Page 144
807 P.2d 144
248 Kan. 217
Oliver K. SMITH, Jr., Appellant,
v.
William DEPPISH, as Sheriff of Geary County, Kansas, Appellee.
STATE of Kansas, Appellee,
v.
Oliver K. SMITH, Jr., Appellant.
Nos. 62939, 63470.
Supreme Court of Kansas.
March 1, 1991.

Page 146
Syllabus by the Court

1. It is the State's obligation to insure that an accused who is in custody is provided with a speedy trial. Delays which are the result of application or fault of the defendant are not to be counted in computing the 90-day statutory speedy trial period.

2. The standard of review for abuse of judicial discretion is whether the judge's ruling was arbitrary, fanciful, or unreasonable. Judicial discretion is abused when no reasonable person would take the view adopted by the trial court.

3. In Barker v. Wingo, 407 U.S. 514, 92 S.Ct. 2182, 33 L.Ed.2d 101 (1972), a four-factor test was established to determine whether a violation of a defendant's constitutional right to a speedy trial had occurred. The four factors are: (1) length of the delay; (2) reason for the delay; (3) defendant's assertion of the right; and (4) prejudice resulting to the defendant.

4. As discussed in Batson v. Kentucky, 476 U.S. 79, 96-97, 106 S.Ct. 1712, 1722-1723, 90 L.Ed.2d 69 (1986), the burden of proof required of a criminal defendant in order to establish a prima facie case of impermissible purposeful discrimination by the prosecution in the use of peremptory challenges during jury selection is to show he or she is a member of a cognizable racial group and that the prosecution used its peremptory challenges to strike persons of that group from the jury panel. Once defendant meets this burden of proof, it becomes the prosecutor's duty to come forward with a racially neutral explanation for the challenges.

5. Before expert scientific opinion may be received into evidence, the basis of that opinion must be shown to be generally accepted as reliable within the expert's particular scientific field. If a new scientific technique's validity has not been generally accepted as reliable or is only regarded as an experimental technique, then expert testimony based upon its results should not be admitted into evidence.

[248 Kan. 218] 6. DNA print testing and the process of Restriction Fragment Link Polymorphism analysis have been recognized as reliable, have gained general acceptance in the scientific community, involve scientifically and professionally established techniques, and, thus, meet the criteria for admissibility under the standard set forth in Frye v. United States, 293 F. 1013 (D.C.Cir.1923).

7. While DNA print testing and the process of Restriction Fragment Link Polymorphism Analysis meet the standard of general acceptance in the scientific community and thus are admissible on that basis, such test results may be inadmissible on grounds of relevancy or prejudice as well as under traditional challenges to admissibility of evidence such as contamination of the sample or chain of custody questions.

Thomas Jacquinot, Asst. Appellate Defender, argued the cause, and Jessica R. Kunen, Chief Appellate Defender, and Ralph J. DeZago, Public Defender, were with him on the briefs, for appellant Oliver K. Smith, Jr.

Steven L. Opat, Sp. Prosecutor, Junction City, argued the cause, and Edwin Wheeler, Marion, and Robert T. Stephan, Attys. Gen., were with him on the brief, for appellee.

LOCKETT, Justice:

This is a consolidated appeal by Oliver K. Smith, Jr., who was convicted by a jury in Geary County of felony murder (K.S.A. 21-3401) and rape (K.S.A. 21-3502). He claims that (1) his constitutional right and his statutory right to a speedy trial under K.S.A. 22-3402 were violated; (2) the State violated his right to equal protection in using two of its peremptory challenges to strike blacks from the jury panel; and (3) the trial court erred in admitting DNA profiling evidence. Smith appeals both his conviction and the court's denial of his habeas corpus petition.

At 6:30 p.m. on October 26, 1986, Robert Prine returned to his rural Marion County home from duck hunting. When Prine entered the unlocked and darkened house, he saw his wife, Shelly, lying on the living room floor in a pool of blood. Except for a

Page 147
shirt and bra pushed up over her breasts, she was naked. Though shot twice in the head, Shelly Prine was still alive. Robert Prine went to a neighbor, Dana Gleason, to call for medical help. Gleason, who accompanied Prine back home, observed a small-[248 Kan. 219] caliber firearm shell casing near the victim. At 6:42 p.m. Gleason notified the sheriff's office of the shooting.

At the St. Francis Medical Center in Wichita, Dr. Gary Porter performed a rape kit examination of Shelly Prine. The victim was pronounced dead at 8:36 a.m. on October 27, 1986. On October 28, 1986, an autopsy performed by Dr. William Eckert, a forensic pathologist, revealed the cause of death was two small-caliber gunshot wounds, which resulted from bullets fired at close range between the victim's eyes. There were no exit wounds. Four bullet fragments removed from the victim's body were deformed and not suitable for ballistics testing. The pathologist observed the victim had fresh bruises on her left shoulder and fresh scratches on her right biceps, and opined that she had been raped.

On October 26, 1986, the KBI searched the Prines' premises and outbuildings. The search revealed no forced entry, indicating the doors had been unlocked. The broken legs of the coffee table indicated a struggle had occurred. The KBI found a spent brass-colored .22 caliber shell casing on the living room floor where the victim's body had been lying and a pair of the victim's jeans stuffed under a small stool in the kitchen. In addition, the KBI collected carpet samples from the area where the victim was lying and blood samples from various areas of the house. From St. Francis Medical Center the KBI obtained the rape kit, bullet fragments, blood, and body and pubic hairs that were retrieved from the body of the victim at the time of the autopsy. All the evidence was sent to the KBI laboratory in Topeka.

The investigation revealed that none of the neighbors had observed anyone at the Prines' residence during the afternoon of October 26. However, one neighbor testified he had seen a motorcycle leave the Prines' house at approximately 5:15 p.m. Another neighbor stated she had heard and seen either a motorcycle or a three-wheeler at approximately 5:30 p.m. Based on the neighbors' reports and the shell casing, the KBI compiled a list of local residents who owned a motorcycle and a .22 caliber firearm.

