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THE USE OF SCIENTIFIC EVIDENCE IN RAPE PROSECUTIONS

I. INTRODUCTION

Rape is defined as “unlawful sexual intercourse with a female without her consent.”¹ The crime has three basic elements: lack of consent,² penetration,³ and identification of the assailant.⁴ Successful rape prosecutions are increasingly utilizing scientific evidence to investigate⁵ and prove the elements of rape. The purpose of this paper is to explore the many uses of scientific evidence with an eye towards providing a useful checklist to aid attorneys involved in a rape prosecution.

A few caveats are necessary at the outset. First, this paper is not designed to be an exhaustive inquiry into all aspects of science and rape. Therefore, the attorney should constantly remain alert for other areas in which scientific evidence may be used to advance his case. Second, not all of the procedures outlined in this paper are admissible in court.⁶ They may, however, be useful in aiding investigations and in gathering information. The attorney should research the law of his jurisdiction to determine if a particular type of evidence is admissible. Third, the use of scientific evidence in criminal cases is usually not testimonial in nature and, therefore, does not violate a defendant’s fifth amendment right against self-incrimination.⁷ However, certain methods of obtaining such evidence, such as the forcible extraction of a semen sample, may violate a defendant’s rights if the procedure “shocks the conscience”⁸ or is a major intrusion of the body.⁹ Fourth, the attorney should be

1. BLACK’S LAW DICTIONARY 1134 (5th ed. 1979).

2. See *infra* notes 12-26 and accompanying text.

3. See *infra* notes 27-62 and accompanying text.

4. See *infra* notes 63-131 and accompanying text.

5. See *infra* notes 132-53 and accompanying text.

6. The majority of jurisdictions follow the general scientific acceptance test outlined in *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), to determine the admissibility of scientific evidence.

7. See *Schmerber v. California*, 384 U.S. 757 (1966).

8. *Rochin v. California*, 342 U.S. 165 (1952).

9. See, e.g., *Adams v. State*, 260 Ind. 663, 299 N.E.2d 834, 837, *cert. denied*, 415 U.S. 935 (1973) (focusing on compelled bullet removal).

aware that a minority of jurisdictions¹⁰ require corroborative evidence to support a victim's testimony. The use of scientific evidence takes on an even greater role in these jurisdictions.¹¹ Lastly, many of the evidence-gathering methods outlined here will be useful only in non-statutory rape situations.

II. PROOF OF LACK OF CONSENT

A. *Physical Proof—The Medical Examination*

The initial medical treatment given to a rape victim is of vital importance in gathering scientific evidence that can be used at trial. Numerous specimens¹² should be taken from the victim including swabs from the vaginal, anal, and oral areas.¹³ It is also essential that the examiner take note of any scratches, cuts, or bruises¹⁴ that are present. This is particularly important where the defendant admits to having intercourse but denies that it was forcible, because evidence will then focus on testimony concerning "cuts, bruises, vaginal tears, and other indicia of trauma, [and] not the presence of sperm or semen in the vagina."¹⁵

A number of jurisdictions have taken steps to ensure the adequate collection and preservation of scientific evidence in rape cases through the use of Evidence Collection Kits.¹⁶ In addition, procedures have been outlined to aid in the gathering of such evidence.¹⁷ The initial examination, however, should not end the medical role in the case. "The victim should be re-examined 24 hours or more later for deep bruising which might not be apparent at the

10. *Criminal Law—Supreme Court Review (Nebraska Survey)*, 15 CREIGHTON L. REV. 213, 220 n.65 (1981).

11. For a discussion of the corroboration requirement, see Hibey, *The Trial of a Rape Case: An Advocate's Analysis of Corroboration, Consent, and Character*, 11 AM. CRIM. L. REV. 309, 310-21 (1973); Note, *Recent Statutory Developments in the Definition of Forcible Rape*, 61 VA. L. REV. 1500 (1975); Note, *The Rape Corroboration Requirement: Repeal Not Reform*, 81 YALE L.J. 1365 (1972).

12. For a checklist of specimens that should be obtained, see Paul, *The Medical Examination of the Live Rape Victim and the Accused*, 1982 MED. TRIAL TECH. Q. 424, 441-42.

13. A. MOENSSENS & F. INBAU, *SCIENTIFIC EVIDENCE IN CRIMINAL CASES* 251-52 (2d ed. 1978).

14. See Stone & Stone, *Scientific Evidence in Rape Cases*, 41 TEX. B.J. 517, 521 (1978).

15. Weninger, *Factors Affecting the Prosecution of Rape: A Case Study of Travis County, Texas*, 64 VA. L. REV. 357, 374 (1978).

16. See Poma, *Sexual Assault: Collection of Evidence*, 162 ILL. MED. J. 473, 476 (1982).

17. See Enos, Beyer & Mann, *The Medical Examination of Cases of Rape*, 17 J. FORENSIC SCI. 50 (1972); Paul, *supra* note 12, at 441-42; Wertheimer, *Examination of the Rape Victim*, 71 POSTGRADUATE MED. 173 (1982).

first examination."¹⁸

B. *Psychological Proof*

1. Common Stress Reactions

A rape victim is obviously involved in a highly stressful situation. An alert prosecutor will be aware of this and utilize psychiatric testimony, when admissible, to bolster his case.¹⁹ Psychiatrists have identified several reaction stages that individuals experience when confronted with stressful situations.²⁰ Testimony that a victim demonstrated behavior consistent with one or more of these stages would logically strengthen the argument that the victim suffered from stress caused by a rape.

2. Rape Trauma Syndrome

In the past decade, the rape victim emotional pattern has been identified and labeled as the "Rape Trauma Syndrome." A 1972-73 study of ninety-two victims of forcible rape, conducted by Doctors Lynda Holmstrom and Ann Burgess,²¹ categorized emotional reaction phases identified among rape victims.²²

18. Sharpe, *The Significance of Spermatozoa in Victims of Sexual Offenses*, 89 CAN. MED. A.J. 513 (1963).

19. See Comment, *Scientific Evidence in Rape Prosecutions*, 48 UMKC L. REV. 216, 221 (1980). The present article develops and updates many of the concepts presented in the UMKC Law Review comment.

20. Rotman & Nadelson, *The Rape Victim: Psychodynamic Considerations*, 133 AM. J. PSYCHIATRY 408, 409 (1976). The reaction phases can be summarized as follows:

1. anticipatory or threat phase whereby the victim creates emotional defenses, such as an illusion of invulnerability, yet retains enough grasp on reality to ward off danger;
2. impact phase in which the victim is stunned, bewildered and fearful;
3. post-traumatic or "recoil" phase during which emotional and behavioral control reemerges; and
4. post-traumatic reconstitution phase in which the victim exhibits a decrease in self-esteem and blames herself for inattention to danger.

Id. at 409. Variations on this theme have been enunciated. See Sutherland & Scherl, *Patterns of Response Among Victims of Rape*, 40 AM. J. ORTHOPSYCHIATRY 503 (1970).

21. Burgess & Holmstrom, *Rape Trauma Syndrome*, 131 AM. J. PSYCHIATRY 981 (1974); see also Holmstrom & Burgess, *Assessing Trauma in the Rape Victim*, 75 AM. J. NURSING 1288, 1291 (1975). For a detailed judicial discussion of rape trauma syndrome, see *In re Pittsburgh Action Against Rape*, 494 Pa. 15, 28-30, 428 A.2d 126, 138-40 (1981) (Larsen, J., dissenting). Burgess & Holmstrom, *supra* note 21, at 982-84.

