

TOMMIE LEE ANDREWS, Appellant, v. STATE OF FLORIDA, Appellee

Case No. 87-2166

Court of Appeal of Florida, Fifth District

533 So. 2d 841; 13 Fla. L. Weekly 2364

October 20, 1988, Filed

SUBSEQUENT HISTORY:

As amended October 20, 1988. Review denied March 15, 1989.

PRIOR HISTORY: Appeal from the Circuit Court for Orange County, Rom W. Powell, Judge.

COUNSEL:

James B. Gibson, Public Defender and Kenneth Witts, Assistant Public Defender, Daytona Beach, for Appellant.

Robert A. Butterworth, Attorney General, Tallahassee and Kellie A. Nielan, Assistant Attorney General, Daytona Beach, for Appellee.

Andre A. Moenssens, Kilmarnock, Virginia, for Amicus Curiae, Lifecodes Corporation.

JUDGES:

Orfinger, J. Dauksch and Daniel, J.J., concur.

OPINIONBY:

ORFINGER

OPINION:

The issue in this case concerns the admissibility of "genetic fingerprint" evidence, by which strands of coding found in the genetic molecule of deoxyribonucleic acid (DNA) are compared for the purpose of identifying the perpetrator of a crime. The trial court admitted the evidence, and the jury convicted defendant of aggravated battery, sexual battery and armed burglary of a dwelling. Defendant also contends that his motion for mistrial should have been granted because of an improper comment by the prosecutor, and that he could not be convicted for both aggravated battery and sexual battery arising from the same incident. We conclude that the evidence was properly admitted and that defendant's other issues are without merit, and we affirm.

In the early morning hours of February 21, 1987, the victim was awakened when someone jumped on top of her and held what felt like a straight edge razor to her neck. The intruder, who the victim could only identify at trial as a strong, black male, held his hand over her mouth, told her to keep quiet and threatened to kill her if she saw his face. The victim struggled with the intruder and for her efforts was cut on her face, neck, legs and feet.

The intruder then forced vaginal intercourse with the victim, following which he stole her purse containing about \$ 40, and then left the house. A physical examination made after the attack was reported to the police revealed the presence of semen in the victim's vagina. A crime lab analyst testified that both the victim and appellant were blood type O but that appellant like a majority of the population is a secretor (secretes his blood type in his saliva and other body fluids) while the victim was not. Blood type O was found in the vaginal swabs taken from the victim though the analyst conceded that while this result could have come from the semen found in the victim's vagina, it also could have come from the victim's blood picked up by the swab. The analyst concluded that appellant was included in the population (which he stated constituted 65% of the male population) that could be the source of the semen.

A crime scene technician testified that on the morning following the crime one of the windows of the victim's house was open, and the screen was missing. The victim had testified that this window had been broken previously and was held together with wire from a coat hanger. A screen was found on the ground and fingerprints were lifted from it. A fingerprint expert testified that two of the prints lifted from the screen matched appellant's right index and middle finger.

Over objection, the state presented DNA print identification evidence linking appellant to the crime. The DNA test compared the appellant's DNA structure as found in his blood with the DNA structure of the victim's blood and the DNA found in the vaginal swab, taken from the victim shortly after the attack. The test was conducted by Lifecodes Corp., a corporation specializing in DNA identity testing. Dr. Baird of Lifecodes testified to a match between the DNA in appellant's blood and the DNA from the vaginal swab, stating that the percentage of the population which would have the DNA bands indicated by the samples would be 0.0000012%. In other words, the chance that the DNA strands found in appellant's blood would be duplicated in some other person's cells was 1 in 839,914,540.

We have found no other appellate decision addressing the admissibility of DNA identification evidence in criminal cases. Although appellant primarily attacks the methods used by Lifecodes as opposed to the admissibility of DNA evidence in general, the novelty of the question requires, in our opinion, that we address both issues.