Defendant Oliver K. Smith, Jr., was a friend of the Prines who worked with Robert Prine. Smith had visited the Prines' home on two occasions in September 1986. Smith owned a motorcycle, [248 Kan. 220] a .22 caliber rifle, and an AMT Lightning .22 caliber semiautomatic pistol.

On November 4, 1986, Smith voluntarily test-fired his .22 caliber rifle and AMT Lightning pistol for the KBI agents so they could compare the spent shell casings from his guns with the shell casing found near the victim's body. Weapons belonging to four other individuals were test-fired for comparison. The shell casing from Smith's .22 caliber AMT Lightning pistol matched the shell casing found in the Prines' home.

On November 14, 1986, the KBI obtained a search warrant for Smith's residence and vehicles. The KBI found the AMT Lightning pistol in a shoulder holster ring in Smith's pickup truck and his Yamaha Enduro 500 motorcycle in the garage. On November 20, 1986, the KBI obtained a search warrant to gather blood, saliva, hair samples, and fingerprints from Smith.

On December 18, 1986, the KBI, after Mirandizing Smith, interviewed him while his attorney was present. At that interview, Smith stated he had never had loaned the AMT gun to anyone. Smith said he had been to the Prines' house three times and on two of those occasions had been in the house. A KBI agent noted the distance between the Smiths' and Prines' residences was thirteen miles.

Bill Mueller, the KBI agent who interviewed Smith on October 26, 1986, testified Smith stated that he had gone deer hunting in the morning and in the afternoon had visited his cousin in Newton. Smith told Mueller he then had driven his Yamaha motorcycle to his friend's home in Newton and had stayed for three to four hours

Page 148
before returning to his home between 7:00 and 8:00 p.m.

A forensic examination revealed semen stains on the victim's jeans as well as on a blanket discovered near her body. At trial Eileen Burnau, a criminalist with the KBI forensic laboratory in Topeka, testified that, although Prine was excluded as a contributor to the samples taken from the jeans, he could have contributed the semen taken from the vaginal swabs and the blanket samples. Her test indicated that Smith was included in the approximately 20 percent of the black population that could have contributed the semen found on the victim's jeans.

[248 Kan. 221] Burnau testified about the tests conducted on Smith's AMT gun and holster for the presence of blood. There were bloodstains in three places on the holster. Human blood was found on the edge of the holster. The blood samples on the gun were insufficient to determine whether the blood was human or animal blood.

Phillip Aviles, KBI laboratory criminalist, found two Negroid body hairs on the carpet samples. Prine testified Smith was the only black person that had been in his home. Prine further testified that his wife had vacuumed the carpet between Smith's visits in September 1986 and the October 26, 1986, shooting.

After the State offered its forensic evidence on the blood typing, a Frye-type hearing was held on the defense's motion to exclude DNA profiling evidence. See Frye v. United States, 293 F. 1013 (D.C.Cir.1923). The trial court denied Smith's motion to exclude the DNA evidence.

The State's DNA experts informed the jury that the DNA test excluded all but .2 percent of the white population and .4 percent of the black population as donors of the semen found on the vaginal swabs. According to the State's three experts, there was more than a 99 percent probability that Smith was a contributor of the semen found on the swab.

On January 11, 1989, after deliberating for more than an hour, the jury found the defendant guilty of rape and murder in the first degree. Smith's appeal raises three claims of trial error. Relevant facts as to each claim will be stated as necessary.

SPEEDY TRIAL

It is the State's obligation to insure that an accused who is in custody is provided with a speedy trial. Delays which are the result of application or fault of the defendant are not to be counted in computing the 90-day statutory speedy trial period. State v. Prewett, 246 Kan. 39, Syl. p 2, 785 P.2d 956 (1990). Was Smith denied his right to a speedy trial required by K.S.A. 22-3402 or the Constitution of the United States?

Smith was arrested and taken into custody on September 16, 1987, and arraigned on January 20, 1988. After Smith's motion for change of venue was granted, his trial was scheduled to commence on February 29, 1988, but was rescheduled at the request of the State. On March 22, 1988, Smith's request for a continuance[248 Kan. 222] was granted. The time from March 22, 1988, until April 27, 1988, was charged to Smith by the district judge. On April 27, 1988, the State requested a continuance to determine whether there was a sufficient sample for a DNA test. After it was determined there was a sufficient sample for the DNA test, on May 17, 1988, the State obtained a continuance pursuant to K.S.A. 22-3402(3) to obtain a DNA test of the samples. The time assessed by the trial judge to the State from Smith's arraignment until its request pursuant to K.S.A. 22-3402(3)(c) was 82 days.

Smith argues the May 17 continuance was not authorized under K.S.A. 22-3402(3). He asserts the time from May 17, 1988, through July 6, 1988, the 50 days required for the DNA testing, should be charged against the State under K.S.A. 22-3402(1). If Smith's claim is correct, 132 days between his arraignment and trial are chargeable to the State and K.S.A. 22-3402(1) would require that Smith be discharged.

K.S.A. 22-3402 provides in part:

"(1) If any person charged with a crime and held in jail solely by reason

Page 149

thereof shall not be brought to trial within ninety (90) days after such person's arraignment on the charge, such person shall be entitled to be discharged from further liability to be tried for the crime charged, unless the delays shall happen as the result of the application or fault of the defendant, or a continuance shall be ordered by the court under subsection (3).

....

"(3) The time for trial may be extended beyond the limitations of subsections (1) and (2) of this section for any of the following reasons:

....

"(c) There is material evidence which is unavailable; that reasonable efforts have been made to procure such evidence; and that there are reasonable grounds to believe that such evidence can be obtained and trial commenced within the next succeeding ninety (90) days. Not more than one continuance may be granted the State on this ground, unless for good cause shown, where the original continuance was for less than ninety (90) days, and the trial is commenced within one hundred twenty (120) days from the original trial date."

Smith contends that the State's request for the continuance to determine whether there were sufficient samples to test was not authorized by K.S.A. 22-3402(3)(c). Smith argues that the DNA evidence was available to the State before he was arraigned and it was the duty of the State during the early stages of the prosecution to determine whether evidence was sufficient for DNA [248 Kan. 223] testing. The State claims it did not become aware of the availability of DNA testing until April 20, 1988.

