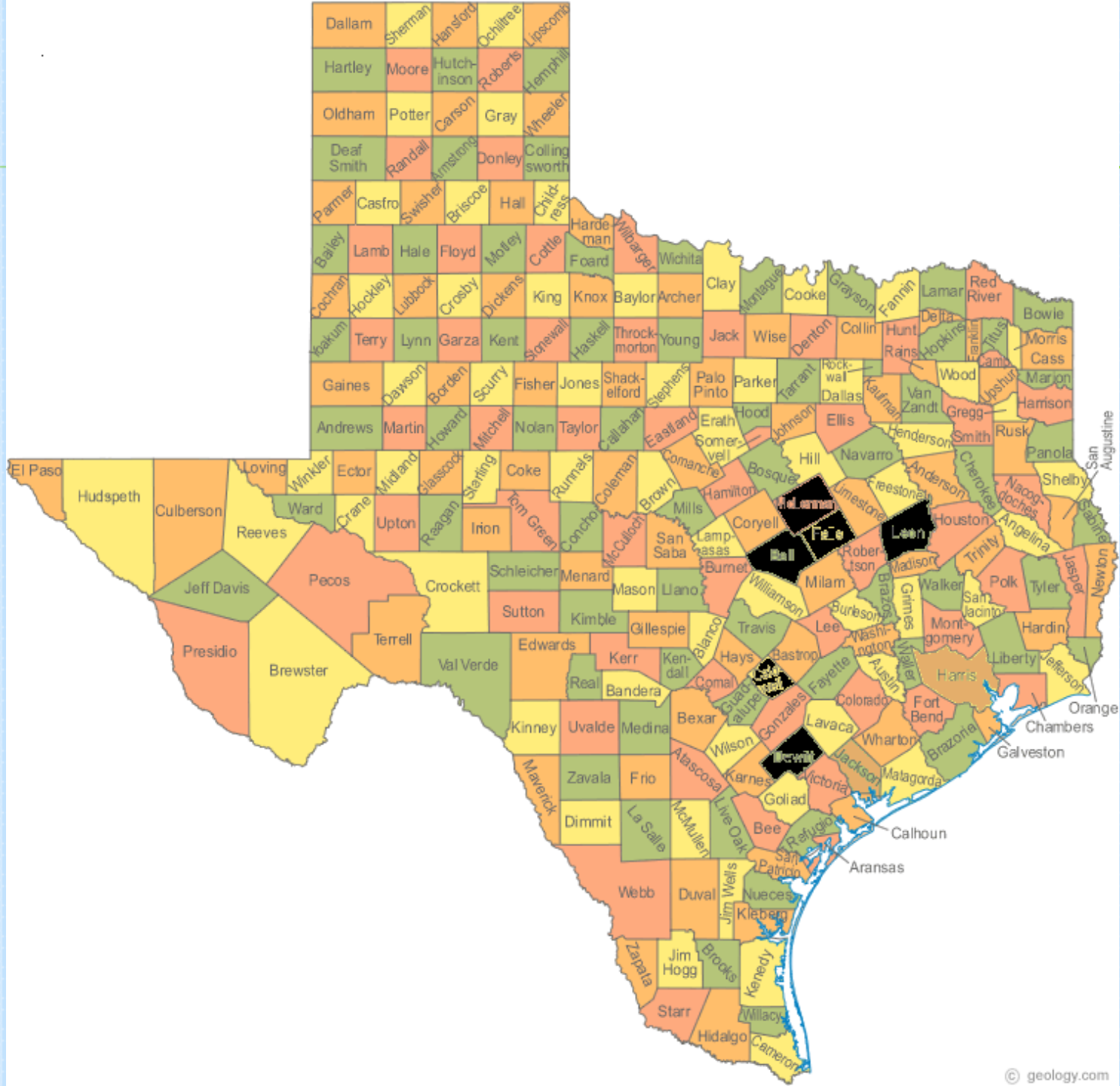
# BACKGROUND

- January 21, 2009 – Sexual Assault of elderly woman. Evidence = gloves. Partial DNA profile, not enough for CODIS. Austin DPS \* - But matches another suspect (2<sup>nd</sup> case)
- February 27, 2009 – S. A. of Elderly. Evidence = **neck swab**. Full profile put into CODIS. Austin DPS (1<sup>st</sup> Case)
- July 3, 2009 – Burglary of elderly – no evidence \*
- July 20, 2009 – S.A. of elderly. Evidence = **toilet paper**. Full profile into CODIS. Waco DPS \* **Same victim**
- August 14, 2009 S.A. of elderly. Evidence = no usable profiles. Waco DPS
- September 5 (burglary) and 11 (S.A.) – no profiles (Waco)
- September 10 (S.A.) – Face swab (full) plus other partial