(A) ADMISSIBILITY OF A NEW SCIENTIFIC TECHNIQUE - STANDARD

We begin by confessing some uncertainty as to the standard applicable in this state governing admissibility into evidence of a new scientific technique. In the seminal case of *Frye v. United States*, 54 App. D.C. 46, 293 F. 1013 (D.C. Cir. 1923), which involved the question of admissibility of lie detector test results, the court, in holding that expert testimony relating to novel scientific evidence must satisfy a special foundational requirement not applicable to other types of expert testimony, declared:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in the twilight zone the evidential force of the principle must be recognized, and while the courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, *the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field to which it belongs.* [Emphasis in original].

293 F. at 1014.

One leading commentator has summarized *Frye* as requiring courts to determine: (1) the status, in the appropriate scientific community, of the scientific principle underlying the proffered novel evidence; (2) the technique applying the scientific principle; and (3) the application of the technique on the particular occasion. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States A Half Century Later*, 80 Columbia Law Rev. 1197, 1201 (1980). *Frye* is still applied in a number of jurisdictions, compare *Cobey v. State*, 73 Md.App. 233, 533 A.2d 944 (1987) (state failed to establish that chromosome variant analysis was generally accepted as reliable in relevant scientific community) with *People v. Reilly*, 196 Cal.App.3d 1127, 242 Cal.Rptr. 496 (1987) (sufficient showing made that electrophoretic typing of dried bloodstains had found general acceptance or consensus in scientific community to warrant its introduction), though it has of late come in for criticism by a number of judges and commentators as being too inflexibleⁿ¹ as well as inconsistent with modern evidence codes. See, e.g., *United States v. Downing*, 753 F.2d 1224 (3d Cir. 1985); *Brown v. State*, 426 So.2d 76, 87-89 (Fla. 1st DCA 1983); Giannelli, *supra*. One judge has suggested that the *Frye* standard should be rejected as a precondition to the admissibility of evidence relating to novel scientific techniques. *Hawthorne v. State*, 470 So.2d 770, 783 (Fla. 1st DCA 1985) (Ervin, C.J., concurring and dissenting in part).

ⁿ¹ For instance, as Professor Giannelli points out, rigid application of *Frye* would require a court to await the passage of time until such time as the new technique has been developed to the point that it has become "generally accepted." This creates a "cultural lag" during the technique's development, resulting in the exclusion of evidence which could be completely reliable. Giannelli, *supra* at 1223, nn. 201 and 202.

In *Brown v. State*, 426 So.2d 76 (Fla. 1st DCA 1983) Judge Ervin exhaustively reviewed the law in Florida on the applicability of the *Frye* test, concluding that it was unclear whether that test had been accepted by the Florida courts. His review of *Kaminski v. State*, 63 So.2d 339 (Fla. 1952), *Coppolino v. State*, 223 So.2d 68 (Fla. 2d DCA 1968), *appeal dismissed*, 234 So.2d 120 (Fla. 1969), *cert. denied*, 399 U.S. 927, 90 S. Ct. 2242, 26 L. Ed. 2d 794 (1970), and *Jent v. State*, 408 So.2d 1024 (Fla. 1981) led him to conclude that the *Frye* test had not been adopted. He added, however that

More recently the Florida Supreme Court cited *Coppolino* as supporting its view that "[a] court should admit evidence of scientific tests and experiments only if the reliability of the results are widely recognized and accepted among scientists." *Stevens v. State*, 419 So.2d 1058, 1063 (Fla. 1982). Superficially, it would seem that the above statement embraces the *Frye* rule, yet the court's reliance upon *Coppolino* undercuts that interpretation. Additionally, the statement made in the same paragraph that "the admissibility of a test or experiment lies within the discretion of the trial judge. . . is contrary to *Frye* since a strict adherence to *Frye* would severely curtail trial court discretion. The latter quoted statement is, moreover, consistent with the court's earlier opinion in *Jent*

426 So.2d at 87.

In *Jent v. State*, 408 So.2d 1024 (Fla. 1981), the question raised was the admissibility of hair analysis testimony. In rejecting the defense claim that evidence regarding hair analysis was not sufficiently reliable or exact to be allowed into evidence, the court stated:

As a general rule, the problem presented to a trial court is whether scientific tests are so unreliable and scientifically unacceptable that admission of those test results constitutes error. *Coppolino v. State*, 223 So.2d 68 (Fla. 2d DCA 1968), *cert. denied*, 399 U.S. 927, 90 S. Ct. 2242, 26 L. Ed. 2d 794 (1970). . . . A trial court has wide discretion concerning the admissibility of evidence, and, in the absence of an abuse of discretion, a ruling regarding admissibility will not be disturbed.