The record reflects the prosecutor first learned of the possibility of a DNA test on April 20 and moved for a continuance on April 27. In granting the continuance in order that the DNA profiling test could be completed by Lifecodes Corporation, a New York-based company specializing in DNA identification, the trial judge reasoned if the evidence was tested, the test results could produce either exculpatory evidence material to the defense or evidence material to the identity of the defendant as the murderer. Did the trial judge abuse his discretion by granting a continuance to the State?

The standard of review for abuse of judicial discretion is whether the judge's ruling was arbitrary, fanciful, or unreasonable. Leeper v. Schroer, Rice, Bryan, & Lykins, P.A., 241 Kan. 241, 248, 736 P.2d 882 (1987); Stayton v. Stayton, 211 Kan. 560, 562, 506 P.2d 1172 (1973). Judicial discretion is abused when no reasonable person would take the view adopted by the trial court. If reasonable persons could differ as to the propriety of the action taken by the trial court, then it cannot be said that the trial court abused its discretion. Stayton v. Stayton, 211 Kan. at 562, 506 P.2d 1172. See State v. Hood, 245 Kan. 367, 375, 780 P.2d 160 (1989). Under the facts, the trial court's ruling that the DNA test results were unavailable material evidence and the granting of a continuance requested by the State under K.S.A. 22-3402(3)(c) was proper.

On June 29, by phone, Lifecodes informed the State of the test results. The State immediately conveyed that information to Smith's lawyer. Lifecodes' written report is dated July 6, 1988. Smith does not allege that the State delayed in conveying the information to him.

On July 6, 1988, the trial court denied Smith's request for dismissal. After his motion for dismissal was denied, Smith requested a continuance. Smith asked that the continuance be charged against the State because the written report from Lifecodes had not yet been received by him; therefore, the request for a continuance was not the result of the defendant's "application or fault." Smith reasons when new forensic technology forces the State to obtain a continuance under K.S.A. 22-3402(3)(c), any continuance required by the defense in response to the new [248 Kan. 224] forensic test results must be charged to the State. Under Smith's reasoning, the time from July 6, 1988, to September 14, 1988, (the day the defense requested a continuance

Page 150

because of delays that its expert was incurring in the evaluation of the DNA evidence) should be charged to the State. The trial court disagreed with this reasoning and denied Smith's motion to dismiss. The district court's July 6, 1988, refusal to discharge Smith was the basis for the defendant filing a habeas corpus petition, which was denied by Judge Melvin Gradert on October 19, 1988.

It is ironic that Smith complains that he should not be charged time due to the newness of DNA profiling, yet complains that the State's unfamiliarity with DNA profiling is not grounds for a continuance. When Smith chose not to pursue independent testing on May 17, 1988, he assumed the risk of the test results being inculpatory. Smith's need for a continuance to obtain an independent DNA test of the samples was not necessitated by the State's actions. The trial court did not abuse its discretion in charging that time to Smith from July 6, 1988, to September 14, 1988. Because of the extension allowed by K.S.A. 22-3402(3)(c), from Smith's arraignment to trial, 82 days were properly charged to the State. Smith was brought to trial within 90 days as required by K.S.A. 22-3402(1). There was no violation of the defendant's statutory right to a speedy trial.

At the habeas corpus hearing and subsequently at trial, Smith contended that his constitutional right to a speedy trial had been violated. At both hearings each of the judges found there had been no violation of Smith's constitutional right to a speedy trial. On appeal, Smith characterizes his incarceration, from his arrest in September of 1987 until his trial in 1989, as so prejudicial that his constitutional right to a speedy trial was violated and his convictions must be overturned.

For authority Smith relies on Barker v. Wingo, 407 U.S. 514, 92 S.Ct. 2182, 33 L.Ed.2d 101 (1972), which established a four-factor test to determine whether a violation of a defendant's constitutional right to a speedy trial had occurred. The four factors are: (1) length of the delay; (2) reason for the delay; (3) defendant's assertion of the right; and (4) prejudice resulting to the defendant. The Barker test was adopted by this court in State v. Otero, 210 Kan. 530, 532-33, 502 P.2d 763 (1972). In Otero, we acknowledged[248 Kan. 225] that the primary burden to assure that defendants are properly brought to trial is on the courts and the prosecutors. Otero, 210 Kan. at 536, 502 P.2d 763.

Applying the four factors adopted in Barker, we find that (1) the length of delay was not unreasonable as the DNA profiling analysis required extensive testing time; (2) the DNA test results would indicate if the defendant was either included or excluded as a member of the group who could have committed the murder, and the delay to determine if there was enough sample to test was charged to the State; (3) Smith did assert his right by objecting to the continuances; (4) there is no evidence that Smith's right to a speedy trial was prejudiced by the delay. Smith was not denied his constitutional right to a speedy trial.

PEREMPTORY CHALLENGES

Smith, a black man, claims that the State's use of two of its peremptory challenges to strike two of the three black persons available for the jury selection was not race neutral. Smith argues that the State's explanations for striking two blacks from the jury did not establish a clear, reasonably specific, and legitimate neutral reason for use of the peremptory challenges.

The State did not individually question any of the potential jurors. During the jury selection, all the potential jurors were asked several questions as a group. The prosecutor observed the jurors respond to the questions by raising their hands. During the examination of the potential jurors the State asked whether they:

1. knew Shelly Prine or her parents;
2. understood the concept of circumstantial evidence;
3. believed in expert or scientific evidence or could render a conviction based on expert or scientific evidence;
4. had an open mind;

Page 151

5. could follow the instructions as to the law;
6. had read anything to affect their impartiality or judgment;
7. had had an unfortunate experience with a law enforcement officer or the criminal justice system;
8. had scheduling conflicts as to the time needed for the trial;
9. had physical or health problems; or
10. had moral, philosophical, or religious beliefs that would interfere with their exercise of judgment at trial.

[248 Kan. 226] When no hands were raised by the potential jurors in response to the prosecutor's questions, the State passed the jury panel for cause.