# BACKGROUND

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- September 15, 2009 – **CODIS Hit**
- October 24, 2009 – Burglary, no profiles
- November 9, 2009 – S.A. – Breast swab full profile
- November 24, 2009 – Attempted Sexual Assault – no DNA
- November 24, 2009 – Attempted Burglary



# BACKGROUND

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- Victoria Texas Sheriff or Police Chief contacts DPS Director
- February of 2010, Director asks Crime Lab to look into Familial Searching as an option.
- California and Denver contacted
- UNT contacted – Software in development
- Validation of UNT software begins.

# VALIDATION

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- 10 Sibling Pairs and 8 Parent/Offspring Pairs were searched.
- Each profile was searched separately for a total of 36 searches (but using various parameters).
- 2 sibling relations and 1 P/O relation would not have been detected.
- 1 P/O pair had 1 mutation and 1 had 2 mutations, but would have still been detected.

# SETTINGS FOR UNT SOFTWARE

Search Parameters and Options

**Populations for searching**

Population list

- AFRICAN
- CAUCASIAN
- SEHISPANIC
- SWHISPANIC

Selected for searching

- AFRICAN
- CAUCASIAN
- SEHISPANIC
- SWHISPANIC

>> <<

Add population

**Searching parameters**

Minimum Allele Freq (5/2n)  Full Sib

0 Fst value  Parent Child

10000 Database Size (N)  Allow mutation

**Searching options**

Minimum number of shared alleles 13

At least one shared allele for each locus

Only consider moderate strigency matched profiles

Allow 1-Locus (a,b)->(a,c)

Use EKR (= KIN) to filter profiles

At least one population has EKR >= 1

Minimum EKR among populations

Min. EKR >= 0.1

Continue

# SEARCH FIELD

**Searching**

**Forensic Profile**

1

**Populations**  ▼

Marker	Forensic	Candidate	IBS	EMR-PO	EMR-FS	KI-PO	KI-FS
CSF1PO	10,11	11,12	1	1.93	2.14	0.94	0.72
D13S317	11,11	11,12	1	2.75	2.32	2.47	1.49
D16S539	11,12	11,12	2	1.66	1.77	1.67	2.46
D18S51	12,14	12,13	1	3.63	5.35	2.36	1.44
D21S11	28,30.2	30,30.2	1	9.9	29.71	7.8	4.14
D3S1358	15,16	15,16	2	1.45	1.5	1.53	2.11
D5S818	11,13	11,12	1	1.93	2.15	0.59	0.55
D7S820	11,12	11,11	1	2.08	2.37	1.73	1.11
D8S1179	10,14	12,14	1	2.94	3.88	1.01	0.76
FGA	20,22	20,21	1	4.02	6.3	3.49	2.01
TH01	7,9.3	9.3,9.3	1	1.73	1.86	2.07	1.28
TPOX	8,11	8,11	2	1.21	1.22	1.37	1.76
VWA	18,19	18,19	2	3.76	5.66	4.78	11.59
D19S433	13,14	13,14	2	2.07	2.36	2.32	3.81
D2S1338	17,25	17,19	1	3.84	5.85	1.13	0.81

