

## CASE REPORT

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# The Recovery of Seminal Components and DNA from the Vagina of a Homicide Victim 34 Days Postmortem

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**ABSTRACT:** The body of an 18-year-old female was discovered in a gravel pit in Northern Maine. Investigation determined the body to be that of a woman who had disappeared from the Bangor, Maine area 34 days earlier. Laboratory examination revealed the presence of intact spermatozoa, P30 and restriction fragment length polymorphism (RFLP) typable DNA on a vaginal swab and smear slide collected at autopsy.

**KEYWORDS:** forensic science, spermatozoa, P30, enzyme-linked immunosorbent assay, DNA, postmortem, restriction fragment length polymorphism, homicide

### Case History

On the morning of November 30, 1990, the body of a white female was discovered by a worker in a gravel pit located in northern Maine. Investigation revealed the body to be that of an 18-year-old female who disappeared from the Bangor, Maine area during the early morning hours of October 27, 1990. The body was located approximately 12 meters west of a main road, hidden from street view by a fallen tree and a sand embankment. The victim was in a prone position with her head slightly lower than her feet. The only items of clothing found on the victim were two pairs of socks. All other clothing articles, including the sweatshirt she was wearing when last seen, had been placed on the victim's back or next to her body. The weather conditions over the 34 day period are outlined in Table 1.

The body was removed to the morgue and an autopsy was conducted on the evening of November 30. The anterior portions of the body were macerated by moisture. The face was darkened by decomposition with some degree of mummification. The skin on the back was well preserved. A reddened zone separated the anterior macerated area from the well preserved lateral and posterior areas. No significant pathological changes were noted in the internal organs, including the vaginal cavity, cervix and corpus uteri. Liquid blood was present in the great vessels of the heart.

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TABLE 1—Weather conditions over the 34 days since the victim's disappearance.\*

Highest recorded temperature	22°C
Lowest recorded temperature	-6°C
Average high temperature	9°C
Average low temperature	0°C
Average daily mean temperature	4°C
Total rain fall	10.5 cm

\*Conditions taken at Bangor International Airport located approximately 11 miles from the location of the body.

The cause of death was determined to be a fractured skull resulting from blunt trauma.

During the autopsy, one vaginal swab was collected. A smear slide was prepared from the swab. Both items were air dried, packaged and forwarded to the Maine State Police Crime Laboratory for analysis. Analysis of the slide by a chemist at the crime laboratory revealed the presence of several intact spermatozoa. Analysis by the FBI Laboratory extracted an abundance of high molecular weight DNA from the male fraction of the swab.

In August of 1990, a 15-year-old female survived a vicious attack in the southern part of the state. During the attack the victim was raped and stabbed in the chest. The perpetrator then slashed the girl's throat, buried her in a shallow grave, and left her for dead. After the perpetrator fled the scene, the girl made her way to a neighboring house for assistance. Based on the detailed descriptions provided by the victim, the perpetrator was found and arrested.

Detectives working on the northern Maine homicide case were alerted to the attack and began to investigate the possibility that the two cases were related. The investigators discovered that the perpetrator of the southern Maine attack had been released from prison on October 5, 1990 and was living in the Bangor area in October 1990. In addition, he had been seen in Bangor on the evening the 18-year-old woman disappeared, and he was involved in a serious automobile accident early the next morning. After the accident, the suspect was confined to the hospital for 15 days. He then spent several weeks at home recuperating with a broken leg. Therefore, the defendant did not have the opportunity to commit the crime after the morning of October 27.

The prosecution sought to establish that the victim had been raped and killed within hours after her disappearance. The defense contention was that the victim had been seen alive by a local bus

driver in Bangor on or about October 30—and as late as November by an acquaintance. The defense also claimed that the victim had left a brief telephone message on a friend’s answering machine six days after the disappearance. If that were true, and she was murdered thereafter, the defendant could not be guilty. The prosecution maintained that the bus driver and acquaintance were mistaken in their sightings and that it was not the victim who had called her friend.