Smith, like the State, asked several questions of the jurors as a group. Then a direct question was asked of all six of the black potential jurors by the defense. The question was whether the fact that the victim was white and that the defendant was black would affect their judgment. All six responded negatively and stated that the victim's and defendant's race would not affect their judgment. Smith passed the venire for cause.

When jury selection began, there were six blacks in the panel of potential jurors. A random selection agreed to by both the State and Smith resulted in 36 individuals, including three blacks, remaining in the venire from which the jury would ultimately be selected. The three blacks were Barbara Wright, Joan Bryant, and Mary Seldon. When exercising its twelve peremptory challenges, the State removed Mary Seldon by use of its sixth peremptory challenge and Barbara Wright by use of its ninth peremptory challenge. Smith timely objected to the removal of two blacks from the jury.

In Batson v. Kentucky, 476 U.S. 79, 106 S.Ct. 1712, 90 L.Ed.2d 69 (1986), during the selection of the jury in a criminal trial where a black defendant was charged with second-degree burglary and receipt of stolen property, the prosecutor used the State's peremptory challenges to exclude blacks from the jury. On certiorari, the United States Supreme Court reversed the defendant's convictions and remanded the case for further proceedings.

The Supreme Court determined that, although a criminal defendant has no right, under the equal protection clause of the Fourteenth Amendment, to a jury composed in whole or in part of persons of his own race, a State's purposeful or deliberate exclusion of persons of defendant's race, on account of their race, as jurors violated the equal protection clause of the Fourteenth Amendment. 476 U.S. at 89, 106 S.Ct. at 1718-1719. It noted, as in any equal protection claim, the burden is on a criminal defendant who alleges discrimination to prove the existence of purposeful discrimination. In deciding if the defendant has carried his or her burden of persuasion, a court must undertake a sensitive inquiry into such [248 Kan. 227] circumstantial and direct evidence of intent as may be available. Criminal defendants may make a prima facie showing of purposeful racial discrimination in selection of the jury venire by relying solely on the facts concerning the selection of the venire in their case. See 476 U.S. at 96, 106 S.Ct. at 1722.

The Supreme Court determined that once a defendant, who claims to have been denied equal protection of the laws through the prosecution's use of peremptory challenges to exclude members of his race from the petit jury, has made a prima facie showing of purposeful discrimination, the burden shifts to the prosecution to come forward with a clear and reasonably specific neutral explanation for challenging such jurors that relates to the particular case to be tried. This explanation need not rise to the level of justifying the exercise of a challenge for cause, but the prosecutor may not rebut a prima facie case of discrimination merely by stating that he challenged jurors of the defendant's race on the assumption, or intuitive judgment, that such jurors would be partial to the defendant because of their shared race, or merely by denying that he had a discriminatory motive or by affirming his good faith in individual selections. After the prosecutor has offered such an explanation, the trial court will have the duty to determine if the

Page 152
defendant has established purposeful discrimination. See 476 U.S. at 96-98, 106 S.Ct. at 1722-1723.

In State v. Hood, 242 Kan. 115, 744 P.2d 816 (1987), we adopted the rule established in Batson.

Here, Smith has shown that he is a member of a cognizable racial group and that the prosecutor has exercised peremptory challenges to remove from the venire members of the defendant's race. Under Batson and Hood, Smith is entitled to rely on the fact, about which there can be no dispute, that the use of a peremptory challenge constitutes a jury selection practice which allows those to discriminate who are of a mind to discriminate. Smith has shown facts and other relevant circumstances which raise the necessary inference that the prosecution used its peremptory challenges to exclude certain veniremen from the petit jury on account of race.

Because Smith has made his prima facie case, the burden shifts to the State to provide a neutral explanation for its exercise of the challenge for removing veniremen that belong to the same [248 Kan. 228] race as Smith, and the State's explanation must be determined by the court to be race neutral. Batson, 476 U.S. at 97, 106 S.Ct. at 1723; Hood, 242 Kan. at 119-121, 123, 744 P.2d 816.

The State came forward with explanations for removal of the two black jurors. As to juror Wright, the prosecutor stated:

"First of all, I'm personally familiar with Mrs. Wright to some degree. I know her husband, Paul; I know them both well; I know that they were both social workers; I knew their background, I had occasion to work with them, or my office, over the years. I don't know how they perceive that relationship with my office. I revealed this to Mr. Wheeler [special prosecutor]; Mr. Wheeler feels that he doesn't want a social worker on the jury. And that's the reason the strike is being made, the reasons I've stated."

As to juror Seldon, the prosecutor stated:

"I can respond to that. Her jury questionnaire stated she did not want to be a juror. We paid particular attention when we were asking the questions; she seemed unresponsive to some degree, and it's our opinion she does not want to be a juror, and, therefore, should not be."

The court upheld the State's explanations of its use of both peremptory challenges.

The State points out that its use of a peremptory challenge to remove Seldon is similar to the elimination of a black from the jury in State v. Hood, 245 Kan. 367, 780 P.2d 160 (1989) (Hood II), where the prosecution relied upon a juror's body language for exercising one of its peremptory challenges. We found that body language can be used by the State as a race neutral explanation for the use of a peremptory challenge. 245 Kan. at 374, 780 P.2d 160. However, this court cautioned that the trial judge must be particularly sensitive when body language alone is advanced as a reason for striking a juror of the defendant's race. 245 Kan. at 374, 780 P.2d 160. In Hood II, the black juror's appearance of hostility toward the prosecutor and partiality to the defense counsel, coupled with body language, supported the State's use of its peremptory challenge. Under the facts of Hood II, we found that the removal of the black man as a prospective juror was not based solely on the individual's race.

In State v. Belnavis, 246 Kan. 309, 787 P.2d 1172 (1990), we reviewed the prosecutor's use of peremptory challenges in selecting the jury and the prosecutor's explanation to determine whether the removal of prospective jurors was race neutral. There, [248 Kan. 229] the prosecutor stated that he used a peremptory challenge to eliminate a black female from the jury panel because she was young and a single parent, with a seven-month-old child, and might be easily distracted. Because the record revealed that a white female juror who was retained had similar characteristics to the black female, we found that the prosecutor's proffered reason for the use of the challenge did not withstand judicial scrutiny. Also, in Blevins we noted that in U.S. v. Garrison, 849 F.2d 103, 106 (4th Cir.1988), the

Page 153
appellate court upheld the prosecutor's explanation that the two black veniremen removed had chatted during the voir dire and this indicated to the prosecution that they were bored and did not care to be involved in the process. 246 Kan. at 313, 787 P.2d 1172.