**EMRs: FS: 4626.52; PO: 135.98;**

**Candidate Profiles**

Opened file: combined.xml

ID	IBS	FS-EKR	PO-EKR
5	20	0.25	1.4
2	21	0.84	2.1
1	30	5.0283604...	2725.35

**Number of Hits: 3**  
**Number of Candidate Profiles: 23**

# OUTPUT FILE

```
output.txt - Notepad
File Edit Format View Help
The forensic profile: 1
----- Search Parameters -----
Minimum Allele options = 5/2n
Fst = 0.0
Database size(N) = 10000
Search Full sib? = true
Search Parent Child? = true
Consider mutation for EKR calculation? = true
----- Search options -----
Filter by Cumulative Number of shared Alleles? = true
Minimum Cumulative Number of shared Alleles = 13
At least one shared allele at each locus? = false
Filter by Moderate Stringency Match? = false
Filter by Expected Kinship Ratio (EKR)? = true
Maximum EKR among all populations at least >= 1.0
----- Selected Populations -----
SWHISPANIC      CAUCASIAN      SEHISPANIC      AFRICAN
----- Sorted hits -----
Candidate      IBS      EKR-FS-SWHISPANIC      EKR-PO-SWHISPANIC      EKR-FS-CAUCASIAN      EKR-PO-CAUCASIAN      EKR-FS-SEHISPANIC
----- Sorted by Number of shared Alleles -----
1      30      50283604.75      2725.35      14122872.28      1526.35      24345068.08      1683.82      2544632954.68      62467.21      30
2      21      0.84      2.1      0.32      0.51      0.75      1.53      7.78      5.12      21
5      20      0.25      1.4      0.08      0.38      0.26      1.03      15.21      93.2      20
----- Sorted by Maximum EKR among Populations for Full-sib -----
1      30      50283604.75      2725.35      14122872.28      1526.35      24345068.08      1683.82      2544632954.68      62467.21      2544632954.68
5      20      0.25      1.4      0.08      0.38      0.26      1.03      15.21      93.2      15.21
2      21      0.84      2.1      0.32      0.51      0.75      1.53      7.78      5.12      7.78
----- Sorted by Maximum EKR among Populations for Parent-Child -----
1      30      50283604.75      2725.35      14122872.28      1526.35      24345068.08      1683.82      2544632954.68      62467.21      62467.21
5      20      0.25      1.4      0.08      0.38      0.26      1.03      15.21      93.2      93.2
2      21      0.84      2.1      0.32      0.51      0.75      1.53      7.78      5.12      5.12
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# SEARCH PARAMETERS

- “The SWGDAM suggested EKR, which adjusts for database size searched, was a very stringent measure for large databases. For a database containing a million samples, almost no unrelated relatives were included, but about 91.2% true full-sib and 95.7% true parent-child were excluded (Table 5). An absolute  $KI = 1,000$  or  $10,000$  might be a good measure for the 13 CODIS loci to balance the false positive and false negative rates.”\*

➤ \*Comparisons of the familial DNA database searching policies – Jianye Ge, et. al. Accepted for publication JFS.

# SEARCH PARAMETERS

- “An IBS  $\geq 15$  or IBS  $\geq 16$  with a KI  $\geq 1,000$  or KI  $\geq 10,000$  combined are practical searching policies with good balance between false positive and false negative rates. An IBS  $\geq 17$  and/or KI  $\geq 1,000,000$  can exclude the majority of profiles in the database, either related or not, and initially may be good start options to produce a small, but manageable possible candidate list.”\*

➤ \*Comparisons of the familial DNA database searching policies – Jianye Ge, et. al. Accepted for publication JFS.

# SEARCH PARAMETERS

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- Offender (and Arrestee) profiles exported from CODIS database in CMF format.
- Software is controlled and secured. Not installed on any computer. Can be run from disk.
- Minimum of 13 shared alleles
- $KI \geq 10,000$ ;  $EKR = 1$
- No minimum EKR across the board.
- Test top 50 candidates (give or take a few).

