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Review of DNA Evidence in State of Texas v. Josiah Sutton
(District Court of Harris County, Cause No. 800450)

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Overview

Investigative reporters David Raziq and Anna Werner of television station KHOU in Houston asked me to review and comment on the DNA evidence in the Sutton case. I reviewed the full transcript of the trial, the defendant's motion for new trial, and the defendant's appellate brief. I also reviewed a set of laboratory notes from the Houston Police Department (HPD) Serology/DNA Laboratory.¹ These notes are sketchy and do not adequately document the work that was done. However, the notes do include photocopies showing the DNA test strips and a copy of the HPD laboratory report on the results of DNA analysis in the case.

I was immediately struck by discrepancies between the conclusions stated in the laboratory report and the results shown in the test strips and recorded in the analyst's notes. According to the laboratory report, a semen sample collected from the seat of the complainant's vehicle where the rape occurred (Sample #1) contains "[a] mixture of DNA types consistent with J. Sutton, P. Stewart (the complainant), and at least one other donor." However, based on the DNA test results shown in the test strips and recorded in the analyst's notes, Sutton and Stewart should both have been EXCLUDED as possible contributors to this sample. I was also struck by inconsistencies in the DNA profiles of the reference samples. According to the test strips and lab notes, reference samples from the complainant were typed three times and produced at least two and arguably three different DNA profiles (a problem not mentioned in the lab report or testimony).

The DNA test results were presented to the jury in a misleading manner that greatly overstated their value. After testifying that every human being has a unique DNA pattern, the analyst stated that Josiah Sutton's DNA pattern was found in the sperm fraction of vaginal swabs, on debris from a combing the complainant's pubic hair, and on a semen stain on the complainant's jeans. No statistical estimates were offered to explain the meaning of this finding. Jurors could reasonably have concluded based on this

¹ My understanding is that HPD provided these notes to Bob Wicoff, lawyer for Josiah Sutton, in response to a subpoena, and that HPD represented that they are the complete set of notes maintained by the laboratory in this case. Mr. Wicoff provided complete copies to KHOU which, in turn, sent them to me for review.

testimony that Sutton was uniquely identified as a semen donor. In fact, Sutton's DNA profile is but one of many profiles that might be "included" as possible components of the mixed evidentiary samples in this case. By my calculations (elaborated below) the probability that a randomly chosen African-American male would be "included" in these mixed samples exceeds 1 in 15, and the probability of a coincidental match to one of the suspects in this case, given the manner in which testing was conducted, exceeds 1 in 8.

The most serious problem, however, was the failure to report aspects of the DNA evidence that appear to exonerate Josiah Sutton. As I will explain more fully below, Sample #1 appears to be semen from one of the two rapists. Sample #1 cannot be from Josiah Sutton. And if Sample #1 is indeed from one of the two rapists, then Josiah Sutton cannot be the other rapist. In other words, the DNA evidence taken as a whole provides strong evidence of Sutton's innocence. The jury knew nothing about this exculpatory evidence. The laboratory report falsely states that this sample is consistent with the profiles of Sutton and the complainant. The trial transcript suggests that the Deputy District Attorney knew there was a problem with this sample and intentionally avoided eliciting testimony about it.

Based on the laboratory notes, it appears that the procedures employed by the HPD Serology/DNA Unit in this case fell well below accepted professional standards for quality scientific work. Many of the problems noted in the recent Texas Department of Public Safety Quality Assurance Audit of the HPD Crime Laboratory Serology/DNA Section (Texas DPS, December 12-13, 2002) and in a recent independent review of several HPD cases (Identigene, January 13, 2003) were manifest in this case, including inadequate characterization of samples, inadequate documentation of findings, failure to run important experimental controls (e.g., reagent or extraction blanks), failure to present allele tables, inadequate review of conclusions, and incorrect and misleading statistical computations. These chronic problems undoubtedly contributed to the serious case-specific deficiencies noted above.

Facts of the Case

The trial record reveals the following facts: On October 25, 1998, Ms. Priscilla Stewart was abducted at gun point from the parking lot of her apartment by two men who forced her into her vehicle, a Ford Expedition, and drove her around while forcing her to perform oral copulation and sexual intercourse in a back seat. (The Expedition has three rows of seats: two buckets in the front and a middle and rear bench seat. The sexual assault occurred on the middle bench seat). One man wore a baseball cap with the bill turned to the side. The other man wore a skull cap. The night of the assault she told police the men were young black males about 5 feet 7 inches tall. She said the one with the baseball cap weighed about 135 lbs. and the one with the skull cap weighed 120 lbs. Ms. Stewart is 5 feet 10 inches tall and weighs over 200 lbs.