Here, the State relied not only on its observance of Seldon's body language, but also considered her response to the jury questionnaire that she did not want to be part of the jury process. Neither Smith nor the record provides information that any of the other jurors had given a similar reply in their questionnaire. Based on the record, the State offered the trial court a sufficient race neutral explanation to exclude Seldon from the jury.

As for Wright, one of the prosecutors knew Wright personally, had worked with her, and did not want a social worker on the jury. The record does not indicate that any of the white jurors who were not challenged had a job similar to Wright's. Prior to selection of the jury, one of the potential jurors volunteered that she knew the prosecutor, had worked with his office, and as county treasurer she did not feel that she could be neutral. She was released from serving as a juror.

The prosecutor's neutral explanation for challenging each juror need not rise to the level of justifying an excuse of a challenge for cause. Batson, 476 U.S. at 97, 106 S.Ct. at 1723; Belnavis, 246 Kan. at 311, 787 P.2d 1172; Hood, 242 Kan. at 120, 744 P.2d 816. Here, we find no abuse of discretion by the trial judge in accepting the State's explanations for use of its peremptory challenges to remove two blacks from the jury. Under the facts of this case, there are sufficient neutral reasons given by the State for use of the peremptory challenges to remove Wright and Seldon from the jury.

[248 Kan. 230] DID THE TRIAL COURT ERR IN ADMITTING DNA EVIDENCE?

Prior to DNA profiling, forensic experts used other DNA techniques to determine paternity and as a means of identification in criminal cases in Kansas. State ex rel. Hausner v. Blackman, 233 Kan. 223, 662 P.2d 1183 (1983) (evidentiary value of blood grouping test in paternity action); State v. Pioletti, 246 Kan. 49, 51, 785 P.2d 963 (1990) (DNA analysis of blood on door of crematory identified as that of the offspring of the victim's parents).

In recent years however, a new method of DNA profiling is used to identify the human source of blood, semen, tissue, or hair samples. DNA profiling can inculpate criminal suspects by matching the suspect's genetic material with genetic material obtained from a sample of human tissue left at the scene, on a murder weapon, or on the suspect's clothes. This technique is useful in sexual assault cases where the DNA print of semen taken from the victim's body is compared with a DNA print taken from the suspect's blood. Although traditional forensic methods exist for comparing blood, hair, and semen, DNA profiling has the advantage of being performed on much smaller tissue samples than traditional tests.

The initial case to accept DNA profiling was Andrews v. State, 533 So.2d 841 (Fla.Dist.App.1988), rev. denied 542 So.2d 1332 (Fla.1989). In Kansas, the admissibility of DNA profiling is an issue of first impression. Because of the advances made in scientific identification, it is necessary for us to review relevant scientific principles of DNA testing and those laboratory methods that are now used in DNA profiling.

DNA THEORY

In People v. Castro, 144 Misc.2d 956, 545 N.Y.S.2d 985 (N.Y.Sup.Ct.1989), an extensive Frye test as to legal admissibility of DNA profiling was conducted. In its review of the scientific background of DNA theory, the trial court stated:

"DNA, deoxyribonucleic acid, is the fundamental natural material which determines the genetic characteristics of all life forms. Humans have human form and elephants have elephant form because of differences in the makeup of their respective DNA.

Page 154

"Every cell that contains a nucleus contains DNA. There are approximately 10 trillion cells in the human body and most contain DNA. Red blood cells, [248 Kan. 231] which do not have nuclei, are a significant exception. Although the DNA is much too small to be seen by even the most powerful microscope, if it were stretched out to its full length, it would be about six feet long. Within humans, as a species, much of the DNA is identical. It is this identity of DNA that makes all humans look like humans, rather than dogs or trees. We humans create human offspring by transferring our DNA to our children. The science of genetics studies how and why this happens.

"DNA's fundamental structure, however, does not vary regardless of the type of genetic creature it creates. DNA is composed of a long double helix, which looks like a spiral staircase. The backbone of this molecule (i.e., the handrails and balustrade of the staircase) consists of repeated sequences of phosphate and deoxyribose sugar. Attached to the sugar links in the backbone are four types of organic bases: adenine (A), guanine (G), cytosine (C) and thymine (T). The steps of the staircase are formed by pairs of these bases, (hereinafter, base pairs). A single DNA molecule consists of approximately three billion base pairs. Because of the chemical nature of the bases, only A and T can bond together, and only C and G can bond together. A cannot bond with G, and C cannot bond with T. Thus, the only possible combinations which can form the steps of the staircase are A-T, T-A, C-G, and G-C.

"The sequence of the three billion base pairs along the handrails of the DNA is the key to the information represented by the DNA. This sequence is responsible for producing arms, legs, kidneys or brain cells.

"Of this sequence, approximately 3 million sites vary from person to person. There are enormous differences between individuals because of the manner in which the base pairs are arranged. These variations, called polymorphisms or anonymous sequence, occur in different regions of the DNA. Polymorphisms are the basis of DNA identification. They are readily detectable when their lengths are altered by the action of restriction enzymes, thereby giving rise to 'restriction fragment length polymorphisms' (hereinafter RFLP). The length of the fragment (or molecular weight) is measured by the distance it moves through an electrophoresis gel.

"Each individual's DNA is apportioned into 46 discrete sections within the nucleus of each cell. These sections are called chromosomes. Twenty-two of these chromosomes come from the mother and 22 come from the father.

These are genetically arranged in pairs. Additionally, two sex-typing chromosomes, denominated 'X' and 'Y', are present.

"During reproduction the chromosome pairs of the mother and the father split apart and then recombine--one chromosome from the mother and one chromosome from the father--to create the 'new' 22 chromosome pairs of their child. Females have two 'X' chromosomes, and males have one 'X' and one 'Y' chromosome, thus giving each human a total of 46 chromosomes.