# POLICY REQUIREMENTS

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- Joint request from Investigating agency and District Attorney stating that all investigative leads have been exhausted.
- Case must be unsolved homicide, sexual assault, or other crime with significant public safety concerns.
- Case will be further investigated and prosecuted.
- Only CODIS eligible profiles will be searched.

# REQUIREMENTS

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- CODIS eligibility does not guarantee profile will be searched
- Must be a single source profile with 13 core CODIS loci, no partial profiles. (deconvoluted profile from mixture acceptable)  
Electropherogram must be provided.
- DNA sample must have Y-STR testing completed. Results must be forwarded to CODIS Lab prior to search.
- State CODIS Administrator screens request.

# REQUIREMENTS

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- State CODIS Administrator will forward request to committee members (4 CODIS analysts).
- If needed, committee can seek advise from DPS Legal or Texas Rangers.
- Committee will make recommendation to DPS Director, through the chain of command.
- Once approved by DPS Director, search takes place.

# REQUIREMENTS

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- **CODIS Lab reserves the right to withhold names based on further investigation. \*\*\***
- Upon release of candidate names, investigating agency will be encouraged to share possible leads with the CODIS lab to determine if any possible suspects are already in CODIS.

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- August 4, 2010 – Validation completed, approved by Agency. AG not consulted as per DPS Legal.
  - August 6, 2010 – First Official Familial Search in Texas was conducted.

# RESULTS OF FIRST SEARCH

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- 52 candidates tested for Y-STR (2 others were female, no further testing)
- Full sib, high of KI = 39,360 for S.E.H. and AFR
- Parent/Offspring high KI = 61,430 for S.E.H. and AFR, 21 shared alleles.
- No matches using Y-STR testing

# SEARCHES SO FAR

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- 4 completed so far, one in progress.
- No success yet.
- Information will be released to Investigating Agency, District Attorney, and Laboratory.
- Procedure made available to Local Labs
- Procedure provided to Agencies discusses pros and cons. Additional discussion will take place as needed.
- Further investigation accomplished through DPS CODIS Liaison if needed.\*\*\*

# OTHER SEARCHES

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- 2. Homicides of two females  
(7/2003 and 4/2004) – 66 tested, no matches with Y-STR
- 3. Homicide of female, December 1981 – 79 tested \*\*\*
- 4. Homicide of Female April 1989 – 64 Tested, no matches.
- 5. Cigarette Butt Near Body – on going – debate among committee – approved for search.

# INTERESTING SEARCH\*\*\*

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- As Y-STRs are run, results are uploaded into CODIS.
- Third search resulted in 79 samples to be tested. Our process includes running Y-STR profile through CODIS after testing of samples completed. Search allows for 2 mismatches based on literature and validation.
- Y-STR profile matched 9 offender samples, 8 with 2 mismatches and 1 that matched at all loci – the full match was not on original list.

# INTERESTING SEARCH\*\*\*

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- KI was adjusted to include the haplotype of the Y profile. (from 10,000 to 50,000 based on our validation samples)
- KI for sample that matched at all Y-STR loci was still  $< 1$ . (0.64) (only 9 shared STR alleles)
- Highest KI for 2 mismatched loci profile was ~3000.
- Frequency of the Y-STR profile was 0.00156\*