The presence of intact spermatozoa and P30 and the subsequent RFLP typing of the vaginal specimen would prove crucial in the homicide case. The prosecution’s theory of the case required the following assumptions.

1. P30 and intact spermatozoa would not be found in the vagina of a living, ambulatory female three to six days after coitus;
2. Intact spermatozoa and P30 can be isolated from the vagina of a deceased female 34 days postmortem.

**Spermatozoa**

Several articles (1–3) provide information concerning the detection of intact spermatozoa with regard to time since ejaculation. Intact spermatozoa have been found between 16 and 26 hours after intercourse. On rare occasions, intact spermatozoa have been found as late as 72 hours post coitus (4).

A search of current literature uncovered a limited number of articles concerning the length of time postmortem that spermatozoa can be isolated from the vagina. Wilson (5) identified the presence of spermatozoa 16 days postmortem in the vagina of a homicide victim. Willott (6) reported the detection of, “semen . . . in the vagina of one of the Christie victims after she had been dead between 3 and 4 months.” Spitz and Fisher (7) stated, “decomposition of the body does not preclude the possibility of finding identifiable spermatozoa . . . as a general rule, if the lining cells of the

vaginal and oral cavities are preserved, the possibility of identifying spermatozoa is reasonably good.”

**P30**

With regard to time and the detection of P30 in the vagina of living females, Graves et al. (8) (using ELISA) reported the mean decay time of P30 to be 27 hours. The shortest interval for detecting P30 was 13 hours and the longest 47 hours post coitus. Graves et al. further reported that after 48 hours, the levels of P30 dropped to below detectable limits (7.5 ng/swab). Poyntz and Martin (9), using crossover electrophoresis, report tests for P30 were positive on most swabs collected within 8 hours and one case 13 hours of intercourse. Baechtel (10) stated in case work, positive results were obtained only on samples collected within 6 hours. Regarding recovery of P30 in the vagina of a deceased person, the author is familiar with one case in which P30 was detected 1 to 4 days postmortem (11).

**DNA**

Although it is well established that DNA can be extracted from long-deceased bodies (12,13), research of the literature uncovered no articles pertaining to time of death and the isolation of high molecular weight DNA from vaginal swab samples.

**Laboratory Findings**

The submitted vaginal smear slide was stained using Florence iodine solution. Microscopic examination revealed the presence of several, easily isolated, intact spermatozoa on the slide. The submitted cotton swab was retained and stored in a freezer at -69°C. In November of 1991, the cotton swab was forwarded to the FBI Laboratory. Testing for P30 using ELISA reported the absorbance on the monoclonal antibody to be .657, well in excess

