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SJC-11672

COMMONWEALTH vs. ROBERT DiCICCO.

Middlesex. November 4, 2014. - February 26, 2015.

Present: Gants, C.J., Spina, Cordy, Botsford, Duffly, & Hines, JJ.

Deoxyribonucleic Acid. Practice, Criminal, New trial, Postconviction relief. Evidence, Expert opinion, Scientific test. Witness, Expert.

Indictment found and returned in the Superior Court Department on September 27, 1983.

A motion for postconviction relief, filed on November 28, 2007, was heard by Diane M. Kottmyer, J., and a motion for additional funds for the services of an expert witness was considered by her.

After review by the Appeals Court, the Supreme Judicial Court granted leave to obtain further appellate review.

David J. Nathanson (Michael A. Nam-Krane with him) for the defendant.

Hallie White Speight, Assistant District Attorney, for the Commonwealth.

Sara A. Colb, for New England Innocence Project, amicus curiae, submitted a brief.

Ira L. Gant & Lisa M. Kavanaugh, Committee for Public Counsel Services, & Elizabeth A. Lunt, for Committee for Public Counsel Services Innocence Program & another, amici curiae, submitted a brief.

CORDY, J. In 1984, the defendant was convicted by a jury of aggravated rape. In July, 2005, the Superior Court clerk's office in Middlesex County located the trial exhibits, including the victim's blue jeans and underpants. They had been stored in plastic bags since the trial. Beginning in January, 2006, the defendant filed a series of motions to test the evidence for deoxyribonucleic acid (DNA). These motions were granted and the State police crime laboratory (crime laboratory) and Orchid Cellmark (Cellmark), an independent laboratory, performed DNA testing on the victim's clothing. The defendant subsequently moved for a new trial pursuant to Mass. R. Crim. P. 30 (b), as appearing in 435 Mass. 1501 (1995), relying on the affidavit of Eric Carita (Carita), a forensic analyst employed by the Connecticut State laboratory,¹ who opined that the defendant was excluded as the source of the male DNA on the victim's jeans based on "potential alleles."² In July, 2010, a judge in the Superior Court (motion judge) held a two-day evidentiary hearing

¹ Eric Carita is employed as a forensic science examiner in the nuclear deoxyribonucleic acid (DNA) casework unit at the Connecticut State laboratory. He has worked at that laboratory since 2003. Carita was the second DNA analyst that the defendant retained to examine the results of the DNA testing.

² "A DNA profile for an individual is that combination of alleles, or versions of genes, possessed by the individual at the loci tested." Commonwealth v. Gaynor, 443 Mass. 245, 248 n.1 (2005).

on the defendant's motion for postconviction relief, at which Carita and Christine Lemire, the crime laboratory analyst who performed the DNA analysis,³ testified.

Subsequently, on March 28, 2011, the judge denied the defendant's motion for a new trial in a detailed memorandum of decision and order. In an unpublished memorandum and order pursuant to its rule 1:28, the Appeals Court affirmed the denial. See Commonwealth v. DiCicco, 84 Mass. App. Ct. 1128 (2014). We granted the defendant's application for further appellate review and conclude that the motion judge did not abuse her discretion in determining that, under Commonwealth v. Lanigan, 419 Mass. 15, 25-26 (1994), Carita's opinion was not sufficiently reliable to be placed before a jury, and the defendant's motion for a new trial was properly denied.

Background. We consider the facts as set forth in the motion judge's findings after an evidentiary hearing, which are supported by the evidence in the record.⁴ See Commonwealth v. Stephens, 451 Mass. 370, 372 (2008).

1. Evidence at the 1984 trial. In August, 1983, the victim was walking home through a parking lot in Waltham

³ Christine Lemire is employed as a DNA analyst with the Massachusetts Forensic Technology Center (also commonly known as the State police crime laboratory [crime laboratory]). She has worked at that laboratory since 1996.

⁴ See note 22, infra.

sometime after 1:30 A.M. when she was attacked by two men. One of these men, later identified as Vincent Park,⁵ grabbed the victim and forced her to the ground. While Park pinned the victim down, the second man, subsequently identified as the defendant, pulled the victim's jeans and underwear down to her ankles. As she struggled, the second man raped her vaginally. The first man called the second man "Chick" and said something about his "turn."