"A portion of DNA which is responsible for certain traits is called a gene (e.g., each person has a gene for the production of eyes). All humans have thousands of genes located on the 46 chromosomes. Each gene is located at a specific site, or locus, upon a specific chromosome. Alternate forms of [248 Kan. 232] genes are called alleles (e.g., blue-eyed allele, green-eyed allele). This total pool of genetic information is known as the human genome.

"In chemical terms, the difference in alleles is explained by the difference in the ways the nucleotides, i.e. base pairs, arrange themselves along the DNA molecule.... All are slightly different. Each is an allele. In actuality, however, each allele is much longer, i.e. on the order of 1,000-10,000 base pairs. Each base pair consists of a single nucleotide, that one bond between A and T or C and

Page 155
G. However, a very small variation in the order in which these base pairs occur on the DNA molecule can make huge differences. Sickle-cell anemia, for example, is caused by a single base pair on a single chromosome occurring out of order. If that single aberrant base pair were placed properly, the afflicted would not suffer from the disease.

"Obviously, if a DNA profile examined all three million sites of variation, each person's DNA could be individualized. Such an undertaking would be unduly burdensome in terms of time, labor, and cost. As an alternative to this approach, it is accepted that scientists can, in relative terms, discriminate between various people's DNA by examining several of these polymorphic sites. At a particular site or locus, a person may have a substantially unique pattern. For instance, a particular fragment size may occur in a small percentage of the population. By examining the sizes of a sufficient number of fragments at different sites on different chromosomes, statistical procedures permit enough discrimination to establish the unique configuration of any one person's DNA pattern." 144 Misc.2d at 961-63, 545 N.Y.S.2d 985.

The Georgia Supreme Court in Caldwell v. State, 260 Ga. 278, 282-83, 393 S.E.2d 436 (1990), discusses the discovery of the DNA structure and its recent uses in the scientific community. That discussion includes the following information:

"The discovery of the structure of DNA by Watson and Crick, recognized as one of the major scientific events of the Twentieth Century, caused an explosion in biochemistry, molecular biology and related sciences, and the technology thereof. Among its vast biological implications are mindboggling applications to medical diagnostics and forensic identification.

"Now knowing the structure of DNA, and its immutable rules, and knowing that genetic information and instructions are transmitted by varying sequences of matched base pairs, molecular scientists were able to decipher much of the genetic codes. In 1970 there was isolated the first enzyme, known as a restriction endonuclease, or restriction enzyme, that cuts DNA molecules at specific sites. A flood of other restriction enzymes were thereafter identified and used to segment the strands of the DNA molecule....

"Other major developments in DNA technology occurred, leading to enhanced methods of sequencing or fragmenting DNA and enabling the examination of specific fragment lengths of the DNA molecule.

"DNA researchers were soon able to identify and map the location on the chromosomes of many genes and alleles (alternative forms of genes, as, for example, alternative genes that determine eye color pursuant to Mendelian[248 Kan. 233] rules of inheritance). Every two years a prestigious group of international scientists meets in a body known as the Human Gene Mapping Conference, receives applications for the acceptance, mapping and publication of gene sites newly-discovered since the last meeting of said body. The Human Gene Mapping Conference is uniformly recognized by the scientific community as the official registrar of gene sites....

"The Human Gene Mapping Conference assigns a locus for every gene site accepted by it. A locus is the specific position occupied by a particular gene or alternative forms of a gene on a chromosome."

In Thompson and Ford, DNA Typing: Acceptance and Weight of the New Genetic Identification Tests, 75 Va.L.Rev. 45, 60-61 (1989), it is stated:

"There is nothing controversial about the theory underlying DNA typing. Indeed, this theory is so well-accepted, that its accuracy is unlikely even to be raised as an issue in hearings on the admissibility of the new tests.... The theory has been repeatedly put to the test and has successfully predicted subsequent observations."

DNA PROFILING FORENSIC LAB TECHNIQUES

At the present time, commercial laboratories and the FBI perform the DNA profiling

Page 156
test to aid in identifying criminal suspects. Lifecodes Corporation uses "restriction fragment length polymorphism analysis" ("RFLP analysis"). As the evidence in this case was analyzed by Lifecodes, the eight basic steps of RFLP analysis will be discussed briefly.

"[(1) DNA extraction.] DNA must be chemically extracted from the sample to be tested. The forensic sample is often dried blood or semen which must be washed from various surfaces such as clothing. Technicians then treat the sample with enzymes to release the DNA from the cells.

"[(2) Fragmentation by restriction enzymes.] A particular restriction enzyme will recognize a base sequence from four to eight bases long which appears throughout the DNA. The enzyme acts as a scissors and cuts the DNA only where that specific sequence occurs. A particular restriction enzyme will produce the same number and length fragments of DNA in a particular individual each time. If each individual's DNA were the same, the enzymes would cut everyone's DNA in the same place.

"However, everyone's DNA is not the same. RFLP analysis focuses on areas of the DNA that are highly polymorphic due to 'length polymorphisms.' Length polymorphisms occur at a site on the DNA where a particular sequence of bases, sometimes referred to as a 'mini-satellite,' is repeated a variable number of times. At that site, then, different individuals will tend to each have a different number of mini-satellites occurring between the restriction sites recognized and cut by the enzyme. This causes the length of the segments of DNA cut by the enzyme to vary among individuals.

[248 Kan. 234] "[(3) Gel electrophoresis.] Gel electrophoresis separates the DNA fragments by length. The DNA sample is placed in a hole at one end of the gel. An electric current is applied to the gel. Because DNA has a negative charge, the fragments will migrate toward the positively charged pole at the far end of the gel. The distance each fragment travels depends upon its size. The smaller the fragment, the faster and farther it travels. Smaller fragments will thus cluster toward the far end of the gel and larger fragments toward the near end.

"[(4) Southern blotting.] Prior to this step, the DNA is 'denatured,' a chemical process which unzips the molecule so that it is single-stranded, separating each base from its complement. Southern blotting transfers the DNA fragments to a nylon membrane. This process occurs by capillary action: Buffer solution is pulled through the gel and the membrane and absorbed into paper towels, bringing DNA fragments with it. The DNA fragments bind to the membrane in the same positions as they were in the gel.

