Ruth Ballard, PHD Inc.
Forensic Biology/DNA Consulting
Northwest Office
142 SE Back Bay Dr., Newport, OR 97365

Jennifer Sheetz
Attorney at Law
775 E. Blithedale Ave.
Mill Valley, CA 94941

October 23, 2023

DNA REPORT

Re: Independent review of DNA discovery in the case of *People c Joseph Hathorn Nuccio,* California Department of Justice Bureau of Forensic Services Central Valley Laboratory Case # 01-008470, California Department of Justice Bureau of Forensic Services Berkeley/Richmond DNA Laboratory Case #02-000015, Forensic Analytical Crime Laboratory Case #20170280.

This review focuses on the biological evidence recovered from Item 16 (knife found at the scene).

Terms and Abbreviations

- CV Crime Lab: California Department of Justice Bureau of Forensic Services Central Valley Laboratory, 1108 West Main Street, Ripon, CA 95366.
- BK Crime Lab: California Department of Justice Bureau of Forensic Services Berkeley DNA Laboratory, 626 Bancroft Way, Berkeley, CA 94710 (for report 0001, issued in 2002). For reports 0002-005, issued from 2003-2008: 1001 West Cutting Blvd., Suite 100, Richmond, CA 94804.
- FA Crime Lab: Forensic Analytical Crime Lab, 3777 Depot Road, Suite 403, Hayward, CA 94545.
- Defendant: Joseph Hathorn Nuccio
- Decedent: Jody L. Zunino

DNA Typing Chemistries and Instrumentation

- BK Crime Lab Report 0001 (3/25/2022): Profiler Plus; 310 Genetic Analyzer
- BK Crime Lab Report 0002 (5/9/2003): Cofiler; 310 Genetic Analyzer
- BK Crime Lab Report 0004 (11/29/2006) and 0005 (1/9/2008): Identifiler; 3130 Genetic Analyzer
- FA Crime Lab Reports (11/7/2019 and 10/11/2021): Investigator 24plex OS; 3500 Genetic Analyzer

Scope of the Opinion

To arrive at my opinion, I reviewed the following documents and DNA discovery. If I am asked to review additional materials in the future, I reserve the right to change/update my opinion.

- CV Crime Lab Report CV-01008470-0003 dated 1/17/2002. Associated Physical Evidence Submission Form completed by Detective Dave Anderson.
- BK Crime Lab Report BK-02-000015-0001 dated 3/25/2002. Associated analyst bench notes.
- BK Crime Lab Report BK-02-000015-0002 dated 5/9/2003. Associated analyst bench notes.
- Cal-DNA Data Bank CODIS match notification letter, dated 8/29/2006.
- BK Crime Lab Report BK-02-000015-0003 dated 9/7/2006. Associated analyst bench notes.
- CE Crime Lab Report CV-01-008470-0005 dated 11/1/2006.
- BK Crime Lab Report BK-02-000015-0004 dated 11/29/2006.
- BK Crime Lab Report BK-02-000015-0005 dated 1/9/2008. Associated analyst bench notes.
- FA Crime Lab Report 20170280 dated 3/7/2019. Associated analyst bench notes, electronic DNA data files, and STRmix reports.
- FA Crime Lab Report 20170280 Supplemental Laboratory Report dated 10/11/2021. Associated analyst bench notes, electronic DNA data files, and STRmix reports.
- Pertinent sections of the expert witness report authored by Beth A. Mohr of the McHard Firm, dated 8/13/2023.
- Declaration by Jeremy Dubois, Forensic Chemist, Acadiana Criminalistics Laboratory, dated 9/28/2023.

Allegations

This case involves the homicide of Jody Lynn Zunino, whose body was found at about 8 AM on 9/26/2001 in a field near railroad tracks about 300 feet from the western dead-end of Jackson Street, in Stockton, CA. She had been stabbed and slashed multiple times. A knife, presumed to be the murder weapon, was lying near her head. She was known to be a sex worker.

Rectal swabs taken from the victim at autopsy produced semen and a male DNA profile that resulted in a CODIS hit on the defendant. Early testing of the knife by the BK Crime Lab (2008) yielded mixed DNA profiles on both the handle and blade that *possibly* included the victim but

excluded the defendant. Additional testing of the knife handle by the FACL yielded a mixture of at least three persons, including the victim and at least two unknown males. The defendant was again excluded as a contributor. The police pursued the defendant as a suspect, and he was subsequently tried and convicted of the crime.