22. A breakdown of these phases is as follows:

I. Acute Phase: Disorganization

A. Impact Reactions—

(duration: first several hours)—victim experiences shock, fear, disbelief, an-

The introduction of testimony concerning rape trauma syndrome has been met with a mixed reaction by the courts. Some courts have admitted such testimony in criminal cases for limited purposes.²³ Minnesota, however, has firmly refused to recognize rape trauma syndrome evidence.²⁴ In two other cases such evidence has been introduced without the court deciding on its admissibility.²⁵ It is safe to say, however, that rape trauma syndrome testimony is more readily accepted in civil cases.²⁶

ger, restlessness, or calm exterior masking reactions.

B. Somatic Reactions—

(duration: first several weeks)—victim experiences physical trauma (e.g., soreness, bruising), skeletal muscle tension (headaches, fatigue, insomnia), gastrointestinal irritability (stomach aches, nausea, lack of appetite), genitourinary disturbance (vaginal discharge, itching, rectal bleeding in cases of anal sex).

C. Emotional Reactions—

wide variance of reactions among victims ranging from fear and embarrassment to anger and self-blame.

II. Long-Term Process; Reorganization

A. Motor Activity—

activity increases, victim changes address and/or phone number, victim increases dealings with her family.

B. Nightmares—

C. Traumatophobia—

victim experiences fear of indoors, fear of outdoors, fear of being alone, fear of crowds, and/or sexual fears.

23. See, e.g., *State v. Marks*, 231 Kan. 645, 647 P.2d 1292 (1982) (admissible to rebut allegation of consensual conduct); *State v. Jackson*, 97 N.M. 467, 641 P.2d 498 (1982) (prosecution introduced testimony of expert retained by defendant indicating the victim suffered from a severe case of rape trauma syndrome); *State v. Middleton*, 294 Or. 427, 657 P.2d 1215 (1983) (testimony admissible regarding the reactions of the typical rape victim, and to explain prior inconsistent statements by the prosecutrix).

24. *State v. McGee*, 324 N.W.2d 232 (Minn. 1982); *State v. Saldana*, 324 N.W.2d 227 (Minn. 1982). For a review of these two cases, see 69 A.B.A. J. 96 (1983).

25. In *People v. Mathews*, 91 Cal. App. 3d 1018, 154 Cal. Rptr. 628 (1979), the defendant was allegedly raped by one Ghormley and two others. The following month the defendant encountered Ghormley and shot at him, missing him but killing one Silva instead. The defendant introduced testimony regarding rape trauma syndrome as a defense concerning her (1) alleged fear for her life upon seeing Ghormley, and (2) inability to form the requisite mental state for malice aforethought. The prosecution did not contest this evidence but instead tried to prove that the defendant was the initial aggressor, contesting the defendant's story that Ghormley pulled a gun on her first. The defendant was convicted of voluntary manslaughter and discharging a firearm at a vehicle. In *State v. Mackie*, ___ Mont. ___, 622 P.2d 673 (1981), the prosecution offered rape trauma syndrome testimony to justify the excited utterance exception to the hearsay rule and gain admittance for statements made by the victim to a rape counselor. The court ruled that the statements were not hearsay without reaching the question of the acceptability of rape trauma syndrome testimony.

26. See *Division of Corrections v. Wynn*, 438 So. 2d 446 (Fla. Dist. Ct. App. 1983); *Alphonso v. Charity Hosp.*, 413 So. 2d 982 (La. 1982); *Terrio v. McDonough*, 16 Mass. App. Ct. 163, 450 N.E.2d 190 (1983); *White v. Violent Crimes Compensation Bd.*, 76 N.J. 368, 388 A.2d 206 (1978).

III. PROOF OF PENETRATION

Penetration of the vagina by the penis must occur to satisfy the definition of rape.²⁷ For several reasons, the attorney must be careful in attempting to prove or disprove penetration. First, emission is not an element of rape;²⁸ therefore, negative vaginal smears are not conclusive evidence that a rape did not occur. Conversely, a positive vaginal smear may occur even though penetration did not take place. Semen emission may have occurred outside of the vagina and, through movement, resulted in a positive vaginal smear. More reliable indicators of penetration include venereal disease, lubricants, or a positive toluidine blue test. Finally, it must be remembered that proof of penetration is not proof of non-consensual sexual intercourse.

A. *Pregnancy*

Of course, pregnancy is indicative of intercourse. In cases of statutory rape the complaint is often filed when pregnancy has advanced considerably.²⁹ In cases of forcible rape, however, pregnancy rarely occurs because the victim is usually given drugs which protect against it.³⁰

B. *Venereal Disease*

The presence of venereal disease in the victim is also indicative of intercourse. Again, this is rare in forcible rape cases because of the use of drugs which protect against these diseases.³¹

C. *Toluidine Blue*

The use of toluidine blue is a newly developed procedure designed to detect minute lacerations in the vaginal area caused by forcible penetration.³² Doctors Alison Lauber and Micki Souma examined twenty-two women who had been sexually assaulted, and

27. See, e.g., *Bailey v. Commonwealth*, 82 Va. 107, 113 (1886).

28. See, e.g., *Coles v. Peyton*, 389 F.2d 224, 227 (4th Cir. 1968).

29. Bornstein, *Investigation of Rape; Medicolegal Problems*, 1963 MED. TRIAL TECH. Q. 229, 232.

30. Burgess & Holmstrom, *supra* note 21, at 982.

31. *Id.*

32. See Lauber & Souma, *Use of Toluidine Blue for Documentation of Traumatic Intercourse*, 60 OBSTETRICS & GYNECOLOGY 644 (1982).

twenty-two women who had consented to sexual intercourse. A solution of toluidine blue was applied to the women's genital areas. The presence of lacerations resulted in a deep royal blue coloration of the solution. Forty percent of the sexual assault victims had positive results, while only two women from the consenting group suffered lacerations.³³

The toluidine blue procedure is not yet ready to pass the *Frye* test for admissibility of scientific evidence.³⁴ The authors themselves state that "a positive toluidine blue test . . . is supportive though not conclusive evidence of sexual assault."³⁵ However, the potential for toluidine blue testing is intriguing and the attorney should strive to keep up to date with developments in this area.

D. *Lubricants*

It is not uncommon for lubricants to be used in cases of forcible rape. As a result, the presence of a lubricant may support the victim's allegations of rape.³⁶ Also, the identification of a type or brand of lubricant used may help to link a defendant with the crime. Two methods are available to identify lubricants: fluorescence electrosopy and gas-liquid chromatography.³⁷

E. *Spermatozoa*

The presence of spermatozoa has traditionally served as major evidence that intercourse took place. Nevertheless, there are pitfalls to this type of evidence. The presence of spermatozoa can only be detected for a limited period³⁸ and its presence in the vagina is not conclusive evidence that intercourse has occurred.³⁹ Furthermore, the lack of spermatozoa in the vagina is far from conclusive that intercourse did not occur, especially in a society where vasectomies and azoospermia⁴⁰ are not uncommon.

33. *Id.* at 646.

34. *See supra* note 6.

35. Lauber & Souma, *supra* note 32, at 647.

36. *See* Blackledge & Cabiness, *Examination for Petroleum Based Lubricants in Evidence from Rapes and Sodomies*, 28 J. FORENSIC SCI. 451, 460 (1983).