"[(5) Hybridization.] For the purposes of distinguishing between individuals through a DNA profile, the only fragments of interest are those from the highly polymorphic area of the DNA. A radioactive DNA 'probe' is used to locate and visualize those fragments on the membrane. The probe is a single-stranded section of DNA manufactured by genetic engineers that is designed to complement a single-stranded base sequence that appears in or adjacent to the highly polymorphic site. The probe seeks out and binds to the DNA fragments from that site. The probe is marked with a radioactive tag in order to locate the positions of those fragments.

"Lifecodes, Cellmark, and the FBI use the same type of probe in criminal cases, known as a single-locus probe. Cellmark, however, also uses a multi-locus probe in civil cases. While the multi-locus probe seeks out DNA sequences that occur at several polymorphic loci in the DNA, the single-locus probe seeks out a specific sequence that occurs in only one polymorphic locus. The multi-locus probe thus results in a more specific, but more complex and more difficult to interpret, banding pattern, whereas single-locus probes produce simpler banding patterns that are easier to interpret....

"[(6) Autoradiography.] The blot is placed in contact with a piece of x-ray

Page 157
film, where the radioactivity of the probe exposes the film. Thus, bands will appear on the film where the probe has bound to the DNA. The pattern created has been repeatedly referred to as resembling a supermarket bar code; however, this is an extremely misleading analogy, since the bands are usually very fuzzy. This banding pattern is what has become known as the 'DNA fingerprint.' The position of the bands reflects the length of the DNA fragments produced by the cutting of the DNA by restriction enzymes at the polymorphic site....

["(7) Interpretation of the results.] The pattern of bands produced by the suspect's or victim's DNA is compared to the pattern created by the unknown [248 Kan. 235] sample retrieved from the crime scene to see if there is a match. One method of declaring a match is simply by visual determination....

"[(8) Conversion into a statistical probability.] Once the examiner declares a match, the next step is to assess the commonness of the particular DNA profile, i.e., the frequency of the alleles in the relevant population. The statistic is generated by consulting a database of results obtained by using the same probe on many individuals. The final statistic is usually expressed in terms of the odds of this match occurring at random in the relevant population.

If more than one probe is used, the probability of a coincidental match becomes smaller." Note, The Dark Side of DNA Profiling: "Unreliable Scientific Evidence Meets the Criminal Defendant," 42 Stan.L.Rev. 465, 472-474 (1990).

See People v. Castro, 144 Misc.2d 956, 545 N.Y.S.2d 985 (N.Y.Sup.Ct.1989).

As a new forensic tool, DNA profiling presents concerns. First is "bandshifting," which is the tendency of DNA fragments to migrate during electrophoresis at different rates at different times, which may produce erroneous results. Another concern is that the quality of the forensic samples from the crime scenes may be degraded, contaminated, or available in limited quantities, affecting DNA testing accuracy. Another concern is the absence of data on the extent to which DNA is inherited in a population, which makes questionable statements regarding the probability that two people would have matching DNA prints. In response to its concerns, the National Academy of Science has established a committee of noted scientists to study DNA profiling. See Davis and Tonkovich, DNA Printing: Recent Developments, 38 Kan.L.Rev. 65, 66 (crim. proc. ed. 1990); see generally Thompson and Ford, DNA Typing: Acceptance and Weight of the New Genetic Identification Tests, 75 Va.L.Rev. at 87-88.

FRYE HEARING

In response to Smith's motion in limine, the trial court held a hearing outside the presence of the jury to determine the admissibility of DNA profiling results. According to Lifecodes' test, the sample of DNA from Smith's blood matched a sample retrieved from the rape kit vaginal swab taken from Shelly Prine. At the in limine hearing, Smith conceded that the science of DNA identification was not the thrust of his challenge. Rather, Smith was concerned with Lifecodes' use of the gene database for its probability calculations and the general scientific acceptance [248 Kan. 236] of Lifecodes' laboratory technique to declare the match. Specifically, Smith relies on the fact that, after his expert contacted Lifecodes, Lifecodes eliminated one of the loci used in its July 6 report and that Lifecodes' probability population figure was changed in its November 3 report.

In general, Smith claims the trial court erred in admitting DNA profiling evidence that did not meet the test for a new scientific principle as enunciated in Frye v. United States, 293 F. 1013 (D.C.Cir.1923). The Frye test requires that, before expert scientific opinion may be received in evidence, the basis of that opinion must be shown to be generally accepted as reliable within the expert's particular scientific field. If a new scientific technique's validity has not been generally accepted as reliable or is only regarded as an experimental technique, then expert testimony based on

Page 158

its results should not be admitted into evidence. State v. Washington, 229 Kan. 47, Syl. p 1, 622 P.2d 986 (1981).

The use of the Frye test to determine the admissibility of a lie detector examination was considered by this court in State v. Lowry, 163 Kan. 622, 629, 185 P.2d 147 (1947). We also applied the Frye test to determine the admissibility of the Multi-System method of blood analysis of polymorphic enzymes in State v. Washington, 229 Kan. 47, Syl. p 2, 622 P.2d 986. Whether the battered woman syndrome had sustained sufficient scientific acceptance to warrant admissibility under the Frye test has been discussed. See State v. Hodges, 239 Kan. 63, 71, 716 P.2d 563 (1986).

Smith argues that this court should follow People v. Castro, 144 Misc.2d 956, 545 N.Y.S.2d 985, and not admit DNA profiling evidence. In Castro, the State sought to introduce DNA evidence to prove that a bloodstain found on Castro's wristwatch was the victim's blood. Lifecodes performed the DNA profile test; however, the trial court found that Lifecodes had failed to use generally accepted techniques and had not followed its own procedures for obtaining reliable results. The trial court held a Frye hearing over a twelve-week period which was at that time the most extensive legal examination of DNA profiling. Castro, 144 Misc.2d at 957, 978, 545 N.Y.S.2d 985. The court used a three-pronged analysis:

(1) Is the DNA theory generally accepted in the scientific community?