Ms. Stewart testified that she was sufficiently traumatized by the attack that she could not return to her apartment for several days. She first returned to her apartment five days after the attack to retrieve some belongings. While driving toward her apartment she

noticed three young black men walking on the street. One was wearing a baseball cap with the bill turned to the side. Another was wearing a skull cap. Ms. Stewart immediately contacted police and reported seeing men who she believed were her assailants. She noted that the man with the skull cap had a distinctive way of walking that she recognized as that of the assailant who had worn a skull cap. The police detained Josiah Sutton, who was wearing a baseball cap, Gregory Adams, who was wearing a skull cap, and a third man. The police placed these suspects in the back seat of patrol cars and drove them to the parking lot of a police sub station. The men remained inside the patrol cars, wearing their hats, while Ms. Stewart observed them from inside her own vehicle, which was parked approximately 10 feet away. She identified Sutton and Adams as her assailants and they were arrested. Josiah Sutton, a former high school football player, is 6 feet one half inch tall. He testified that at the time he was arrested he weighed 200 lbs.

The HPD Serology/DNA Unit conducted tests on vaginal swabs and pubic hair combings from a rape kit, a stain on the victim's jeans, and on a semen sample (Sample #1) collected from the middle bench seat of the Expedition. The victim reported that only two men participated in the rape and that she had last had sex with another man more than six days before the rape. The HPD report states that: "A mixture of DNA types consistent with J. Sutton, P. Stewart, and at least one other donor was detected on the vaginal swabs, unknown sample #1, debris from the pubic hair combings, and the jeans based on PM, DQA1, D1S80 typing results. The DNA type of J. Sutton can be expected to occur in 1 out of 694,00 people among the black population."

Thereafter, the district attorney dropped all charges against Gregory Adams. Joshua Sutton was prosecuted and convicted. At the trial the only evidence offered against Sutton was the complainant's eyewitness identification and the DNA test results.

Serology Results

The serology test results are not adequately documented. The laboratory notes indicate that Acid Phosphatase and P-30 tests produced positive results for Sample #1 and for the blue jeans. There is no indication in the lab notes of any serological analysis or characterization of the vaginal swabs or pubic combings. However, a serology report labeled Supplement No-0021 states: "Semen was detected in the vaginal smear and swabs, pubic hair combings, 'sample #1' swabs, and the jeans."

DNA Test Results

There is no documentation in the laboratory notes regarding the methods used for extracting DNA from the samples. There are some notes on the amplification, quantitation, and typing of samples. These notes indicate the samples were processed in two batches. The first batch was amplified and typed for DQA1/PM and D1S80 on February 23, 1999. It reportedly consisted of DNA from the following samples: vaginal epithelial fraction (VEF), vaginal sperm fraction (VSF), a blood sample from the

complainant Pricilla Stewart (Comp P.S.), blood reference samples from Gregory Adams (G.A.) and Josiah Sutton (J.S.).

The second batch was amplified and typed for DQA1/PM (but not for D1S80) on February 25, 1999. It reportedly consisted of DNA extracted from the following samples: the jeans, the semen sample from the middle seat of the Expedition (#1 Sample), the debris from the pubic combing of the complainant (Pubic Combing), a buccal swab of the complainant, and a blood reference sample of the complainant from the rape kit (P.S. Comp.). The samples from the jeans and the semen stain on the seat (Sample #1) apparently were not subjected to differential extraction.

The HPD laboratory produced no table of alleles. However, Table 1 shows the alleles recorded in the laboratory notes. Based on photocopies of the test strips and D1S80 gels, it appears that the analyst made correct “calls”—i.e., recorded the results correctly in the laboratory notes, with one exception. On the DQA strip for the “Jeans,” a distinct “3” dot can be seen that was not recorded by the analyst. I have indicated this allele, which was not called by the analyst, by placing it in brackets [].

Table 1: Table of Alleles—State of Texas v. Josiah Sutton

SAMPLE	DQA	LDLR	GYP A	HBGG	D7S8	GC	D1S80
2-23-99							
VEF	3, 4.2/4.3	B	AB	A C	A	B	21,28
VSF	1.1,2,3,4.1 (1.2)	AB	AB	A C	AB	B	20,21,24,25,28
P.S.(COMP)	3,3	B	AB	A C	A	B	21,28
G.A..	1.2	AB	A	BC	A	AB	24,34
J.S.	1.1,2	AB	A	A	A	B	25,28
2-25-99							
JEANS	[3]	AB	AB	A C	AB	B	
#1 SAMPLE	2,3	AB	AB	A C	A	B	
PUBIC COMBINGS	1.1,2,3,4.1 (1.2)	AB	AB	A C	AB	B	
BUCCAL SWAB (COMPLAINANT)	3,4.2/4.3	B	AB	A C	A	B	
P.S.(COMP)	3,4.2/4.3	B	AB	A C	A	B	