37. It is beyond the scope of this paper to attempt to explain in any detail these and other medical and scientific terms and techniques. For a detailed explanation of these methods, see Blackledge & Cabiness, *supra* note 36, at 452-53.

38. *See infra* notes 41-42 and accompanying text.

39. *See infra* notes 43-44 and accompanying text.

40. Azoospermia is "the condition characterized by lack of spermatozoa in the semen."

There is a limit to how long spermatozoa are detectable after intercourse. One study indicated that motile sperm can be found up to six hours after intercourse.⁴¹ Another experiment concluded that “[s]permatozoa were usually found up to 3 days after intercourse and were occasionally found up to 6 days afterwards. Smears without spermatozoa were obtained from swabs as early as 28 hours, but remained rare until 2 days after intercourse.”⁴² It thus seems safe to conclude that any examination conducted within twenty-four hours after intercourse will reveal any spermatozoa present.

The presence or absence of spermatozoa near a certain region of the body is not necessarily indicative of emission occurring or not occurring in that region. For example, spermatozoa may penetrate the vagina if they are deposited on the outer genitalia and the victim remains on her back for an extended period of time.⁴³ Likewise, spermatozoa may escape from the vagina if a victim walks for a prolonged period after intercourse.⁴⁴ It is also not uncommon for spermatozoa to be present in the anal canal and rectum of a rape victim even though sodomy did not occur.⁴⁵ It is, however, rare that spermatozoa are present in the victim's oral cavity if fellatio did not take place.⁴⁶ Furthermore, vasectomized and azoospermic males would, of course, leave no spermatozoa. Nevertheless, the traditional test for spermatozoa has justifiably remained an essential tool in rape prosecutions.⁴⁷

BLACK'S MEDICAL DICTIONARY 77 (31st ed. 1976).

41. Sharpe, *supra* note 18, at 513.

42. Davies & Wilson, *The Persistence of Seminal Constituents in the Human Vagina*, 3 FORENSIC SCI. 45 (1974). Another study found spermatozoa in internal and external vaginal swabs five days after intercourse. See Willott & Allard, *Spermatozoa—Their Persistence After Sexual Intercourse*, 19 FORENSIC SCI. INT'L 135, 136 (1982).

43. Sharpe, *supra* note 18, at 513.

44. *Id.*

45. Enos & Beyer, *Spermatozoa in the Anal Canal and Rectum and in the Oral Cavity of Female Rape Victims*, 23 J. FORENSIC SCI. 231, 232 (1978).

46. *Id.*

47. For an overview of the methods used for extracting spermatozoa from clothing, see Hueske, *Technique for Extraction of Spermatozoa from Stained Clothing: A Critical Review*, 22 J. FORENSIC SCI. 596 (1977). For an understandable review of information-gathering techniques used in rape cases, see Boyce & McCloskey, *Legal Application of Standard Laboratory Tests for the Identification of Seminal Fluid*, 7 J. CONTEMP. L. 1 (1982).

F. Acid Phosphatase

Another substance tested for in medical examinations of rape victims is acid phosphatase. Research indicates that the normal acid phosphatase content of body fluid is twenty units per cubic centimeter. Semen, however, has an acid phosphatase content of 400-8000 units per cubic centimeter.⁴⁸ Therefore, an abnormally high concentration of acid phosphatase is a reliable indication of the presence of seminal fluid. Furthermore, seminal acid phosphatase can be distinguished from vaginal acid phosphatase.⁴⁹ In addition to determining the probable occurrence of ejaculation, the acid phosphatase test is also useful in determining the time of coitus.⁵⁰

Like spermatozoa, acid phosphatase can only be detected soon after intercourse. One study indicated that "[s]eminal acid phosphatase sometimes remained detectable up to 3 days after sexual intercourse. The test was most useful on swabs taken within 1 day and rarely useful after 2 days."⁵¹ Another study revealed a positive acid phosphatase reaction for periods longer than one day.⁵² Yet another experiment concluded that "acid phosphatase activity will only be useful on anal and rectal swabs when semen is abundant and will not be helpful on vaginal swabs more than two days after the offense."⁵³ Therefore, it is safe to conclude that the test for acid phosphatase should also be conducted within twenty-four hours after intercourse.

Another tremendous advantage of the acid phosphatase test is that it does not rely on the presence of spermatozoa for positive results. In fact, the acid phosphatase activity is not in the spermatozoon itself, but rather in the seminal fluid.⁵⁴ As a result, the acid phosphatase test can be used in cases involving azoospermic or

48. Fisher, *Acid Phosphatase Tests as Evidence of Rape*, 240 NEW ENG. J. MED. 738 (1949); see also Gutman & Gutman, *Quantitative Relations of Prostatic Component (Acid Phosphatase) of Human Seminal Fluid*, 28 ENDOCRINOLOGY 115, 118 (1941).

49. Adams & Wraxall, *Phosphatases in Body Fluids: The Differentiation of Semen and Vaginal Secretion*, 3 FORENSIC SCI. 57 (1974).

50. Findley, *Quantitation of Vaginal Acid Phosphatase and Its Relationship to Time of Coitus*, 68 AM. J. CLINICAL PATHOLOGY 238, 242 (1977).

51. Davies & Wilson, *supra* note 42, at 45.

52. Rupp, *Sperm Survival and Prostatic Acid Phosphatase Activity in Victims of Sexual Assault*, 14 J. FORENSIC SCI. 177, 183 (1969).

53. Willott & Allard, *supra* note 42, at 153.

54. See Adams & Wraxall, *supra* note 49, at 62.

vasectomized males.⁵⁵ In addition, research has indicated that an acid phosphatase test will be positive even in those cases where chronic alcoholism has resulted in an absence of sperm.⁵⁶ This is not to imply, however, that the acid phosphatase test should be used to the exclusion of the test for spermatozoa. Both tests are useful, reliable, and important to any rape investigation.⁵⁷

G. *Choline*

Yet another substance present in human semen is choline. Several tests have been developed to detect the presence of choline.⁵⁸ However, a significant drawback to these is that choline must be detected very soon after intercourse. One study indicated that "[c]holine was usually only detectable on swabs taken within 1 day of intercourse and even within this time many negative results were obtained."⁵⁹ As a result, the choline test should only supplement the tests for spermatozoa and acid phosphatase.

H. *Semen—Specific Protein*

A new procedure is being developed whereby seminal plasma protein can be identified, purified, and characterized.⁶⁰ This new semen marker would have advantages over the test for spermatozoa (because azoospermic and vasectomized males are not subject to detection), and the acid phosphatase test (because acid phos-

55. *Id.*

56. Enos & Beyer, *Prostatic Acid Phosphatase, Aspermia, and Alcoholism in Rape Cases*, 25 J. FORENSIC SCI. 353, 355-56 (1980).

57. For summaries of the acid phosphatase test in laymen's terms, see Boyce & McCloskey, *supra* note 47, at 1; Raju & Iyengar, *Acid Phosphatase Reaction as a Specific Test for the Identification of Seminal Stains*, 55 J. CRIM. L., CRIMINOLOGY & POLICE SCI. 522 (1964) (concentrating on seminal stains). For an in-depth, technical description of the acid phosphatase test, see Kind, *The Acid Phosphatase Test*, 3 METHODS FORENSIC SCI. 267 (1964).