While the rape was occurring, a van entered the parking lot and illuminated the area with its headlights such that the victim could see the second man. This man then stood up and urinated on and around the victim. The two men then ran from the parking lot with the van in pursuit. The victim had trouble getting up because she kept slipping on the urine, but on doing so, she ran to a telephone booth and called her father. The police were called and the victim went to the hospital, where evidence was collected and the victim was interviewed. Two hours after the rape, the victim told police that she thought she had seen the second man before and that his name was Robert or "Chico." Additionally, she provided the police with a physical description of the second man. The police took the

⁵ Vincent Park was later charged with aggravated rape, but was found not guilty by reason of lack of criminal responsibility.

evidence, including the victim's clothing, when leaving the hospital.

Later that morning, the victim went to the police station, looked through two books of photographs, and positively identified the defendant as the person who had raped her. The police located the defendant at a local shelter at 6:45 A.M. Although the defendant had been scheduled to be at the shelter the previous night, he did not arrive until shortly before the police looked for him there. The defendant fit the description of the second man provided by the victim. At trial, the victim identified the defendant again.

At trial, the parties stipulated that Mark Grant, a State police chemist, would testify to facts contained in his October, 1983, report, that chemical tests conducted on a stain on the victim's underwear did not exclude the defendant as the source, but were inconclusive as to anything further. The tests, conducted both on the stain and on a vaginal smear slide taken from the rape kit administered to the victim after the attack, were positive for the presence of a substance characteristically found in semen, but no sperm cells were found.

The defendant was convicted and sentenced to a term of not more than twenty years or less than eighteen years in State prison. On April 26, 1985, the Appeals Court affirmed the defendant's conviction, Commonwealth v. DiCicco, 19 Mass. App.

Ct. 1115 (1985). After completing his sentence, the defendant was found to be a sexually dangerous person and was committed to the Nemasket Treatment Center at Bridgewater.

2. Postconviction proceedings. In January, 2006, after the Superior Court clerk's office located the trial exhibits,⁶ the defendant filed a motion for necessary access to test evidence for DNA, a motion for funds to do comparison DNA testing, and a request for discovery and access to the smear slide. These motions were granted subject to the parties' filing a stipulation as to protocols for handling and testing the DNA evidence and subject to the availability of the smear slide.⁷

In July, 2006, the defendant's motion for funds for a defense expert, Thomas Fedor of the Serological Research Institute, to observe the inventory and evidence assessment at the crime laboratory was granted. Later that month, the Commonwealth filed a stipulation for release and testing of the evidence, wherein the parties agreed that portions of the victim's jeans and underpants would be released for testing. This stipulation was approved and Fedor was present in November, 2006, when the clothing was examined at the crime laboratory.

⁶ Originally the Superior Court clerk's office in Middlesex County had indicated that the exhibits were "gone, destroyed."

⁷ The vaginal smear slide had been lost, and therefore was not available for testing in 2007 and 2008.

a. Results of the crime laboratory DNA testing. In December, 2006, the victim's clothing was examined at the crime laboratory. No sperm cells or seminal fluid residue was detected in the stains on the victim's underpants. Several stains were observed on the exterior and interior of the jeans, and sperm cells were detected in three of them. Cuttings were then taken from these three stains (stains 9, 13, and 14). Only stains 13 and 14 are relevant on appeal.^{8,9}

The crime laboratory¹⁰ extracted DNA from the above mentioned cuttings and performed short tandem repeat (STR)

⁸ The analysis of stain 9 by the crime laboratory resulted in a finding of "insufficient DNA" for comparison in both its sperm and nonsperm fractions. Carita does not offer an opinion as to stain 9.

⁹ The samples provided to the defense were subsequently tested by Orchard Cellmark (Cellmark), see infra.

¹⁰ Laboratories that analyze DNA samples for forensic casework purposes are required by the Quality Assurance Standards for Forensic DNA Testing Laboratories to "establish and follow documented procedures for the interpretation of DNA typing results and reporting." The Scientific Working Group DNA Analysis Methods (DNA working group), a group of individuals authorized by Congress to advise the Federal Bureau of Investigation on DNA testing, has promulgated interpretation guidelines that are generally accepted in the community of forensic DNA analysts. The crime laboratory has adopted the DNA working group's Y-STR guidelines, and analysts conducting Y-STR analysis are required to comply with these protocols. The DNA working group's guidelines recommend the establishment of certain thresholds in the interpretation of Y-STR DNA results.

testing/typing (specifically Y-STR testing)¹¹ on stains 13 and 14. The Y-STR DNA testing is conducted first by subjecting the sample to a process of "differential extraction" which separates any sperm cells (sperm fraction) from epithelial cells (nonsperm fraction). On stain 13, the crime laboratory concluded that the defendant was excluded as the source of the nonsperm fraction DNA,¹² but that there was insufficient DNA for analysis in the sperm fraction, as the only result was a single "potential allele," falling below the threshold at which alleles can be positively identified, at Locus DYS456.¹³ As for stain 14, the

¹¹ Short tandem repeat (STR) testing focuses on different places (loci) on the human genome where certain known sequences of DNA base pairs repeat themselves. The repeat sequences at a particular locus are called alleles. Analysts measure the number of times these repeat sequences occur in a forensic DNA sample to determine whether the sample matches the subject's DNA profile. Y-STR typing is a technique by which analysts separate male DNA from female DNA and focus only on the male fragment.