408 So.2d at 1029. The evidence was held to be admissible despite the testimony that, although the unknown hair found at the scene of the crime was microscopically the same as the defendant's it could not be positively identified as having come from the defendant. The court noted that "determining what weight to accord this testimony was within the jury's province"

In *Bundy v. State*, 455 So.2d 330 (Fla. 1984) [*Bundy I*] the court extensively reviewed case law pertaining to the admissibility of hypnotically aided testimony, but declined to decide which test was applicable, finding that the specific testimony involved was admissible because ". . . this is simply not a case of hypnotically refreshed recall testimony." *Id.* at 341. The court then addressed the admissibility of expert testimony on bite mark comparison evidence. Without specifically referencing *Frye*, the court held such testimony to be admissible and explained:

The trial court found that the science of odontology, which is based on the discovery that the characteristics of individual human dentition are highly unique, is generally recognized by scientists in the relevant fields and therefore is an acceptable foundation for the admissibility of expert opinions into evidence. The court in effect ruled that since the proffered [sic] evidence met this criterion the details of the comparison techniques were matters of credibility and weight of the evidence for the jury to determine . . .

As the trial court found, the basis for the comparison testimony--that the science of odontology makes such comparison possible due to the significant uniqueness of individual dental characteristics--has been adequately established. Appellant does not contest this supposition. Forensic odontological identification techniques are merely an application of this established science to a particular problem. *People v. Marx* [54 Cal.App.3d 100, 126 Cal.Rptr. 350 (1975)]. The technique is similar to hair comparison evidence, which is admissible even though it does not result in identifications of absolute certainty as fingerprints do. *Jent v. State*, 408 So.2d 1024 (Fla. 1981), *cert. denied*, 457 U.S. 1111, 102 S. Ct. 2916, 73 L. Ed. 2d 1322 (1982); *Peek v. State*, 395 So.2d 492 (Fla. 1980), *cert. denied*, 451 U.S. 964, 101 S. Ct. 2036, 68 L. Ed. 2d 342 (1981). Its probative value to the case is for the trier of fact to determine.

The trial court also found that the comparison techniques actually used in this case were reliable enough to allow the experts to present their materials and their conclusions to the jury. Bundy has presented no basis for finding that the trial judge abused his discretion in doing so.

455 So.2d at 348-49.

In *Bundy v. State*, 471 So.2d 9 (Fla. 1985) [*Bundy II*], the court directly confronted the question of the admissibility of hypnotically aided testimony. While referring to *Frye*, 471 So.2d at 13, the court never specifically declared that it was adopting the *Frye* standard. However, in holding that the testimony was per se inadmissible in criminal trials "because of its basic unreliability," the court drew on language in opinions from jurisdictions that apply *Frye*.ⁿ² See also *Mills v. State*, 476 So.2d 172 (Fla. 1985) (results of neutron activation analysis gunshot residue test held admissible with court noting test "has attained sufficient standing among scientists to be accepted as reliable evidence in the courts").

n2 The court declared:

We are swayed by the opinions of the courts of other jurisdictions that have held that the concerns surrounding the reliability of hypnosis warrant a holding that this mechanism, like polygraph and truth serum results, has not been proven sufficiently reliable by experts in the field to justify its validity as competent evidence in a criminal trial. Nor can we agree that employing safeguards has been shown to insure that hypnotically recalled testimony is reliable at the present time. The Michigan Supreme Court recently joined the growing number of jurisdictions that hold that the testimony of a witness whose memory has been refreshed through hypnosis is inadmissible. We feel that court's conclusion in *People v. Gonzales*, 415 Mich. 615, 329 N.W.2d 743 (1982), aptly describes our view on this issue. The court stated:

Hypnosis has not received sufficient general acceptance in the scientific community to give reasonable assurance that the results produced under even the best of circumstances will be sufficiently reliable to outweigh the risks of abuse and prejudice.