58. These tests are the Florence method, paper chromatography, thin-layer chromatography, and the enzymatic method. See generally Hessel, Modglin & Webster, *The Identification of Seminal Fluid by Thin-Layer Chromatography*, 12 J. FORENSIC SCI. 554 (1967); Levenon, *A Method for Identification of Seminal Stains by Paper Chromatography*, 5 J. FORENSIC SCI. 102 (1960); Suzuki, Matsumoto, Oya, Katsumata & Asano, *A New Enzymatic Method for the Demonstration of Choline in Human Seminal Stains*, 26 J. FORENSIC SCI. 410 (1981); Takatori, Tomii & Tanaka, *The Determination of Choline in Human Semen by the Enzymic Method*, 17 FORENSIC SCI. INT'L 79 (1981).

59. Davies & Wilson, *supra* note 42, at 45.

60. Sensabaugh, *Isolation and Characterization of a Semen-Specific Protein from Human Seminal Plasma: A Potential New Marker for Semen Identification*, 23 J. FORENSIC SCI. 106, 107 (1978).

phatase is not unique to seminal fluid).⁶¹ Unfortunately, "[t]he technique is not yet ready for the courtroom,"⁶² and extensive research is still necessary.

IV. PROOF OF IDENTITY

A. *Blood*

Rape is a violent crime where the victim and her assailant often engage in a physical struggle. As a result, it is not uncommon for blood, either that of the victim or assailant or both, to be present at the rape scene. Although it is currently impossible to say that a blood sample came from a certain person, it is possible, through blood typing, to state that the sample did not come from a certain person, or that it possibly could have come from that person.⁶³ Two methods, one traditional and one novel, can be used to type blood.

The traditional method of blood typing involves antigen-antibody reactions. This typing system, commonly referred to as the AB, typing system was developed by Dr. Karl Landsteiner around the turn of the century.⁶⁴ It is the most familiar and widely accepted typing system. The population breakdown according to the different blood groupings is as follows: Type A—forty-one percent, type B—ten percent, type AB—four percent, type O—forty-five percent.⁶⁵

In recent years a new procedure called electrophoresis has been used. One commentator briefly explains this method:

Many blood components exist in genetically distinct variations. These substances are called polymorphic, which means that although the substances may take different forms, they all serve the same function in the body. Electrophoresis separates some of the polymorphic blood enzymes and other proteins through the use of an electrical current. The blood factors identified by the traditional agglutination tests are often called blood groups or types. The broader term "genetic markers" is applied to the factors identified

61. *Id.* at 106.

62. Comment, *supra* note 19, at 227.

63. See A. MOENSSENS & F. INBAU, *supra* note 13, at 293.

64. Jonakait, *Will Blood Tell? Genetic Markers in Criminal Cases*, 31 EMORY L.J. 833, 836 (1982).

65. Comment, *supra* note 19, at 228.

by the traditional procedure as well as by electrophoresis.⁶⁶

Some researchers believe that this new method is almost capable of telling if a blood sample came from a specific individual.⁶⁷ As a result, several courts have admitted electrophoresis as evidence.⁶⁸ However, this type of evidence is based on little more than probability.⁶⁹ Undoubtedly, both prosecutors and defense attorneys need to keep an eye on future developments in this area.⁷⁰

B. Semen Typing

Sometimes the blood type of an assailant in a rape can be determined by examining his semen. "An inherited trait of about 80% of the population is the ability to secrete a substance in body fluids other than blood which identifies the blood type. These people are referred to as 'secretors'."⁷¹ This testing, however, is not completely reliable.⁷² In addition, as is the case with blood typing, semen typing can only show that the semen did not come from a certain person, or that it may have come from that person.⁷³

Semen typing can be made from smears and stains. The medical examiner should conduct a thorough examination of the victim's entire body, including the "skin about the mucous membrane of the lips, medial and anterior aspects of the thighs, vulva, perineal area, buttocks, and head hair."⁷⁴ Also, an exhaustive search of the rape site should be conducted to uncover any traces of semen.⁷⁵

66. Jonakait, *When Blood Is Their Argument: Probabilities in Criminal Cases, Genetic Markers, and, Once Again, Bayes' Theorem*, 1983 U. ILL. L.F. 369, 370 n.5.

67. *Id.* at 371.

68. Jonakait, *supra* note 64, at 857-72.

69. Jonakait, *supra* note 66, at 371.

70. For information on blood typing, see A. MOENSENS & F. INBAU, *supra* note 13, at 290-304, 336-39; Annot., 46 A.L.R.2d 1000 (1956). For a summary of the trends in blood stain testing, see Baxter, *Grouping of Blood Stains: Present and Future Trends*, 12 CAL. W.L. REV. 284 (1976).

71. Stone & Stone, *supra* note 14, at 518.

72. See 12 AM. JUR. POF, *Identification of Seminal Fluids* § 13 (1962).

73. See Samuels, *Defending a Rape: The Forensic Science Element*, 127 SOLIC. J. 314, 315 (1983).

74. Enos & Beyer, *The Importance of Examining Skin and Hair for Semen in Sexual Assault Cases*, 26 J. FORENSIC SCI. 605, 607 (1981).

75. For an outline of the procedure used to identify semen, see Enos, Mann & Dolan, *A Laboratory Procedure for the Identification of Semen*, 39 AM. J. CLINICAL PATHOLOGY 316, 317 (1963).

C. *Saliva*

Secretor evidence can also be used to identify and type saliva stains.⁷⁶ Although this type of evidence may be rare in cases of rape, it should not be disregarded because there is the possibility that "a cigarette or handkerchief left behind at a crime scene may have saliva stains present."⁷⁷ The identification of saliva can take place through one of four techniques: starch-iodine assay, insoluble starch-dye complex, soluble amylopectin-dye complex, and the use of filter paper with blue starch fragments.⁷⁸

D. *Hair*

Hair examinations are often used in cases of rape. An examination of hair samples can be used to determine a number of things: whether the sample is actually hair,⁷⁹ whether the hair is human or animal,⁸⁰ the sex of the hair source,⁸¹ the race of the hair source,⁸² the region of the body the hair sample came from,⁸³ and whether the hair was from an adult or a child.⁸⁴

There are seven methods available to test hair. The most traditional method is through microscopic comparison. The hair is examined for foreign matter, dye, and curl.⁸⁵ Hairs from different parts of the body can be distinguished using this method. For example, microscopic comparison is commonly used to distinguish pubic hairs from scalp hairs.⁸⁶

Another more reliable technique is neutron activation analysis (NAA).

Neutron activation analysis is based on the principle that when

76. See Sato & Ottensooser, *Blood Group Substances in Body Fluids: Comparison of the Concentrations in Semen and in Saliva*, 14 J. FORENSIC MED. 30 (1967).

77. A. MOENSSENS & F. INBAU, *supra* note 13, at 309.

78. For a discussion of these methods, see Willott & Griffiths, *A New Method for Locating Saliva Stains—Spotty Paper for Spotting Spit*, 15 FORENSIC SCI. INT'L 79 (1980).

79. Imwinkelried, *Forensic Hair Analysis: The Case Against the Underemployment of Scientific Evidence*, 39 WASH. & LEE L. REV. 41, 45-46 (1982).

80. *Id.* at 46-48.

81. *Id.* at 48-49.

82. *Id.* at 49-50.

83. *Id.* at 50-51.

84. *Id.* at 51.