- 1 in 641 = 786 expected matches in our database. (\*[usystrdatabase.org](http://usystrdatabase.org))

# INTERESTING SEARCH\*\*\*

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- Just to be safe, all matching offenders were researched by our CODIS Liaison for known residences, family members, and their residences. None had any known activity in the area of the offense.
- No names were released based on additional research and statistical analysis.
- “None met our criteria for reporting...”

# COST PER SEARCH

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- Testing ~ \$22.82/ sample; \$1,743.98 search
  - Indentifiler also tested for comparison to original results (QC) and additional loci uploaded (D2, D19).
- ~16 – 20 hours Analyst Labor hours per search
- Does not include case review by State Administrator, committee, Chain of Command, or any office supplies used.

# EPILOGUE

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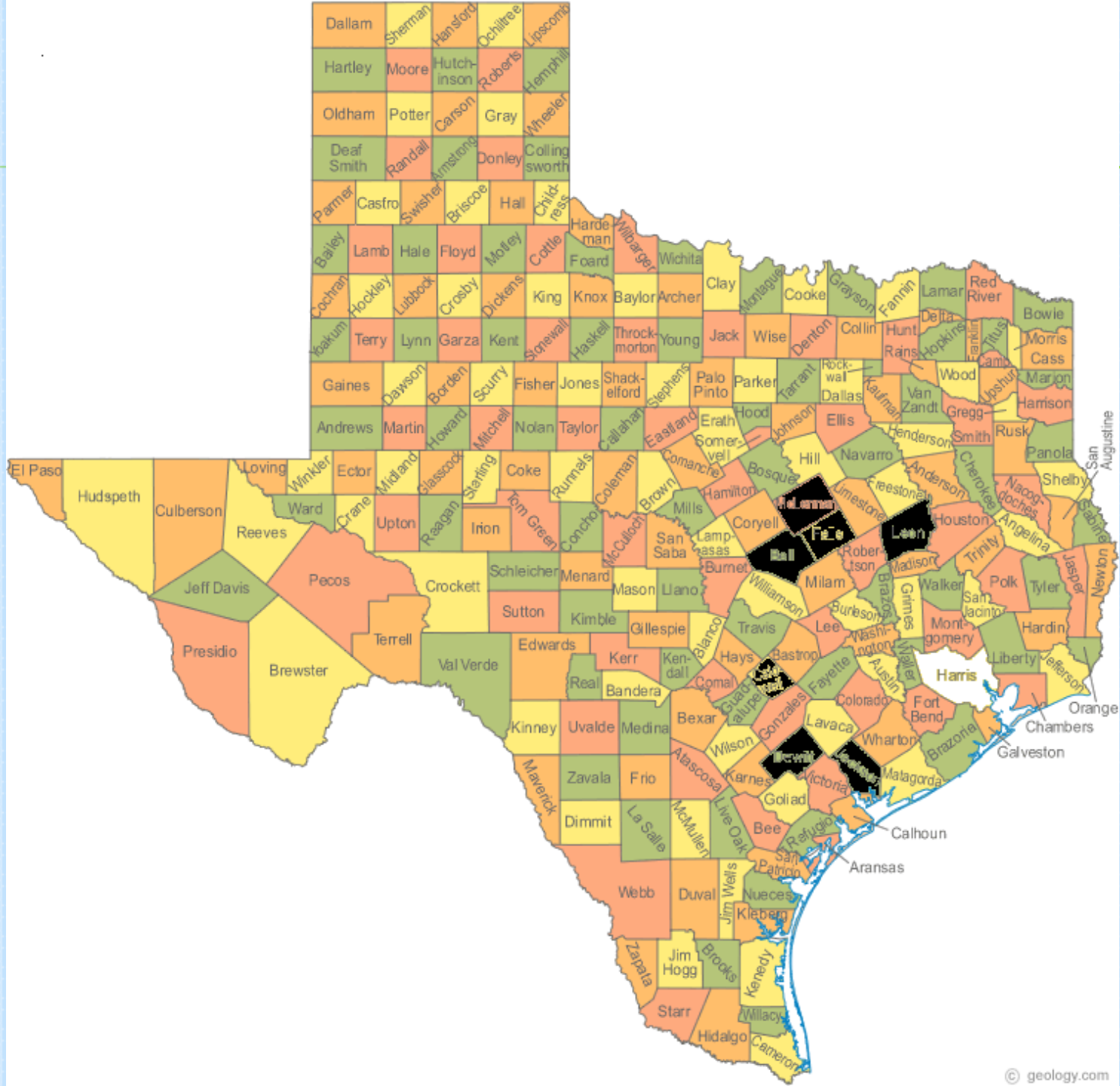
- ✘ January 8<sup>th</sup>, 2011 – Edna TX - Officers respond to a Medical Alert - bracelet.
- ✘ Upon arrival, officers encounter man who proceeds to run away from home.
- ✘ Chase occurs for about 150 yards until officers tackle suspect.

# BILLY JOE HARRIS – TWILIGHT RAPIST



53 years old. His sample was sent to Waco DPS and overnight results concluded his DNA was consistent with the DNA from the Sexual Assault Cases in CODIS. (A subsequent CODIS search made the same conclusion.)

**A search of our database confirmed he did not have any male (or female) relatives in the TEXAS CODIS database.**



# EPILOGUE

- ✘ Suspect's family seeks assistance from Local Activist  
– Quanell X
- ✘ Quanell X said he specifically asked Harris about the DNA tests.
- ✘ "He believes somebody must have broke into his home, stole his clothing and littered his DNA all over the place," said Quanell X.

"And I said to him, 'Sir, is that what you really want me to say to the public?' and I said 'because there's no way in hell anybody is going to buy that.'"



# REFERENCES

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- ✘ NDIS CODIS Bulletin, Interim Plan for the Release of Information In the Event of a “Partial Match” at NDIS. BT072006 2006.
- ✘ Forensic Science Service Police Standards Unit and National Centre for Policing Excellence, Tactical Advice Using Familial DNA Intelligence Products in Serious Crime Investigations. 2006.
- ✘ California Department of Justice, Information Bulletin #2008-BFS-01. DNA Partial Match (Crime Scene DNA Profile to Offender) Policy. 2008.
- ✘ Colorado Bureau of Investigation, DNA Familial Search Policy. CBI Policy Statement. 2009.

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- Scientific Working Group on DNA Analysis Methods Ad Hoc Committee on Partial Matches, SWGDAM Recommendations to the FBI Director on the Interim Plan for the Release of Information in the Event of a Partial Match at NDIS, Forensic Sci. Comm. 2009;11 (4).
- Ge J., Chakraborty R, Eisenberg A, Budowle B, Comparison of the Familial DNA Database Searching Policies. Accepted for publication by Journal of Forensic Sciences.
- Kayser M, Sajantila A, Mutations at Y-STR Loci: Implications for Paternity Testing and Forensic Analysis, Forensic Science International, v. 118, pp 116-121 (2001)

# ACKNOWLEDGMENTS

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- **Greg LaBerge**  
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Albar Chavana, Kelly Bell**  
Texas Department of Public Safety
- **Steven McCraw – Director of TX DPS**
- **D. Pat Johnson – Director TX DPS Crime Lab**
- **Brady Mills – Assistant Director TX DPS Crime  
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# QUESTIONS ABOUT SOFTWARE

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# TEXAS DPS CODIS PROGRAM

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