. . . Until hypnosis gains general acceptance in the fields of medicine and psychiatry as a method by which memories are accurately improved without undue danger of distortion, delusion, or fantasy and until the barriers which hypnosis raises to effective cross-examination are somehow overcome, the testimony of witnesses which has been tainted by hypnosis must be excluded in criminal cases.

471 So.2d at 18. *But see Rock v. Arkansas*, 483 U.S. 44, 107 S. Ct. 2704, 97 L. Ed. 2d 37 (1987) (per se exclusion of a criminal defendant's post-hypnotic testimony infringes impermissibly on the right of a defendant to testify on his or her own behalf).

In *Kruse v. State*, 483 So.2d 1383 (Fla. 4th DCA 1986) where the state sought introduction of expert testimony that the child/victim was suffering from a condition known as Post Traumatic Stress Syndrome, the Fourth District employed the relevancy approach based on our evidence code for determining the admissibility of such expert testimony. Noting that the "helpfulness" standard of section 90.702 n3 reflects a liberal policy in the admission of expert testimony, the court held:

With some qualification, we believe the relevancy approach set out in the evidence code is the appropriate standard for determining the admissibility of expert testimony on child sexual abuse. The statutory relevancy standard also comports with the holdings of the Florida Supreme Court in the area of expert testimony. The court has stated that while trial courts have broad discretion in determining the range of subjects on which an expert may testify, such testimony should usually be received only where the disputed issue for which the evidence is offered, is beyond the ordinary understanding of the jury. *Johnson v. State*, 393 So.2d 1069, 1072 (Fla. 1980). This view is consistent with the first requirement of section 90.702, that the opinion evidence be helpful to the trier of fact, as well as the provisions of section 90.403, that the danger of prejudice may outweigh the value of the evidence.

483 So.2d at 1385.

n3

90.702 Testimony by experts.--If scientific, technical, or other specialized knowledge will assist the trier of fact in understanding the evidence or in determining a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify about it in the form of an opinion; however, the opinion is admissible only if it can be applied to evidence at trial.

In an effort to ensure a degree of reliability of such evidence, the court went on to:

reaffirm what we view to be a fundamental requirement that the party seeking to introduce expert testimony first establish that the subject can support an expert opinion with a reasonable degree of reliability. Expert testimony in areas that are not sufficiently developed to support an expert opinion can present the kind of danger that section 90.403 was designed to prevent. While there is no requirement to demonstrate general acceptance, we believe that, without some indicia of reliability, opinion evidence on a particular subject could hardly be helpful to a jury as required by section 90.702.

Id. at 1386.

This "relevancy approach" suggested by the First District in *Brown* and adopted by the Fourth District in *Kruse*, n4 has been referred to as the preferred approach and was substantially adopted by the federal Third Circuit in *United States v. Downing*, 753 F.2d 1224 (3d Cir. 1985). n5 This approach recognizes relevancy as the linchpin of admissibility, while at the same time ensuring that only reliable scientific evidence will be admitted, and seems preferable to the "general acceptance" approach of *Frye* which is predicated on a "nose counting," *Downing*, 753 F.2d at 1238, and may result in the exclusion of reliable evidence. We believe this approach to be the one which should be followed in Florida. n6

n4 In a recent case, *Correll v. State*, 523 So.2d 562 (Fla. 1988), our supreme court was confronted with the question of admissibility of blood tests using the electrophoresis process, a method used to determine the presence of certain enzymes in the blood. The court, noting at the outset that such process *could hardly be characterized as novel* (a fact which distinguishes that case from the one before us), held the evidence to be admissible. We make note of this case, despite its factual differences, because the electrophoresis process is an important step in separating the DNA fragments.