¹² Alleles were identified ("called") at seven loci and potential alleles were identified at an additional four loci.

¹³ Consistent with DNA working group's Y-STR guidelines, the crime laboratory conducted validation studies to help establish certain thresholds for use in the interpretation of Y-STR DNA results. Based on the data generated in these validation studies, the crime laboratory established a "noise threshold," which is "based on signal-to-noise analysis internally derived from empiric data." The noise threshold at the crime laboratory was established at fifty-five relative fluorescent units (RFUs). The crime laboratory also established a "call threshold," which is the level at which the laboratory would identify or report a peak as an allele given the strength of the result. The call threshold at the crime laboratory was established as three times the noise threshold, or 165 RFUs. Pursuant to the crime laboratory's protocol, peaks below the call level, but above the

crime laboratory concluded that there was a mixture of more than one male source in the nonsperm fraction, which yielded inconclusive results for comparison with the defendant's DNA, that is, he could not be included or excluded as one of the contributors. With respect to the sperm fraction, there was insufficient DNA for analysis.

b. Motion for postconviction relief. In November, 2007, the defendant filed a motion for postconviction relief, arguing that the results of the comparative DNA testing done by the crime laboratory exonerated him. In March, 2008, the defendant filed a substitute motion for funds and access to do comparison DNA testing by the defendant's expert, or, in the alternative, for further testing by the Commonwealth and for funds for observation of such testing by the defendant's expert.¹⁴ On September 24, 2008, after a hearing, the judge allowed the defendant's motion for funds to have Cellmark take custody of

noise level, are called "potential alleles," and are designated by an asterisk symbol and a number. Both called and potential alleles are "then checked by two DNA analysts to verify that the resulting peaks are found in the correct horizontal location ('binned' correctly) and are shaped correctly (have good 'peak morphology') and are not artifacts." The single potential allele detected in the crime laboratory's testing of the sperm fraction of stain 13 was approximately seventy RFUs, just over the noise threshold established by the laboratory, and significantly below the call threshold of 165 RFUs.

¹⁴ In support of this motion, the defendant submitted an affidavit of Thomas Fedor.

the useable samples from the crime laboratory and subject them to further DNA testing.

With respect to stain 13, Cellmark concurred with the crime laboratory's conclusion as to the nonsperm fraction, that the defendant was excluded as the source. With respect to the sperm fraction, where the crime laboratory testing had revealed a single potential allele, insufficient for analysis, Cellmark's testing detected no male DNA at all. Cellmark's testing of the stain 14 sample also detected no male DNA in the sperm fraction, and concurred with the crime laboratory that the defendant could not be excluded as a contributor of the male DNA detected in the nonsperm sample.

In March, 2010, the defendant filed a document entitled, "Submission of New Forensic Analysis and Motion for Immediate Relief," together with an affidavit of Carita. The defendant had retained Carita to review the test data from the analyses of the crime laboratory and Cellmark. In his affidavit, Carita stated an opinion that excluded the defendant as the source of DNA found in both stain samples (13 and 14) taken from the victim's jeans. The Commonwealth filed an opposition to the defendant's motion along with an affidavit of Lemire. In April, 2010, the judge found that, notwithstanding certain limitations, the Carita affidavit stated an opinion that might be admissible in evidence. Accordingly, she ordered an evidentiary hearing,

explaining that the defendant would have the burden of establishing both the admissibility of Carita's opinion and that any DNA evidence that would be admissible satisfied the standard for a new trial.