(2) Are the techniques or experiments capable of producing reliable results in DNA identification that are generally accepted in the scientific community?

[248 Kan. 237] (3) Did the testing laboratory itself perform accepted scientific techniques in analyzing the forensic samples? 144 Misc.2d at 959, 545 N.Y.S.2d 985.

The Castro trial court determined that the Frye standard was satisfied in that DNA theory and DNA identification techniques and experiments are generally accepted in the scientific community and can produce reliable results. 144 Misc.2d at 969-73, 545 N.Y.S.2d 985. However, the trial court found that the State did not meet the requirements of the third prong as Lifecodes had "failed in several major respects to use the generally accepted scientific techniques and experiments for obtaining reliable results, within a reasonable degree of scientific certainty." 144 Misc.2d at 980, 545 N.Y.S.2d 985. Based on these facts, the trial court refused to admit the evidence showing that the DNA in the blood on the defendant's watch matched the blood of the victim.

Since Castro, another New York trial court conducted a Frye hearing and found evidence of DNA printing admissible but limited testimony to the lowest figure of probability because the defendant offered no expert testimony to contradict Lifecodes' Chinese statistical data base sample. People v. Shi Fu Huang, 145 Misc.2d 513, 546 N.Y.S.2d 920 (1989).

Also subsequent to Castro, the Supreme Court of South Carolina in State v. Ford, 301 S.C. 485, 392 S.E.2d 781 (1990), found that DNA theory and DNA forensic testing were generally accepted by the scientific community under the Frye standard. It also held that a Frye-type hearing will not be necessary in the future as the initial burden of proving general acceptance in the scientific community has been established and that DNA analysis may be admitted in court proceedings in the same manner as other scientific evidence such as fingerprint analysis and ABO blood tests. The Supreme Court of South Carolina noted:

"The admissibility of any such evidence remains subject to attack. Issues pertaining to relevancy or prejudice may be raised. For example, expert testimony may be presented to impeach the particular procedures used in a specific test or the reliability of the results obtained. See e.g. People v. Castro, 144 Misc.2d 956, 545 N.Y.S.2d 985 (1989). In additional, traditional challenges to the admissibility of evidence such as the contamination of the sample or chain of custody questions may be presented. These issues relate to the weight of the evidence. The evidence may be found to be

Page 159

so tainted [248 Kan. 238] that it is totally unreliable, and, therefore, must be excluded." Ford, 301 S.C. at ----, 392 S.E.2d at 784.

Smith, like the defendant in Ford, did not raise any of the issues described in Ford that would affect the admissibility of DNA test results into evidence. Furthermore, Smith's reliance on Castro is misplaced as the Castro court specifically found that DNA theory and forensic testing is generally accepted in the scientific community, but excluded the DNA test results from evidence because Lifecodes had not followed its own testing procedure.

Smith did not use an expert to challenge the reliability of the specific tests performed by Lifecodes as did the defendant in Castro. Smith did not challenge the qualifications of the State's three expert witnesses or refute their testimony. He offered no evidence that Lifecodes' tests were unreliable or that the tests were not generally accepted by the scientific community.

During the Frye hearing, Smith cross-examined the State's witnesses as to the statistics used by Lifecodes on its population studies. All three expert witnesses testified that the changes in the population figures did not affect the statistics and the changes only give Smith the benefit of the doubt. Even with the change, Smith still remained a possible contributor. Statistics based on population studies are admissible and any challenge to the reliability of the testing goes to its weight, not its admissibility. State v. Washington, 229 Kan. at 58-59, 622 P.2d 986. We find no error by the trial court under the Frye test in admitting the DNA profiling evidence into trial.

DNA print testing and the process of RFLP analysis have been recognized as reliable, have gained general acceptance in the scientific community, involve scientifically and professionally established techniques, and, thus, meet the criteria for admissibility under the Frye standard. While DNA print testing and the process of RFLP analysis meet the standard of general acceptance in the scientific community and thus are admissible on that basis, such test results may be inadmissible on grounds of relevancy or prejudice as well as under traditional challenges to admissibility of evidence such as contamination of sample or chain of custody questions. State v. Ford, 301 S.C. at ----, 392 S.E.2d at 784.

[248 Kan. 239] We agree with the trial court that: (1) The experts' testimony in this case established that there is sufficient acceptance of DNA profiling; (2) Lifecodes' techniques and procedures are accepted by the scientific community; (3) the DNA profiling evidence was admissible; and (4) Smith did not establish that the amendments to the reports affected the reliability of Lifecodes' procedures. The trial court did not abuse its discretion by admitting the results of DNA testing into evidence. It should be noted our decision is in accord with other appellate courts that have reached the same conclusion that DNA profiling results can be admissible. See Martinez v. State, 549 So.2d 694 (Fla.Dist.App.1989); Andrews v. State, 533 So.2d 841 (Fla.Dist.App.1988), rev. denied 542 So.2d 1332 (Fla.1989); Caldwell v. State, 260 Ga. 278, 393 S.E.2d 436 (1990); Cobey v. State, 80 Md.App. 31, 559 A.2d 391 (1989); People v. Shi Fu Huang, 145 Misc.2d 513, 546 N.Y.S.2d 920; People v. Castro, 144 Misc.2d 956, 545 N.Y.S.2d 985; People v. Wesley, 140 Misc.2d 306, 533 N.Y.S.2d 643 (1988); State v. Pennington, 327 N.C. 89, 393 S.E.2d 847 (1990); State v. Ford, 301 S.C. 485, 392 S.E.2d 781; Glover v. State, 787 S.W.2d 544 (Tex.App.1990); Spencer v. Commonwealth, 238 Va. 295, 384 S.E.2d 785 (1989), cert. denied 493 U.S. 1093, 110 S.Ct. 1171, 107 L.Ed.2d 1073 (1990); Spencer v. Commonwealth, 238 Va. 275, 384 S.E.2d 775 (1989), cert. denied 493 U.S. 1036, 110 S.Ct. 759, 107 L.Ed.2d 775 (1990); State v. Woodall, --- W.Va. ----, 385 S.E.2d 253 (1989).

Affirmed.