n5 *Downing* involved expert testimony on the accuracy of eyewitness identification *offered by the defendant*. At least one commentator has suggested that this may be a distinguishing factor and that "the additional threshold of acceptance in the scientific community as a joint requirement with a judicial determination of reliability seems warranted where the scientific evidence carrying so much weight with the trier of fact is admitted against the criminal defendant, as it usually is." Graham, *Handbook of Florida Evidence*, § 704.2, p. 552 (n. 18). Professor Graham suggests that because of the importance juries place on scientific tests, "the *Frye* test in its original general acceptance or preferably its liberalized substantial acceptance form, which serves to screen such tests to assure scientific reliability, should continue to be followed." *Id.* at § 704.2, p. 551. Conversely, Professor McCormick advocates admissibility based on logical relevancy and exclusion if probative value is substantially outweighed by prejudice, misleading the jury or consuming undue amounts of time. *McCormick on Evidence*, § 203 at p. 608 (3d ed. 1984).

n6 The State correctly asserts that in this case the evidence would meet the *Frye* standard as well as the relevancy test. We have reviewed the authorities discussing the standards of admissibility to determine which of these will apply in this District, pending a definitive interpretation by our supreme court.

In *Downing*, the Third Circuit, in applying a relevancy/reliability approach, declared that where, as here, a form of scientific expertise has no established "track record" in litigation, courts may look to a variety of factors that may bear on the reliability of the evidence. 753 F.2d at 1238. These include the novelty of the new technique, i.e., its relationship to more established modes of scientific analysis, the existence of a specialized literature dealing with the technique, the qualifications and professional stature of expert witnesses, and the nonjudicial uses to which the scientific technique are put. *Id.* at 1238-39, citing 3 J. Weinstein & M. Berger, *Weinstein's Evidence* § 702[03].

(B) THE TECHNIQUE AND TESTIMONY RELATING TO DNA PRINTING -

(1) WITNESSES:

Several witnesses testified for the State concerning the test. Dr. David E. Housman, the holder of a bachelor's degree and a Ph.D in biology, of the Massachusetts Institute of Technology, is a professor of molecular genetics, which deals with the structure and function of the DNA molecule and has taught at several universities since 1973. He has engaged in DNA analysis for some eleven years. He has published approximately 120 papers on molecular genetics, most of which deal with DNA, and has served on advisory boards involving genetics for the National Institute of Health, the Heredity Disease Foundation, and the Tourette's Syndrome Foundation. Housman visited Lifecodes, Inc., the company which performed the instant test and examined the procedures of the company though he did not witness the instant test.

Allen Guisti is a forensic scientist employed by Lifecodes, Inc. and performed the DNA print identification tests here. He holds a Bachelor of Science degree from Yale University and has published several papers on genetics, one of which involved his own research on DNA analysis. He has performed the identification test about 200 times.

Dr. Michael Baird is the manager of forensic testing at Lifecodes. He received a doctorate in genetics from the University of Chicago in 1978. He worked as a research associate at both the University of Michigan and Columbia University in the field of blood diseases at the DNA level and joined Lifecodes at its inception in 1982. He has been the manager of forensic testing for the past year and one-half. He teaches graduate courses in DNA technology at New York Medical College and has published a number of articles on DNA testing.

(2) SCIENTIFIC PRINCIPLES:

Summarizing Dr. Housman's testimony, it appears that DNA print identification is predicated on several well accepted scientific principles. DNA, a molecule that carries the body's genetic information, is contained in every living organism in every cell which has a nucleus (nearly all the cells of the human body). The configuration of the DNA is different in every individual with the exception of identical twins. It is the same in all the particular person's cells, and its characteristics remain unchanged during the life of the individual. DNA is a very complicated molecule and to read the "information" contained therein one needs to perform certain chemical procedures. Dr. Housman stated that a procedure known as restriction fragment length polymorphism has been in existence for ten years and enables scientists to cut the strands at predetermined locations and compare the DNA structure of different individuals. The test involves treatment of the DNA molecule with an enzyme or reagent which recognizes differences in the sequences found in the DNA molecule. The discovery of the use of these reagents won Dr. Arber a Nobel Prize about ten years ago and according to Dr. Housman, is generally accepted in the scientific community. Indeed, Dr. Housman testified that DNA sequencing and comparison testing has been done for about ten years, is considered reliable, is performed by a number of laboratories around the world and is generally accepted in the scientific community. He stated also that the test and information received therefrom are routinely used in such areas as the diagnosis, treatment and study of genetically inherited diseases. n7