3. Evidentiary hearing. A two-day evidentiary hearing was held, at which both Carita and Lemire testified¹⁵ and the laboratory reports were admitted in evidence.

a. Carita's testimony. Consistent with his affidavit, Carita testified that the defendant was excluded as the donor of DNA extracted from the nonsperm fractions of stains 13 and 14. Although both laboratory reports and Lemire concurred that the defendant was excluded as the source of the nonsperm fraction of

¹⁵ At the hearing, the defendant did not call Fedor, his previous expert, as a witness, but stated that he was relying solely on the test results of the crime laboratory and Cellmark, along with Carita's testimony. Until he filed the Carita affidavit in March, 2010, the defendant had relied on an affidavit submitted by Fedor. Fedor did not personally analyze the DNA, but he had reviewed the test data from the crime laboratory. Fedor agreed with the crime laboratory that the defendant was excluded as the source of the DNA on the nonsperm fraction of stain 13. He disagreed, however, with the crime laboratory's conclusion that there was insufficient data to include or exclude the defendant as the source of the DNA from the nonsperm fraction of stain 14, concluding that the defendant was excluded as its source. Fedor did note that, "[a]dmittedly, there is the problem of 'extraneous DNA,'" but qualified this statement given his speculation that the cuttings were taken from the area of the victim's jeans that would have been "potentially soaking in the assailant's urine." Fedor did not address the crime laboratory's conclusion that the partial DNA profile obtained from stain 14 indicated the presence of more than one source. The record does not indicate that Fedor drew any conclusions regarding the sperm fractions of either cutting.

stain 13, only Carita testified that the defendant was also excluded as the donor of DNA extracted from the nonsperm fraction of stain 14. Although he agreed with the crime laboratory (and Cellmark) that the DNA from the nonsperm fraction of stain 14 was a mixture from more than one male, Carita based his opinion of exclusion on the fact that "two possible genetic markers" identified by the crime laboratory as potential alleles at one location (DYS458) were inconsistent with the defendant's allele at that location.¹⁶ Additionally, Carita testified that the defendant also was excluded as the donor of the DNA extracted from the sperm fraction of stain 13. His opinion was based on the single potential allele, measured at approximately seventy relative fluorescent units (RFUs), at DYS456, far below the "call" threshold of 165 RFUs established by the crime laboratory. See notes 12 and 13, supra.

Carita acknowledged in his testimony that his opinion was not in accord with the crime laboratory's Y-STR interpretive guidelines, and offered no evidence that the Scientific Working Group DNA Analysis Methods (DNA working group) Y-STR guidelines explicitly permit an exclusion to be based on a single potential allele. He contended, however, that his conclusions were nevertheless permissible under the provisions of the DNA working

¹⁶ Both the crime laboratory and Cellmark had concluded that there was insufficient data to render such a conclusion.

group's Y-STR guidelines, which state that "the interpretation of the results of casework is a matter of professional judgment and expertise . . . not every situation can or should be covered in a preset rule." Carita went on to testify that he relied on the Connecticut State laboratory interpretive guidelines, which bind him in his consulting work, to form his opinion, but these were not introduced in evidence.

b. Motion judge's ruling. After hearing, the judge ruled that, given the limited data from the low-level DNA procured from the victim's clothing, Carita's opinions with respect to the sperm fraction of stain 13 and the nonsperm fraction of stain 14, which were based exclusively on potential alleles, were not sufficiently reliable to be placed before a jury. With respect to the sperm fraction of stain 13, the judge found that Carita cited no authority for the proposition that an exclusion may be based on a single potential allele in the absence of any other data, and that the potential allele on which he relied did not meet "the requirements of the laboratory's calling threshold, which gives absolute confirmation that a genetic marker is DNA and not a possible artifact." The judge also found that although Carita agreed that the detected DNA in the nonsperm fraction of stain 14 was a mixture, he cited no authority for the proposition that an exclusion may be based on two potential alleles at one locus in such a mixed sample where

the possibility of stutter¹⁷ cannot be eliminated. Although the judge acknowledged that it is permissible to use potential alleles in the interpretation of a DNA profile, "[i]n this case . . . given the minimal amount of DNA, Carita is not using potential alleles to interpret results. His opinions are based solely on peaks identified as potential alleles in the context of very limited data obtained from low-level DNA."¹⁸

After concluding that Carita's opinions with respect to the sperm fraction of stain 13 and the nonsperm fraction of stain 14 would not be admitted in evidence, she went on to find that the newly discovered DNA evidence which would be admissible lacked the materiality, weight, and significance necessary to demonstrate that it would likely have been a real factor in the jury's deliberations.

Discussion. "Motions for a new trial are addressed to the 'sound discretion' of the trial judge." Commonwealth v. DiBenedetto, 458 Mass. 657, 663-664 (2011), citing Commonwealth v. De Christoforo, 360 Mass. 531, 542 (1971). See also Mass. R.

¹⁷ Stutter, "a very common artifact," is a byproduct of the process used to amplify DNA and will result in peaks that occur before and after a real peak. Accordingly, stutter peaks may mask true peaks.