85. A. MOENSSENS & F. INBAU, *supra* note 13, at 410.

86. Gaudette, *Probabilities and Human Pubic Hair Comparisons*, 21 J. FORENSIC SCI. 514, 517 (1976).

materials are irradiated in a nuclear reactor or other neutron source, some of the atoms in the substance are converted into radioactive isotopes. The type of radiation emitted by an element, its energy, and decay rate are specific identifying characteristics. A quantitative analysis can be made by comparing the element's radioactivity with that of standards.

The advantages of neutron activation analysis over other methods of elemental analysis include its sensitivity, size of sample required, and to a certain extent, its nondestructive nature.⁸⁷

NAA is so reliable that one commentator has ventured to say that it is as accurate and conclusive as fingerprint identification.⁸⁸

There remain a number of other techniques by which hair can be analyzed. Perhaps the most promising of these techniques is the scanning electron microscope (SEM).⁸⁹ With the SEM, a hair sample is magnified 100,000 times, enabling the examiner to observe minute characteristics of the sample. In the future, the possibility exists that the SEM will be able to reveal whether a particular hair came from a particular individual.⁹⁰ Another electron method involves the use of the transmission electron microscope (TEM).⁹¹ However, very little has been written on the use of this method.

Extensive research has been conducted on the ion microprobe. This method involves the use of mass spectrometers which analyze the concentration of trace elements present in a sample.⁹² Admission of this type of evidence was rejected in *United States v. Brown*⁹³ when the prosecution attempted to assert that a certain hair came from a certain person.⁹⁴ Nevertheless, the ion microprobe still has potential value as an evidence tool.

87. Forslev, "Nondestructive" Neutron Activation Analysis of Hair, 11 J. FORENSIC SCI. 217 (1966). The NAA technique is utilized infrequently because of its expense.

88. Comment, *supra* note 19, at 232; see also A. MOENSSENS & F. INBAU, *supra* note 13, at 441-62; Comment, *The Evidentiary Uses of Neutron Activation Analysis*, 59 CALIF. L. REV. 997 (1971).

89. See Clement, Hagege, Le Pareux, Connet & Gastaldi, *New Concepts About Hair Identification Revealed by Electron Microscope Studies*, 26 J. FORENSIC SCI. 447 (1981); Verhoeven, *The Advantages of the Scanning Electron Microscope in the Investigative Studies of Hair*, 63 J. CRIM. L. CRIMINOLOGY & POLICE SCI. 125 (1972).

90. Imwinkelried, *supra* note 79, at 55.

91. Clement, Hagege, Le Pareux, Connet & Gastaldi, *supra* note 89, at 448.

92. Imwinkelried, *supra* note 79, at 53; see also *United States v. Brown*, 557 F.2d 541, 555 (6th Cir. 1977).

93. 557 F.2d 541 (6th Cir. 1977).

94. *Id.* at 555.

A novel technique that has tremendous potential is pyrolysis gas chromatography (PGC), which charts the elements contained in the hair sample.⁹⁵ However, more testing needs to be done before the reliability of this technique is established. In addition, dyes, shampoos, sprays and other cosmetic products may have an unknown effect on the procedure.⁹⁶ A similar technique is pyrolysis mass spectrometry (Py-MS).⁹⁷ Here, the sample passes through a mass spectrometer, which analyzes the elements present in the sample. This technique is also not yet ready for the courtroom.⁹⁸ This is not to say, however, that one of the five novel techniques outlined above will not receive judicial approval in the foreseeable future. Undoubtedly, for all scientific evidence that is judicially accepted today, there was a court, spurred on by an innovative attorney, that broke new ground and admitted the evidence. No moratorium has yet been declared by the judicial system on innovation, boldness, and persuasiveness.⁹⁹

E. *Fingerprints*

The use of fingerprint evidence in criminal cases is quite familiar to the legal profession as well as the general public.¹⁰⁰ In rape cases, investigators should be aware that fingerprints can be obtained from human skin. Six techniques have been developed whereby fingerprints may be obtained.

The first technique is electronography.¹⁰¹ This procedure is similar to the procedure used on inanimate objects where a metallic element is applied over the surface. One advantage of this technique is that weak prints can be intensified.¹⁰² A second technique is the Krome-Kote paper method.¹⁰³ This procedure involves the

95. Imwinkelried, *supra* note 79, at 54.

96. *Id.*

97. *Id.* at 54-55.

98. *Id.*

99. For a more in-depth analysis of hair as evidence, see Obrusnik, Gislason, McMillan, D'Auria & Pate, *The Variation of Trace Element Concentrations in Single Human Head Hairs*, 17 J. FORENSIC SCI. 426 (1972); Perkons & Jervis, *Trace Elements in Human Head Hair*, 11 J. FORENSIC SCI. 50 (1966).

100. For background material on fingerprint identification generally, see A. MOENSSENS, *FINGERPRINT TECHNIQUES* (1971); A. MOENSSENS & F. INBAU, *supra* note 13, at 350-96.

101. See Graham, *Some Technical Aspects of the Demonstration and Visualization of Fingerprints on Human Skin*, 14 J. FORENSIC SCI. 1 (1969).

102. *Id.* at 2.

103. See Reichardt, Carr & Stone, *A Conventional Method for Lifting Latent Fingerprints from Human Skin Surfaces*, 23 J. FORENSIC SCI. 135 (1978).

use of a magnetic brush, fingerprint powder, a fiberglass filament brush, lifting tape, and Krome-Kote cards. A third procedure is the iodine-silver plate method.¹⁰⁴ Here, an iodine fuming gun and a silver plate are used to reveal an image which is then photographed.

A fourth method involves autoradiography.¹⁰⁵ This technique is seldom used, however, because it requires rare equipment and expertise. A fifth technique is called laser-induced fluorescence.¹⁰⁶ In this procedure the area in question is illuminated by lasers and then photographed. The prime advantages of this method include its nondestructive character and its ability to be used in conjunction with other methods.¹⁰⁷ A sixth method to recover fingerprints from human skin has yet to receive a name, but it involves the use of iodine and a coated strip of plastic.¹⁰⁸ A dark purple reproduction of the print is produced and mounted. An advantage of this technique is that more than one lift can usually be obtained.¹⁰⁹

The six procedures outlined above are all in the experimental stage. However, the wealth of experimentation in this area underscores the desperate need for attorneys to keep abreast of these developments.

F. *Bite Marks*

An area of scientific evidence that has received little attention in the past is the examination of bite marks. Two methods are used to secure this type of evidence. These methods basically involve the use of photography and the taking of impressions,¹¹⁰ however, variations among these methods exist.¹¹¹ "The identification process involves three stages: the gathering of data about the bite

104. See Adcock, *The Development of Latent Fingerprints on Human Skin: The Iodine-Silver Plate Transfer Method*, 22 J. FORENSIC SCI. 599 (1977).

105. See Feldman, Meloan & Lambert, *A New Method for Recovering Latent Fingerprints from Skin*, 27 J. FORENSIC SCI. 806 (1982).

106. See Dalrymple, Duff & Menzel, *Inherent Fingerprint Luminescence - Detection by Laser*, 22 J. FORENSIC SCI. 106 (1977); Menzel, *Laser Detection of Latent Fingerprints on Skin*, 27 J. FORENSIC SCI. 918 (1982).

107. Dalrymple, Duff & Menzel, *supra* note 106, at 114.

108. See Feldman, Meloan & Lambert, *supra* note 105, at 806.

109. *Id.* at 807.