n7 In the work entitled *Scientific Evidence in Criminal Cases*, Third Ed. (1986), the authors, Professors Moenssens, Inbau and Starrs comment thusly on the reliability studies and courtroom use of DNA evidence:

c. Reliability Studies and Courtroom Use Unlike many advances in forensic sciences, which are developed by experts who are actively engaged in case work, and immediately applied by them to forensic experimentation and use, the DNA probe studies on semen and blood came out of a research laboratory whose scientists did not initially desire to apply the techniques to actual forensic investigations as soon as a working postulate and hypothesis had been formulated. Instead, they chose to subject the novel technique (explained here at greater length than some of the other techniques precisely because no other literature on it is as yet in print) to extensive experimentation and verification. As part of this research process, they have also invited independent scientists to follow their protocols, put the new techniques through its paces, and arrive at an impartial scientific assessment of the claims made by Lifecodes--a process of verification that ideally should always be followed by forensic scientists, but almost never is. The proponents of the techniques contend that the DNA testing establishes identity in rape and similar cases to a higher degree of certainty and with greater reliability and consistency than any other testing method currently available to forensic science and in paternity cases will provide a significant improvement over any current scientific test in establishing biological parentage and accurately identifying cases of innocent alleged parenthood. Their research to date appears to validate these claims. However, independent research is still going on to determine if the claims can be supported. As this chapter is being written, there are, as yet, no court decisions involving the use of DNA testing for the simple reason that its developers have refrained from seeking its evidentiary use until all testing is completed. With the body of knowledge and verification that is currently available, the test results undoubtedly could meet a standard of "verifiable certainty." Possibly, since the underlying genetic research has been done for several decades by the most prominent geneticists and immunologists, the test results could meet the "general acceptance test" of the venerable *Frye* decision. Because the developers of the probes and test protocols have not, as of this writing, chosen to offer the test as an evidentiary tool, no appellate courts have had the opportunity to decide the issue of admissibility. Without a doubt, if the independent verification that is expected to be well advanced even as this book is published confirms the claims of the originators, courts will leap to embrace the new technique as yet another source for scientific evidence of identity. [Footnote omitted].

Id. at 358-359.

We briefly summarize the test as described by Doctors Housman and Baird. The strand of DNA is cut at very precise points using the reagents which in effect "read" the order of the elements and cut precisely at the sequence they recognize. The next step is to identify by length the DNA fragments. This is done through gel electrophoresis which separates the different sized fragments of DNA. In this procedure, the cut DNA is put in a cell matrix composed of gel and a negative electric current applied. The DNA, which has a negative charge, runs toward the positive charge. The gel acts as a sieve in which the large fragments cannot move as fast as the smaller ones. Once the length of the DNA fragments is established, the DNA is transferred to a piece of nylon membrane. A radioactive probe is then added which identifies particular fragments that it is designed to recognize. The membrane is put next to X-ray film and the film is exposed by the radioactivity. The film is developed and the results reveal bands of DNA. Such bands or more accurately the pattern of such bands can then be compared to those obtained in tests of other specimens. n8

n8 For a more detailed description of the test, see Moenssens, et al., *Scientific Evidence In Criminal Cases*, Third Ed. (1986), pp. 356-358.

(C) PROCEDURES IN THIS CASE:

The test here was performed by Lifecodes, Inc., a licensed clinical laboratory in the State of New York. The testimony revealed that Lifecodes was founded in 1982 as a research and development laboratory, specializing in DNA paternity and identity testing and began developing DNA probes. The company currently performs forensic and paternity testing as well as testing in diagnosing genetic-type diseases. The DNA test is essentially the same for all of these purposes, with the difference being in the probe that is used.