Inconsistent Typing of Complainant

A blood sample from complainant Priscilla Stewart (labeled P.S. COMP) was typed twice—once on 2-23-99 and again on 2-25-99 with inconsistent results at DQA. The first typing showed only a 3 allele, the second a 3 and a 4.2/4.3. However, examination of the test strip shows that the 4.2/4.3 dot was considerably weaker than the 3 dot on the 2-25 strip labeled P.S. COMP, as if the sample contained a mixture of DNA from a primary

donor with type 3,3, and a secondary donor with a 4.2/4.3. A third sample from the complainant, a buccal swab, produced a 3, 4/2/4.3 type with dots of equal intensity.

The fact that the laboratory obtained different profiles when typing samples from the same person raises profound concerns about the reliability of its procedures. Faced with a discrepancy of this nature, the laboratory should have shut down its operations and devoted full attention of the staff to diagnosing the problem. Was one of the samples contaminated with foreign DNA? Did the system fail to detect some of the alleles that were present due to problems with reagents, hybridization procedures, or test strips? Based on the information available, I can only speculate on the cause of the problem. But it is difficult to imagine any explanation for this result that would not call into question the fundamental reliability of the laboratory's procedures, not just in this case but in other cases as well.

There is no indication in the laboratory notes of any efforts to determine the cause of this serious anomaly. Nor did the analyst mention this in the laboratory report or in her courtroom testimony. By failing to mention the anomaly, the analyst effectively covered up a problem that would have caused any reasonable evaluator to question the validity of the laboratory's findings.

Incorrect Statements in the Laboratory Report

The laboratory report states:

A mixture of DNA types consistent with J. Sutton, P. Stewart, and at least one other donor was detected on the vaginal swabs, unknown sample #1, debris from the pubic hair combings, and the jeans based on PM, DQA1, D1S80 typing results.

However, based on the table of alleles, it is apparent that Sample #1 does *not* contain DNA types consistent with Josiah Sutton. Sutton has DQA allele 1.1, which was not detected in this sample. Furthermore, the sample does *not* contain DNA types consistent with the Priscilla Stewart, the complainant (if we assume, as the analyst apparently did, that her correct DQA type is 3,4.2/4.3). The 4.2/4.3 was not detected in Sample #1. Hence, the laboratory report is simply wrong about the possible contributors to Sample #1.

Sample #1 produced positive results for Acid Phosphatase and P-30, which indicates that it is a semen sample. Based on the number of alleles detected, it could plausibly be from a single unknown male donor. This sample was collected from the middle seat of the Expedition in the location where the complainant said she was assaulted. The profile of this sample is "included" in the mixed DNA samples found in the vaginal sperm fraction, the pubic combings, and the jeans. Therefore, it is entirely possible that Sample #1 is a semen sample from one of the two rapists. Indeed, this appears a reasonable assumption.

Probable Exclusion of Josiah Sutton

If Sample #1 is semen from one of the two rapists, and if the complainant was truthful in saying that the two rapists were the only men who had sex with her during the relevant period, then Josiah Sutton is ruled out as the other rapist. As Table 2 illustrates, the donor of Sample #1 can account for two of the four DQA alleles found in the vaginal sperm fraction (VSF)—alleles 2 and 4. Hence, if there are two male donors, the DQA genotype of the second donor must be 1.1, 4.1. Josiah Sutton’s genotype is 1.1, 2. Because he lacks the 4.1 allele, he could not be one of the rapists, assuming the donor of Sample #1 is the other rapist.

This apparent exclusion of Josiah Sutton is not entirely certain. It is conceivable that the semen collected from in Sample #1 is unrelated to the rape. Perhaps it was deposited at an earlier time and just happened to be on the seat where the complainant was forced to engage in sexual acts with two men. In that case, Sutton could have committed the rape in combination with another unidentified man who happened to have a 4.1 allele. It is also conceivable that the complainant failed to report having sexual intercourse with another man shortly before the crime, and that this unidentified man happened to have a 4.1 allele. But these theories seem rather farfetched. It seems much more plausible that the alleles found in the vaginal sperm fraction are from the two rapists, and that semen stain on the seat where the rapes occurred (Sample #1) is from one of the rapists. If these more plausible assumptions are true, then Josiah Sutton was not one of the rapists.