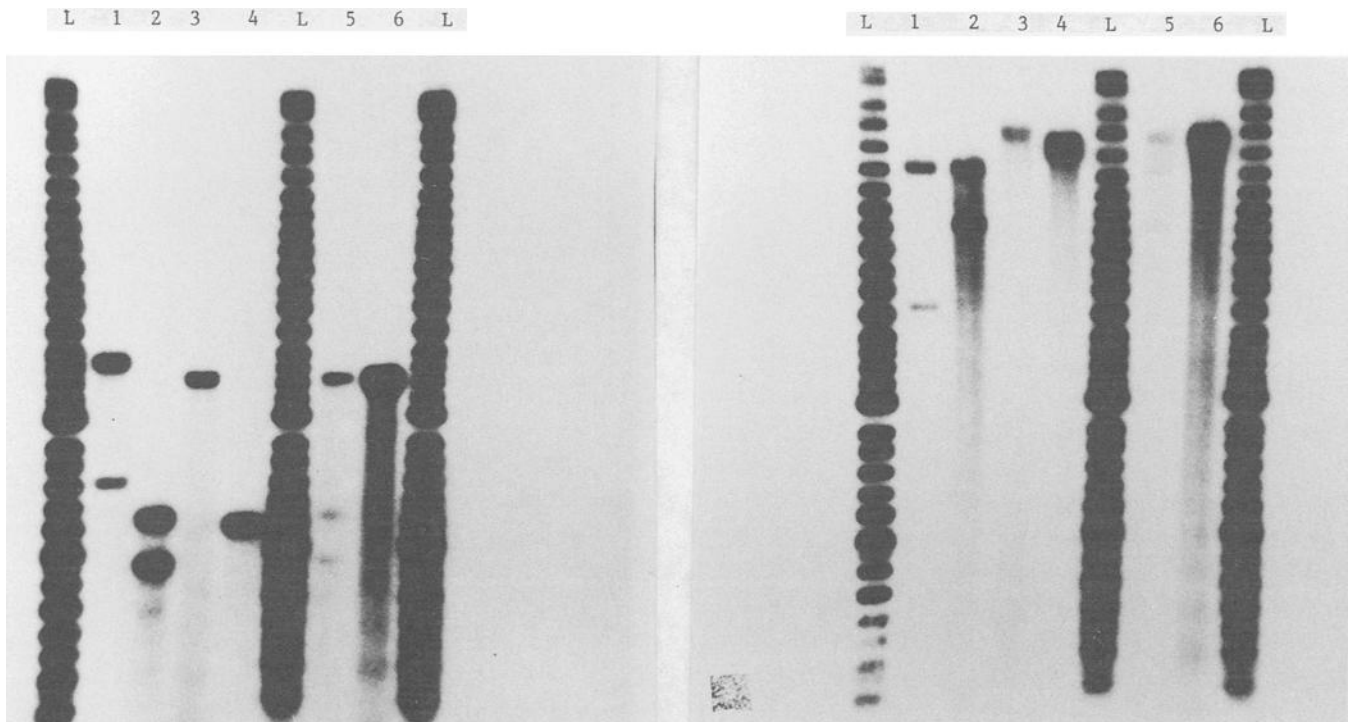


FIG. 1—Autoradiographs showing results of D2S44 (left) and D4S139 (right). Lanes L, BRL DNA analysis marker ladder; 1, K562 control DNA; 2, suspect’s blood DNA; 3, victim’s blood DNA; 4, alternate suspect’s blood DNA; 5, vaginal swab (male fraction); 6, vaginal swab (female fraction).

of the FBI's .398 absorbance for the 10 ng/mL cut-off limit. A swatch taken from the swab was forwarded to the DNA Analysis Unit of the FBI Laboratory for RFLP analysis. DNA profiles for genetic loci D2S44, D1S7 and D4S139 were developed from HAE III digested high molecular weight DNA extracted from the vaginal swab. The DNA profile for genetic locus D17S79 was uninterpretable. The DNA profile from the vaginal swab matched the DNA profile of the suspect. Figure 1 shows the autoradiograms obtained for two of the loci. The probability of selecting an unrelated individual at random from the population having a DNA profile matching the vaginal swab was approximately 1:500,000 in Caucasians, 1:400,000 in Blacks and 1:200,000 in Hispanics. It should be noted that the population of the State of Maine is approximately 1.2 million with non Caucasian groups making up approximately 2% of the population.

### Conclusion

A limited number of articles exist pertaining to time and the detection of seminal components and high molecular weight DNA in samples collected from the vaginal cavity of deceased persons. In this case, intact spermatozoa, P30, and DNA were recovered from a vaginal swab taken from a homicide victim 34 days post-mortem. These findings support Spitz and Fisher's theory concerning the detection of spermatozoa in decomposing bodies and provides useful information about the persistence of seminal components in the vagina of a deceased victim.

In addition, this case underscores the importance of collecting swabs and smear slides in cases where sexual assault is suspected. Pathologists and investigators should not be biased by the presence of decomposition or time factors. In this case, climate, weather conditions, time of year, and position of the body helped keep decomposition to a minimum and preserve the seminal components in the vaginal cavity.

### Acknowledgment

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