There was extensive testimony as to the precise methods used by Lifecodes in performing the instant test. Dr. Guisti testified about each step in the process and Dr. Housman, who reviewed Dr. Guisti's results testified that in his opinion the test was accurately and properly performed. There was also testimony that various controls were used in the testing process. For example, Dr. Baird testified that every reagent and enzyme purchased by Lifecodes is tested on known DNA samples. Similar tests are performed on the gel used in the electrophoresis process. Appellant contends that this test is unreliable, because the new gel is only tested to be certain that it works the way the old gel worked and that if the old gel worked improperly, that error would be carried over to the new batch. We find no merit in this contention. In addition to the foregoing tests, control samples containing known fragment sizes are loaded in the test to monitor the electrophoresis and assure an accurate result. The evidence reveals that if the gel is not properly prepared or if it is bad, the test will ordinarily not work rather than leading to an incorrect result. Indeed, if there were any voltage fluctuations or problem with the solutions ordinarily no result is received as opposed to an erroneous result. Use of control samples is also a check as they would also be affected by any error. The scientific testimony indicates acceptance of the testing procedures. The probative value of the evidence is for the jury.

The radiographs of the victim's and appellant's blood and the vaginal smear were exhibited to the jury, the comparison was explained, and the radiographs were admitted into evidence. Dr. Baird concluded that to a reasonable degree of scientific certainty, appellant's DNA was present in the vaginal smear taken from the victim. The State's expert witnesses were skillfully and thoroughly cross-examined, but no expert witness testified for the defense.

(D) ADMISSIBILITY.

In applying the relevancy test, it seems clear that the DNA print results would be helpful to the jury. § 90.702, Fla.Stat. (1988). Each of the State's witnesses was accepted by the trial court as an eminently qualified expert in the field of molecular genetics. n9 The crucial question here is whether the probative value of the testimony and test is substantially outweighed by its potential prejudicial effect. In this regard, the indicia of reliability referred to in *Kruse* come into play.

n9 Appellant argues that these witnesses, particularly Dr. Baird, possess a built-in bias because their reputations and careers are built on DNA comparison work. Several courts have questioned whether a leading propo-

ment of a particular technique could fairly and impartially testify concerning admission of the technique. *See, e.g., People v. Kelly*, 17 Cal.3d 24, 130 Cal.Rptr. 144, 549 P.2d 1240 (1976); *People v. Tobey*, 401 Mich. 141, 257 N.W.2d 537 (1977) (both cases involving voiceprints). Neither *Frye* nor our evidence code require impartiality. *See Giannelli, supra* at 1216. Further, the point would not appear substantial here given that unlike voiceprints, DNA comparison work has a number of uses in fields other than forensic medicine such as diagnosis and treatment of disease.

As noted in *Downing*, under the relevancy approach where a form of scientific expertise has no established "track record" in litigation, courts may look to other factors which bear on the reliability of the evidence. 753 F.2d at 1238. One of these is the novelty of the technique, i.e., its relationship to more established modes of scientific analysis. DNA testing has been utilized for approximately ten years and is indicated by the evidence to be a reliable, well established procedure, performed in a number of laboratories around the world. Further, it has been used in the diagnosis, treatment and study of genetically inherited diseases. This extensive nonjudicial use of the test is evidence tending to show the reliability of the technique. *Downing*, 753 F.2d at 1239.