Table 2: Comparison of Sutton’s DQ Alpha Genotype With Obligatory Genotype of 2nd Contributor to Vaginal Sperm Fraction (VSF), Assuming Donor of Sample #1 is one of Two Male Contributors

	DQA
VSF	1.1,2,3,4.1 (1.2)
PUBIC COMBINGS	1.1,2,3,4.1 (1.2)
#1 SAMPLE	2,3
Obligatory genotype of 2 nd contributor to VSF (assuming donor of Sample #1 is one of two male contributors)	1.1, 4.1
Josiah Sutton’s Alleles	1.1, 2

Unfortunately the jury in Sutton’s trial never had the opportunity to consider and weigh these possibilities because the jury was never told about this important issue. The prosecutor carefully avoided eliciting testimony about Sample #1. When asking about the evidentiary samples, he repeatedly stated that he was interested only in the vaginal sample, the pubic combings, and the stain on the jeans. At one point the analyst mentioned Sample #1, which was labeled “#1 unknown sample” in some of the lab notes.

The prosecutor responded: “I don’t want to talk about the unknown sample. Okay?” (TR p. 185). This sample was never mentioned again. On reading the transcripts I was left with the strong impression that the prosecutor knew there was a problem with Sample #1 and was taking care to avoid putting any testimony about it on the record. The defense lawyer also failed to inquire about Sample #1 it (perhaps because the lab report falsely stated that it was consistent with a mixture of DNA from Sutton and the complainant).

Misleading Presentation of Test Results

After reporting that the DNA in the evidentiary samples is consistent with a mixture of types from Josiah Sutton, the complainant, and another man, the laboratory report states: “The DNA type of J. Sutton can be expected to occur in 1 out of 694,00 people among the black population.”

This is an inappropriate and misleading statistic. Sutton’s DNA profile is but one of many profiles that might be “included” as possible components of the mixed evidentiary samples in this case. Because it is impossible in this case to distinguish primary and secondary donors to the samples, the correct and scientifically accepted statistic for characterizing the value of the DNA evidence is the cumulative probability of inclusion (CPI). The CPI can be calculated by taking the sum of the frequencies of all possible genotypes at each locus, and then combining these sums across loci using the product rule.

Table 3 illustrates the computation of the CPI for the vaginal sperm fraction. The allele frequencies I present for DQA/PM are from the FBI’s African-American data base (Budowle & Monson, 1997). The allele frequencies for D1S80 are from a published database of African-Americans in Texas (Peterson, et al. 2000). I make no effort to introduce a theta correction for population structure, so the figures I report should be regarded as rough estimates likely to understate the actual probability of a coincidental match some subpopulations. My computation shows that the frequency in the African-American population of men who would be “included” as possible contributors to the vaginal sperm fraction in this case is 0.069 (6.9%), or approximately 1 man in 15.

However, this statistic understates the probability of a coincidental match in this case. Because the police tested two men, Sutton and Adams, they had two opportunities to find the matching profile. The probability of a coincidental DNA match in this case, if the complainant picked the wrong pair of men, is the probability that *one or both* of two innocent men would be “included.” That probability is $1-(1-.069)^2 = .133$ (13.3%), or 1 in 7.5. In other words, in any randomly selected pairs of black men in Texas, there is better than 1 chance in 8 that at least one man would be “included” as a possible contributor to the vaginal sperm fraction. In my opinion, this is the statistic that the jury needed in order to assign proper meaning to the DNA “match” found in this case.

During the trial the analyst presented no statistics. However, she repeatedly gave testimony that implied that every DNA pattern is unique (*“If it came from one person, it should have a same exact DNA pattern. No other two persons will have the same*

DNA...” TR p. 176; “Q: ...You put what you have referred to as a primer to find the sections of DNA you need to study? A: Exactly. Q: The sections that your studies have identified as a unique section in that DNA strand? A: Exactly.” TR p. 181; “Q: So you need enough DNA until you see a unique pattern. Would that be fair to say? A: Yeah, it’s fair to say....Q: And you’re already in an area where you know this is a unique...” TR p. 184-5). The analyst then proceeded to testify that Josiah Sutton’s “DNA pattern” was detected in the evidentiary samples. This testimony undoubtedly left jurors with the incorrect impression that Sutton’s “DNA pattern” was unique, and therefore that the DNA evidence uniquely identified him as a rapist.

Table 3: Frequency of Included Genotypes: Vaginal Sperm Fraction

Locus	Alleles	Allele Frequency	Frequency of All Included Genotypes
DQA	1.1	.125	.68
	(1.2)	.297	
	2	.101	
	3	.102	
	4.1	.202	
LDLR	A	.192	1.00
		.808	
GYPA	A	.502	1.00
	B	.498	
HBGG	A	.439	.58
	C	.324	
D7S8	A	.645	1.00
	B	.355	
GC	B	.725	.53
D1S80	20	.034	.328
	21	.135	
	24	.199	
	25	.057	
	28	.148	
Overall			0.069 1 in 14.58

References

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