The defendant admits to having had sex with the victim, and anal sex in particular, but claims it was paid, consensual sex. He denies any involvement in her murder. During his interview, police told the defendant that his DNA would appear on the knife, and he adamantly denied that it would. He challenged officers to test the knife for his DNA, because it would not be present. The defendant turned out to be correct in this assertion, as noted above (and, in more detail, below).

Collection, Swabbing, and DNA Testing of Item 16 (Knife)

Swabbing of the knife in 2001

The knife was collected at the scene by Officer McGinnis, who swabbed it for blood (near the base of the blade where it meets the handle). He also took substrate control swabs from the back edge of the blade. These swabs were submitted to the CV Crime Lab soon after the crime with a Physical Evidence Submission Form requesting that they be screened for blood and tested for the victim's DNA. However, the CV Crime Lab analyst did not perform any testing on them. Instead, he put them in the lab freezer. As far as I can tell, they were never tested. I strongly recommend that they be located and tested.

Swabbing of the knife in 2007

The knife enters the legal discovery record again in 2007, when it was submitted to the CV Crime Lab for serological and DNA testing. The analyst did not detect any blood on the knife, possibly because it was wiped clean after the murder (before its discovery or collection) or because the initial swabs taken in 2001 removed it. It's also possible that the analyst did not do a thorough job of looking for blood and simply missed it, or that the knife was not the murder weapon. The analyst took two "trace swabs" from the blade (**Item 16A**), two "trace swabs" from the handle (**Item 16B**), and two water blank control swabs (**Item 16cont**).

DNA testing of swabs taken from the knife in 2007

The CV Crime Lab was not doing DNA testing at the time, so the swabs were forwarded to the BK Crime Lab for analysis. The analyst issued a report on this testing in early 2008.

The BK Crime Lab analyst removed approximately half of the swab material for DNA testing. She amplified the DNA using ABI's Identifiler system and separated the amplicons on a 3130 Genetic Analyzer. Where she could, she used a random match probability statistic to assign weights to her inclusions.

The Identifiler DNA profile from the blade (**Item 16A**) was partial and very low level with only five alleles (X at the amelogenin locus, 15 at the D8S1179 locus, 11 at the D5S818 locus, 9.3 at the TH01 locus, and 13 at the D19S433 locus). The lab analyst compared this profile to the

profile of victim (obtained from a reference bloodstain; **Item 3A**) and learned that she carries all these alleles. Therefore, the lab analyst could not conclusively exclude her as a contributor. She also compared the profile to the reference profile of the defendant (obtained from a reference swab from him; **Item 8**) and, finding that he carried only one of the five detected alleles, excluded him as a contributor.

The Identifiler DNA profile from the handle (**Item 16B**) was also partial and very low level with only four alleles (X at the amelogenin locus, 11 and 15 at the D8S1179 locus, and 13 at the D19S433 locus). Again, she was unable to conclusively exclude the victim but did exclude the defendant.

In summary, the results did <u>not</u> place the victim's blood or DNA on the knife. Therefore, they did not provide evidence that the knife was, in fact, the murder weapon. The results excluded the defendant as a contributor to the profile, but if the knife was not the murder weapon, then the absence of the defendant's DNA on the knife is meaningless as far as establishing his guilt or innocence. Notably, this was the state of the biological testing at the time of the defendant's trial.

Additional testing of the knife in 2019 and 2021

Post conviction, the Court granted the defendant's pro se Motion for DNA testing under Penal Code section 1405. In August 2017, the knife was hand-delivered by Investigator Rodriguez (San Joaquin County District Attorney's Office) to the FA Crime Lab for additional testing. At this time, as discussed above, about half of the original swab material collected at the CV Crime Lab in 2007 remained, and these swab remnants, along with the knife itself, were subjected to analysis.

The FL Crime Lab analyst obtained 67 picograms of human DNA from the residual swab material from the blade (**Item 16A; FA Crime Lab Item 5-1**) and about 71 picograms of human DNA from the residual swab material from the handle (**Item 16B; FA Crime Lab Item 5-2**). In addition, the analyst disassembled the knife handle to expose its inner surfaces and took additional swabs, including a swab from the entire blade (**Item 1A**), a swab of the hilt of the knife (**Item 1B**), a swab of the entire outside surfaces of the knife handle (**Item 1C**), and a swab of the entire inside surfaces of the knife handle (that surfaces that had been exposed when the knife was disassembled (**Item 1D**). She recovered no human DNA from the swab of the blade, the swab of the hilt, and the swab of the inside surfaces of the knife handle. However, she did recover 41 pg of human DNA from the swabs of the outside surfaces of the knife handle.