Another factor is the existence of specialized literature dealing with the technique. The record reveals that a great many scientific works exist regarding DNA identification. According to Dr. Baird, Lifecodes maintains a file on all scientific journal articles and publications with regard to DNA testing and he was unaware of any that argue against the test's reliability. n10

n10 While no appellate court in this country has yet passed on the admissibility of DNA print identification in criminal cases, such evidence has been admitted in civil actions, *In the Matter of the Adoption of Baby Girl S*, 140 Misc.2d 299, 532 N.Y.S.2d 634 (N.Y.Surr.Ct. 1988), (holding DNA evidence admissible in paternity action and noting that New York state trial court had recently authorized a DNA comparison test in criminal prosecution), and is admitted at trials in England. *See Cobey v. State*, 73 Md.App. 233, 533 A.2d 944, 950, n. 1 (1987). Further, at least one jurist, concurring in part and dissenting in part in a capital case wondered why the State had not done a DNA test which he said would have made the question of guilt or innocence far less murky. *State v. Apanovitch*, 33 Ohio St.3d 19, 514 N.E.2d 394, 406 (1987) (Brown, J., concurring in part, dissenting in part).

A further component of reliability is the frequency with which a technique leads to erroneous results. *Downing*, 753 F.2d at 1239. The court there noted:

At one extreme, a technique that yields correct results less often than it yields erroneous ones is so unreliable that it is bound to be unhelpful to a finder of fact. Conversely, a very low rate of error strongly indicates a high degree of reliability. In addition to the rate of error, the court might examine the type of error generated by a technique.

Id.

The testimony here was that if there was something wrong with the process, it would ordinarily lead to no result being obtained rather than an erroneous result. Further control samples are employed throughout the process which permits errors, if any, to be discovered. These factors are further indicia of reliability. *See United States v. Williams*, 583 F.2d 1194 (2d Cir. 1978) (court, in upholding admission of voiceprint evidence, emphasized that any shortcomings in scientific technique would result in inability to match two voice spectrograms rather than erroneous conclusion that the two spectra were generated by the same voice).

The frequency by which given DNA bands appear in the population is calculated by using an established statistical data base, employing a statistical formula known as the Hardy-Weinberg equilibria. This principle is used for determining other genetic characteristics such as blood type or Rh factors, dates back to the 1920's and has been generally accepted in the scientific community as being accurate for this calculation. Appellant contends that the data base of 710

samples is too small to be statistically significant. The only evidence in the case supports the statistical value of the randomly selected samples. The testimony reveals that as the data base expands, the probability numbers do not change statistically, and that The American Association of Blood Banks, in its book entitled *Probability of Inclusion in Paternity Testing* (1982) concludes that a data base of two to five hundred samples was found to provide adequate statistical results. Admittedly, the scientific evidence here, unlike that presented with fingerprint, footprint or bite mark evidence, is highly technical, incapable of observation and requires the jury to either accept or reject the scientist's conclusion that it can be done. While this factor requires courts to proceed with special caution, *cf. United States v. Ferri*, 778 F.2d 985 (3d Cir. 1985) (expert testimony as to footprint evidence, unlike other scientific evidence is susceptible to examination by jury which factor limited potential prejudice), it does not of itself render the evidence unreliable.

The trial court did not abuse its discretion in ruling the test results admissible in this case. In contrast to evidence derived from hypnosis, truth serum and polygraph, evidence derived from DNA print identification appears based on proven scientific principles. Indeed, there was testimony that such evidence has been used to exonerate those suspected of criminal activity. Given the evidence in this case that the test was administered in conformity with accepted scientific procedures so as to ensure to the greatest degree possible a reliable result, appellant has failed to show error on this point.

We find no merit in appellant's remaining points on appeal. The objected to comment by the prosecutor was in response to appellant's argument that there was an innocent explanation for appellant's fingerprints found on the window screen. The prosecutor commented in response that no evidence had been presented which provided an innocent explanation. Appellant's reliance on *Carawan v. State*, 515 So.2d 161 (Fla. 1987) for the proposition that he could not be convicted on both the aggravated battery and the sexual battery charges is misplaced. *Carawan* specifically applied only to separate punishments arising from one *act*, not one *transaction*. The charges of aggravated battery and sexual battery arose from discrete acts committed during one transaction and separate convictions and punishment are appropriate here. *See Arnold v. State*, 514 So.2d 419 (Fla. 2d DCA 1987).

Finding no error, the convictions and sentences are

AFFIRMED.

Dauksch and Daniel, J.J., concur.