110. Note, *The Admissibility of Bite Mark Evidence*, 51 S. CAL. L. REV. 309, 312 (1978).

111. See, e.g., Furness, *A New Method for the Identification of Teeth Marks in Cases of Assault and Homicide*, 124 BRIT. DENTAL J. 261 (1968); Glass, Andrews & Jones, *Bite Mark Evidence: A Case Report Using Accepted and New Techniques*, 25 J. FORENSIC SCI. 638 (1980).

mark; comparison with the relevant data of the suspect; and evaluation of the significance of similarities or dissimilarities revealed by that comparison."¹¹²

Investigators should look for bite mark evidence not only on the bodies of the victim and the defendant, but also in or on inanimate objects. One commentator has written:

Objects that are bitten that may be useful in a criminal investigation are either inanimate, primarily foodstuffs, or human tissue. Bites involving foodstuffs will occasionally occur in criminal cases, as criminals sometimes eat at the scene of a crime, leaving their bite marks in the discarded or uneaten portions of food.¹¹³

Nevertheless, the most common use of bite mark evidence involves bites of human flesh. In these cases, speed is of the essence in gathering evidence. The mark in a live body will remain apparent for four to thirty-six hours, while the mark in a dead body remains apparent for twelve to twenty-four hours.¹¹⁴ The areas of the body that are most commonly bitten include "the neck, cheek, arms, thighs, and the female breast."¹¹⁵ Investigators should be aware that it is not always the victim alone who suffers bite marks. The assailant may also have suffered a bite mark in his attempt to subdue the victim. Bite marks often appear at first glance to be bruises,¹¹⁶ but closer inspection should reveal their true character.

Bite mark evidence is gaining respectability in the courts. Genuine *scientific* bite mark evidence was first used in *People v. Marx*¹¹⁷ and *People v. Milone*.¹¹⁸ The courts in these cases ruled that bite mark evidence goes to the weight, not the admissibility, of the evidence. The rulings in these two cases were soundly criticized¹¹⁹ due to the fact that at that time standards for certainty and acceptability of bite mark evidence had not been established

112. Note, *supra* note 110, at 312.

113. Dinkel & Captain, *The Use of Bite Mark Evidence as an Investigative Aid*, 19 J. FORENSIC SCI. 535, 536 (1974).

114. Note, *supra* note 110, at 311.

115. Dinkel & Captain, *supra* note 113, at 537.

116. *Id.*

117. 54 Cal. App. 3d 100, 126 Cal. Rptr. 350 (1975). For a comment on the *Marx* case by the doctors who recorded and preserved the bite mark evidence, see Vale, Sognnaes, Felando & Noguchi, *Unusual Three-Dimensional Bite Mark Evidence in a Homicide Case*, 21 J. FORENSIC SCI. 642 (1976).

118. 43 Ill. App. 3d 385, 356 N.E.2d 1350 (1976).

119. See, e.g., Note, *supra* note 110, at 309.

by forensic odontologists. It appears that steps have been made in this regard, resulting in increased acceptance of such evidence.¹²⁰

G. *Fibers*

The investigator should be aware of the potential that exists for fiber evidence in rape cases. Fibers generally fall within one of four categories: "animal, vegetable, mineral, and synthetics or man-made."¹²¹ Fibers may be transferred from the victim to the assailant, from the assailant to the victim, or from the assailant to the scene of the rape. Concentration in recent years has been on the identification of man-made fibers. Several processes have been identified by which synthetic fibers can be examined: microscopic examination, birefringence, infrared spectrophotometry, and pyrolysis gas chromatography.¹²² There are additional methods which may be used.¹²³ The attorney should keep in mind that it is usually not possible to say that a specific fiber sample came from a specific source.¹²⁴

H. *Fingernail Scrapings*

Every medical examination of a rape victim and suspected assailant should include the taking of scrapings from the individual's fingernails. Often the victim will scratch her assailant in the struggle or the assailant will scratch the victim. Fingernail scrapings have the potential to reveal skin and blood samples.¹²⁵ The blood

120. For additional commentary on bite mark evidence, see DeVore, *Bite Marks for Identification? — A Preliminary Report*, 11 *MED., SCI. & L.* 144 (1971); Holt, *Identification from Bite Marks*, 20 *J. FORENSIC SCI. SOC'Y* 243 (1980); Sperber & Lubin, *Bite Mark Evidence in Crimes Against Persons*, 29 *J. AM. C. HEALTH A.* 165 (1981).

121. A. MOENSSSENS & F. INBAU, *supra* note 13, at 414.

122. For an overview of these methods, see Rouen & Reeve, *A Comparison and Evaluation of Techniques for Identification of Synthetic Fibers*, 15 *J. FORENSIC SCI.* 410 (1970); see also Fox & Schoetzman, *The Infrared Identification of Microscopic Samples of Man-Made Fibers*, 13 *J. FORENSIC SCI.* 397 (1968); Grieve & Kearns, *Preparing Samples for the Recording of Infrared Spectra from Synthetic Fibers*, 21 *J. FORENSIC SCI.* 307 (1976); Grieve & Kotowski, *The Identification of Polyester Fibers in Forensic Science*, 22 *J. FORENSIC SCI.* 390 (1977).

123. See A. MOENSSSENS & F. INBAU, *supra* note 13, at 416-17; Paplauskas, *The Scanning Electron Microscope: A New Way to Examine Holes in Fabrics*, 1 *J. POLICE SCI. & AD.* 362 (1973); Saferstein & Manvra, *Pyrolysis Mass Spectrometry—A New Forensic Science Technique*, 22 *J. FORENSIC SCI.* 748 (1977).

124. A. MOENSSSENS & F. INBAU, *supra* note 13, at 414.

125. See *Cupp v. Murphy*, 412 U.S. 291 (1973).

sample, of course, can be typed.¹²⁶ The skin scrapings can, at the very least, be used to determine the race of the individual.¹²⁷

I. *Allergies*

The allergies of an individual can be determined from a blood-stain.¹²⁸ The finding of specific antibodies in the bloodstream enables the scientist to differentiate among stains, gives clinical information about the individual who left the stain, and sometimes enables the scientist to confine the source of the stain to a narrow population group.¹²⁹

J. *Venereal Disease*

In addition to being useful in proving penetration,¹³⁰ the presence of a venereal disease in the victim or suspected assailant can be helpful in establishing identity. "Should either victim or assailant transmit a venereal infection during the attack . . . it can be used to corroborate the identity of the defendant."¹³¹

V. AIDS TO INVESTIGATION

A. *Polygraph*

One of the most well-known and controversial types of scientific evidence is the polygraph or lie detector test. The polygraph does not detect a lie, but instead measures breathing, blood pressure, pulse, and skin resistance. The key to the entire process is the polygraph examiner. The examiner must convince the subject that he can detect deception. Unfortunately, the talent of the examiner in formulating relevant and control questions, coupled with the subjectivity involved in analysis, renders the polygraph far from fool-proof in criminal investigations.¹³²

126. See *supra* notes 63-70 and accompanying text.

127. See *Harnage v. State*, 49 Ala. App. 563, 274 So. 2d 333 (Ala. Crim. App.), *rev'd*, 290 Ala. 142, 274 So. 2d 352 (1972).