The analyst combined the DNA extracts from 5-2, 1C, and 1D (knife handle; approximately 112 picograms of human DNA in all) and amplified it with Qiagen's Investigator 24plex QS system. She then separated the amplicons and generated DNA profiles on a 3500 Genetic Analyzer platform. She interpreted the profile with Genemapper ID-X software and deconvoluted the mixture she obtained using STRmix probabilistic genotyping. This combination of chemistries, software, and instrumentation is considerably more sensitive and reliable than the DNA testing performed at the BK Crime Lab in 2008 and generated a much more complete and genetically informative DNA profile that included DNA from at least three persons, with a mixture ratio of approximately 71:24:6, where the victim and two unknown males were included, while the

defendant was excluded. The difference between the Identifiler profile that the BK Crime Lab analyst generated from the swabs of the knife handle (Item 16B) and the Investigator 24plex profile that the FA Crime Lab analyst generated from the knife handle extracts is stark and demonstrates the advancement in technology discussed above.

Importantly, the new FA Crime Lab testing provided extremely strong statistical support for the presence of the victim's DNA on the knife handle, suggesting that the knife was, in fact, the murder weapon. The new testing also revealed the presence of DNA from two unidentified males and verified the BK Crime Lab's earlier finding that the defendant's DNA is *not* one of these two (as yet unidentified) males.

Notably, the FA Crime Lab analyst's 3/7/2019 report (Results section, #5) indicates that the new DNA profile from the knife is suitable for additional reference comparisons. No additional references have been provided to the lab, despite the fact an alternate suspect, Terry Sprinkle, was identified by police early in the investigation.

Also of interest is the fact that the FA Crime Lab analyst sent the lab reports and supporting DNA files to Acadiana Criminalistics Laboratory in New Iberia, LA for review and possible entry into the CODIS database. In a declaration dated 9/28/2023, Forensic Chemist Jeremy Dubois states that "The mixed partial deduced DNA profile from the combined FAS and DOJ swabs of the knife handle was determined to be suitable and it was entered into the CODIS database on 10/14/2021 in accordance with local, state, and national regulations where regular searches are performed." However, it is very unclear to me whether he uploaded the deduced profile of the primary contributor (who we know to be the victim) or whether he was able to glean enough information about the second and third contributors for a CODIS upload. In examining the "Component Interpretation" section of the STRmix deconvolution report for this sample that was generated by the FA Crime Lab during their analyses (and conditions on the victim as a known contributor), the highest genotype weight for any locus for the second (24%) contributor is only 70.47% (D2S441), and most are far lower. The situation is even worse for the third (6%) contributor, where the highest genotype weight is only 43.93% (TH01). Moreover, the amount of DNA attributed to the second and third contributors is vanishingly low. The total DNA recovered from the combined handle sample was only 112 pg. About 24% of that (27 pg) came from Contributor 2 and only about 6% came from Contributor 3 (6.7 pg). That amounts to only 4-5 cells' worth of DNA from Contributor 2 and only 1-2 cells' worth of DNA from Contributor 3. It's hard to imagine that a CODIS-unloadable profile could be obtained from so little DNA, especially in the context of a complex, mixed sample. In any event, Mr. Dubois' declaration reports that "As of the date of this declaration, there has been no offender hit or match resulting from the submission of the above-mentioned profiles to CODIS.

As a final note, the FA Crime Lab analyst detected three possible areas of blood on the blade that were *not* detected by the BK Crime Lab analyst. Although the FA Crime Lab analyst did not perform DNA testing on swabs from the blade, she did discover human DNA in the extract from the original BK Crime Lab residual swab material (**Item 16A**), and it's very possible (if not probable) that she would have detected the victim's DNA on the blade had she looked for it. (Recall that all five of the alleles detected on the blade swabs by the BK Crime Lab analyst are

carried by the victim.) I strongly recommend that this testing be performed by the FA Crime Lab to establish whether the putative blood discovered on the blade came from the victim.

END OF REPORT

Respectfully submitted,

Ruth Ballard, Ph.D.
Forensic DNA Consultant