128. See King, Werrett & Whitehead, *Antibody Profiling of Bloodstains*, 8 FORENSIC SCI. 151 (1976).

129. Werrett & King, *Application of Allergy Diagnosis in Forensic Serology*, 22 J. FORENSIC SCI. 763, 769 (1977).

130. See *supra* note 31 and accompanying text.

131. Comment, *supra* note 19, at 233.

132. For a description of how the polygraph works, see A MOENSSENS & F. INBAU, *supra* note 13, at 603-23.

"Polygraph results are inadmissible by either side in nearly every state . . . except by stipulation of the parties in advance."¹³³ As a result, the polygraph is primarily used in rape cases, as in all criminal cases, as an investigative aid. Recent years, however, have witnessed a renewed debate over the admissibility of polygraph evidence, for limited and unlimited purposes.¹³⁴ Undoubtedly, polygraph evidence has a significant effect on jurors, who often grant such evidence more weight than it is justifiably due.¹³⁵ Despite this handicap, the polygraph remains an important tool that can be used to the advantage of both the prosecution and the defense. For example, polygraph evidence may be used to corroborate a rape victim's story.¹³⁶

B. Hypnosis

Hypnosis, like the polygraph and other investigative aids, should be utilized in criminal cases. "It is frequently appropriate in sex offense cases because anxiety often interferes with a victim's recall.

133. Comment, *supra* note 19, at 235-36.

134. See, e.g., Abbell, *Polygraph Evidence: The Case Against Admissibility in Federal Criminal Trials*, 15 AM. CRIM. L. REV. 29 (1977) (arguing that the federal judiciary should not act on the admissibility of the polygraph in lieu of legislative action); Kadish, Brofman, Peskin & Baccus, *The Polygraph, Hypnosis, Truth Drugs and the Psychological Stress Evaluator: Admissibility in a Criminal Trial*, 4 AM. J. TRIAL ADVOC. 593, 593-602 (1981) (suggesting tactics to use to gain admissibility); Tarlow, *Admissibility of Polygraph Evidence in 1975: An Aid in Determining Credibility in a Perjury-Plagued System*, 26 HASTINGS L.J. 917, 935-46 (1975) (an in-depth analysis arguing for admissibility); Note, *Admission of Polygraph Results: A Due Process Perspective*, 55 IND. L.J. 157 (1979) (advocating a due process rationale to allow a criminal defendant to introduce polygraph evidence); Note, *Polygraph: Short Circuit to Truth?*, 29 U. FLA. L. REV. 286 (1977) (chastising the judiciary for not establishing a measure of acceptance regarding polygraph evidence); Comment, *Compulsory Process and Polygraph Evidence: Does Exclusion Violate A Criminal Defendant's Due Process Rights?*, 12 CONN. L. REV. 324 (1980) (arguing that the constitutional right to compulsory process demands that the defendant be allowed to present favorable polygraph evidence).

135. See Cavoukian & Heslegrave, *The Admissibility of Polygraph Evidence in Court: Some Empirical Findings*, 4 L. & HUM. BEHAV. 117 (1980).

136. For additional commentary on the polygraph, see Abrams, *Polygraph Today*, 3 NAT'L J. CRIM. DEF. 85 (1977) (providing an overview of the polygraph for use by criminal defense lawyers); Axelrod, *The Use of Lie Detectors by Criminal Defense Attorneys*, 3 NAT'L J. CRIM. DEF. 107 (1977) (counseling defense attorneys on the use and misuse of the lie detector); Axelrod, *The Need for an Evidentiary Privilege for the Use of Lie Detectors in Criminal Cases: Investigation as Risk*, 31 S.C.L. REV. 469 (1980) (calling for creation of an evidentiary privilege to exclude evidence of unrelated crimes revealed in polygraph tests); Kleinmuntz, *Personal Viewpoint: Lie Detection: Admissible or Inadmissible Evidence?*, 68 A.B.A. J. 120 (1982) (arguing for a critical examination of lie detector evidence); Comment, *The Courtroom Status of the Polygraph*, 14 AKRON L. REV. 133 (1980) (reviewing the uses of the polygraph).

The purpose of hypnosis in police investigations is to calm and relax the witness who otherwise does not have detailed recall."¹³⁷ Hypnosis, when admitted, has been used as a pre-trial device to aid the memory of a witness.¹³⁸

A great number of courts have disapproved of hypnotically induced testimony. However, one current line of reasoning argues that such testimony should go to the weight, not the admissibility, of the evidence.¹³⁹ Courts have taken three approaches to analyzing this problem.¹⁴⁰

The first approach involves the well-known general scientific acceptance standard of *Frye v. United States*.¹⁴¹ When this approach is used, courts have universally ruled that hypno-induced testimony does not meet the general scientific acceptance test.¹⁴² The second approach was used in *Harding v. State*.¹⁴³ Under this approach, hypno-induced testimony is admitted as going to the weight of the evidence.

The third approach comes from the New Jersey case of *State v. Hurd*.¹⁴⁴ The *Hurd* approach outlines six safeguard procedures that must be followed before hypno-induced testimony can be admitted. First, a psychologist or psychiatrist experienced in hypnosis must perform the procedure. Second, the hypnotist shall not be employed by the prosecution or the defense. Third, information given to the hypnotist before the hypnosis session must be recorded. Fourth, before hypnosis, the subject should describe the facts he remembers to the hypnotist. Fifth, recording of the session is required, preferably by videotape. Sixth, no one but the hypnotist and the subject should be present during the session.¹⁴⁵ Regardless of which approach is used and regardless of whether hypno-induced testimony can be admitted in a certain jurisdiction,

137. Comment, *supra* note 19, at 233-34.

138. *Id.*

139. Ruffra, *Hypnotically Induced Testimony: Should It Be Admitted?*, 19 CRIM. L. BULL. 293 (1983).

140. For a more detailed description of these three approaches, see *id.* at 297-302, 311-21.

141. 293 F. 1013 (D.C. Cir. 1923); see also Comment, *Testimony by Previously Hypnotized Witnesses: Should It Be Admissible?*, 18 IDAHO L. REV. 111 (1982) (calling for strict application of the *Frye* test in cases involving hypnosis).

142. Ruffra, *supra* note 139, at 301.

143. 5 Md. App. 230, 246 A.2d 302 (1968), *cert. denied*, 395 U.S. 949 (1969).

144. 86 N.J. 525, 432 A.2d 86 (1981).

145. *Id.* at ____, 432 A.2d at 96-97. For a comment on *Hurd*, see 4 AM. J. TRIAL ADVOC. 778, 791-94 (1981).

the use of hypnosis serves as a valuable investigative aid in rape cases.¹⁴⁶

C. *Narcoanalysis*

Narcoanalysis, the truth serum test or truth drug test, is a process in which an individual is given certain barbiturates that allegedly compel the individual to answer questions truthfully. The use of narcoanalysis in court is relatively clear. Statements made under the influence of narcoanalysis can be used by an expert as the basis for his opinion, but the statements cannot be offered for their substantive truth or falsity.¹⁴⁷ In any event, narcoanalysis is an option open to the attorney and the investigator in cases of rape.¹⁴⁸

146. There has been no lack of commentary in recent years on the subject of hypnosis. See generally Abrahams, *Courts Question Admissibility of Hypnotically Enhanced Testimony*, 66 JUDICATURE 323 (1983) (reviewing recent cases); Beaver, *Memory Restored or Confabulated by Hypnosis — Is It Competent?*, 6 U. PUGET SOUND L. REV. 155 (1983) (arguing that previously hypnotized witnesses are incompetent to testify regarding matters raised under hypnosis); Diamond, *Inherent Problems in the Use of Pretrial Hypnosis on a Prospective Witness*, 68 CALIF. L. REV. 313 (1980) (arguing that testimony by witnesses who were hypnotized prior to trial should never be admitted due to its inherently unreliable traits); Dilloff, *The Admissibility of Hypnotically Influenced Testimony*, 4 OHIO N.U.L. REV. 1 (1977) (contending that hypnosis should only be used as a last resort to “unlock” the memory of a key witness); Falk, *Posthypnotic Testimony — Witness Competency and the Fulcrum of Procedural Safeguards*, 57 ST. JOHN’S L. REV. 30 (1982) (calling for admissibility with safeguards); Quarles, *Hypnosis and the Law of Evidence: Testimony From the Hypnotically-Refreshed Memory*, 51 MISS. L.J. 743 (1981) (calling for admission under certain guidelines); Rothblatt, *The Mental Probe Continued — Hypnosis and Witness Preparation*, 4 AM. J. TRIAL ADVOC. 615 (1981) (counseling attorneys on the use of hypnotists as expert witnesses); Spector & Foster, *Admissibility of Hypnotic Statements: Is the Law of Evidence Susceptible?*, 38 OHIO ST. L.J. 567 (1977) (advocating admission of some hypno-induced statements); Stratton, *The Use of Hypnosis in Law Enforcement Criminal Investigation: A Pilot Program*, 5 J. POLICE SCI. & AD. 399 (1977) (discussing a pilot program using hypnosis in Los Angeles); Timm, *The Effect of Forensic Hypnosis Technique on Eyewitness Recall and Recognition*, 9 J. POLICE SCI. & AD. 188 (1981) (stating that the procedure itself can affect the results).

For commentary on the use of hypnosis in specific states, see Spector & Foster, *The Utility of Hypno-Induced Statements in the Trial Process: Reflections on People v. Smrekar*, 10 LOY. U. CHI. L.J. 691 (1979) (Illinois); Survey, *Evidence — Hypnotically Induced Testimony Admissible if Reasonably Likely to Result in Recall Comparable to Normal Memory* — State v. Hurd, 86 N.J. 525, 432 A.2d 86 (1981), 12 SETON HALL 404 (1982) (New Jersey); Note, *Evidence — The Admissibility of Hypnotically Refreshed Testimony in New Mexico: State v. Beachum*, 13 N.M.L. REV. 541 (1983) (New Mexico); Note, *Evidence — Admissibility of Present Recollection Restored by Hypnosis* — State v. McQueen, 15 WAKE FOREST L. REV. 357 (1979) (North Carolina); Comment, *Evidence — Hypnotically Induced Testimony: The Pendulum Swings Towards Admissibility* — Commonwealth v. A Juvenile, 80 MASS. ADV. SH. 2319, 412 N.E.2d 339 (1980), 15 SUFFOLK U.L. REV. 1372 (1981) (Massachusetts).

147. Kadish, Brofman, Peskin & Baccus, *supra* note 134, at 608-11.

148. For additional commentary on narcoanalysis, see A. MOENSSENS & F. INBAU, *supra*

D. *Psychological Stress Evaluator*

The psychological stress evaluator (PSE) involves voice stress analysis in an attempt to ascertain whether an individual is being deceptive. The PSE "analyzes a recording of the subject's voice for the presence or absence of muscle-tremor, an inaudible voice component."¹⁴⁹ The PSE has been greatly confused with the polygraph, but the two systems actually have little in common except their end results (detecting deception). One unique aspect of the PSE is its ability to be used without the knowledge of the subject.

Few criminal cases have considered the admissibility of the PSE. In *Smith v. State*,¹⁵⁰ the court refused admissibility, stating that "a lie detector test by any other name is still a lie detector test."¹⁵¹ The *Smith* court failed to consider the theory and technique of the PSE, which is drastically different from the polygraph. The court ruled that since the polygraph was inadmissible in Maryland, the PSE must also be inadmissible since both are "lie detector" tests. No other court has admitted the PSE for its substantive value.¹⁵² Nevertheless, the PSE, like the other investigative aids mentioned here, can be an asset at the pre-trial stage.¹⁵³

note 13, at 625-31; Dession, Freedman, Donnelly & Redlich, *Drug-Induced Revelation and Criminal Investigation*, 62 YALE L.J. 315 (1953); MacDonald, *Truth Serum*, 46 J. CRIM. L. CRIMINOLOGY & POLICE SCI. 259 (1955); Moenssens, *Narcoanalysis in Law Enforcement*, 52 J. CRIM. L. CRIMINOLOGY & POLICE SCI. 453 (1961); Note, *An Analysis of the Limited Legal Value of Truth Serum*, 11 SYRACUSE L. REV. 64 (1959); Note, *Hypnosis, Truth Drugs, and the Polygraph: An Analysis of Their Use and Acceptance by the Courts*, 21 U. FLA. L. REV. 541 (1969).

149. Kadish, Brofman, Peskin & Baccus, *supra* note 134, at 611; see also A. MOENSSENS & F. INBAU, *supra* note 13, at 638-41; Kenety, *The Psychological Stress Evaluator: The Theory, Validity, and Legal Status of an Innovative "Lie Detector"*, 55 IND. L.J. 349 (1980).

150. 31 Md. App. 106, 355 A.2d 527 (1976).

151. *Id.* at —, 355 A.2d at 536.

152. See *Adkinson v. State*, 611 P.2d 528 (Alaska), *cert. denied*, 449 U.S. 876 (1980) (defendant wanted a new trial due to newly discovered evidence, i.e., a PSE test allegedly showed his innocence. The motion was denied.); *State v. Schouest*, 351 So. 2d 462 (La. 1977) (the PSE test ruled inadmissible); *People v. Tarsia*, 50 N.Y.2d 1, 405 N.E.2d 188, 427 N.Y.S.2d 944 (1980) (testimony admitted regarding the techniques used when the defendant claimed that the PSE test overbore his will to such an extent as to make his subsequent confession involuntary); *State v. Milano*, 297 N.C. 485, 256 S.E.2d 154 (1979) (without deciding whether the PSE met the *Frye* test, it was ruled inadmissible because the results had not been stipulated to as is allowed for the polygraph in North Carolina). *Milano* was partially overruled in *State v. Grier*, 307 N.C. 628, 300 S.E.2d 351 (1983) (court held that polygraph evidence was no longer admissible in any case).

153. For additional commentary on voice stress analysis, see Reeves, *Audio-Stress Analysis: A Means of Truth Verification in Forensic Practice*, 1980 MED. TRIAL TECH. Q. 430; Note, *The Psychological Stress Evaluator: Yesterday's Dream—Tomorrow's Nightmare*, 24 CLEV. ST. L. REV. 299 (1975); Note, *The Psychological Stress Evaluator: A Recent Development In Lie Detector Technology*, 7 U.C.D.L. REV. 332 (1974).

VI. CONCLUSION

The use of scientific evidence in rape prosecution plays an invaluable role in proving the elements of the crime and serving as an aid to investigation. Too often legal minds are trained to rely solely on the law. But an absence of factual data can ultimately doom an attorney's case. Nowhere are those facts more desperately needed than in a rape prosecution. By providing a summary in this paper of the uses of scientific evidence in such cases, it is hoped that attorneys will venture beyond the narrow sphere of the legal world to improve themselves, their cases, and the criminal justice system.

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