¹⁸ In making her findings, the judge pointed out that the findings in the report of Cellmark, an independent laboratory hired by the defendant, were consistent with the crime laboratory findings in all material respects, and both stood in stark contrast to Carita's opinion as to the adequacy of the data to make an exclusion.

Crim. P. 30 (b), as appearing in 435 Mass. 1501 (2001). "Judges are to apply the standard set out in Mass. R. Crim. P. 30 (b) rigorously," and "grant such a motion only if it appears that justice may not have been done" (quotations and citations omitted). Commonwealth v. Fanelli, 412 Mass. 497, 504 (1992). "[A]n appellate court will examine the motion judge's conclusion only to determine whether there has been a significant error of law or other abuse of discretion." DiBenedetto, 458 Mass. at 664, quoting Commonwealth v. Wolinski, 431 Mass. 228, 235 (2000).

1. The exclusion of Carita's opinion. In Lanigan, 419 Mass. at 25-26, we adopted, in part, the standard for the admissibility of expert testimony delineated by the United States Supreme Court in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993). In so doing, we held that "a proponent of scientific opinion evidence may demonstrate the reliability or validity of the underlying scientific theory or process by some other means, that is, without establishing general acceptance," Lanigan, supra at 26, as "the touchstone of admissibility is reliability, and not necessarily general acceptance within the scientific community." Commonwealth v. Vao Sok, 425 Mass. 787, 796 (1997), quoting Commonwealth v. Sands, 424 Mass. 184, 185-186 (1997). However, we noted that, "in most cases general acceptance will be the significant, and

'often the only, issue.'" Canavan's Case, 432 Mass. 304, 310 (2000), quoting Lanigan, supra. Accordingly, "a party seeking to introduce scientific evidence may lay an adequate foundation either by establishing general acceptance in the scientific community or by showing that the evidence is reliable or valid through an alternate means." Canavan's Case, supra.

Under Daubert-Lanigan, the motion judge, in her role as gatekeeper, "has a significant function to carry out in deciding on the admissibility of a scientific expert's opinion." Lanigan, 419 Mass. at 25. Conclusions based on personal observation or clinical experience are subject to this analysis. Canavan's Case, 432 Mass. at 313. The expert's opinion must "have a reliable basis in the knowledge and experience of his discipline," Daubert, 509 U.S. at 592, and the motion judge must assess "whether the reasoning or methodology underlying [an expert witness's] testimony is scientifically valid and whether that reasoning or methodology is properly applied to the facts in issue." Lanigan, supra at 26, quoting Daubert, supra at 592-593.

Accordingly, if the process or theory underlying an expert's opinion lacks sufficient reliability or an expert cannot provide a reliable factual basis for his conclusions, the trial judge must exclude the opinion from reaching the trier of fact. Lanigan, 419 Mass. at 25-26. See Canavan's Case, 432

Mass. at 315.¹⁹ The defendant, as the proponent of the expert testimony at issue, has the burden to establish that Carita's opinion is reliable. See Commonwealth v. Sliech-Brodeur, 457 Mass. 300, 328 n.41 (2010), citing Canavan's Case, 432 Mass. at 314. We review a judge's determination to admit or exclude expert testimony under Daubert-Lanigan for an abuse of discretion. Commonwealth v. Vasquez, 462 Mass. 827, 844 (2012). Commonwealth v. Pytou Heang, 458 Mass. 827, 844 (2011). As we have held previously, "the admissibility of DNA test results should be determined on a case-by-case basis." Commonwealth v. Mathews, 450 Mass. 858, 871 (2008), citing Commonwealth v. Curnin, 409 Mass. 218, 222 (1991).²⁰

a. Stain 13. The defendant argues that Carita's opinion regarding the sperm fraction of stain 13 is admissible for a few reasons. First, he contends that the opinion meets the Daubert-Lanigan standard as it is "based on reliable data from which [Carita] drew a logical conclusion." The defendant notes that the motion judge never found that the potential allele found in

¹⁹ See Mass. G. Evid. § 702 (2014) (expert opinion may be given if "[a] the testimony is based upon sufficient facts or data, [b] the testimony is the product of reliable principles and methods, and [c] the witness has applied the principles and methods reliably to the facts of the case").

²⁰ "[A] judge's determination on the reliability of scientific testimony is no different from other evidentiary decisions by a trial judge that are reviewed on appeal under an abuse of discretion standard of review." Canavan's Case, 432 Mass. 304, 311 (2000).

the sperm fraction of stain 13 was unreliable. Further, both Carita and Lemire testified that potential alleles were used in the work of DNA analysts. Both individuals additionally agreed that the potential allele was correctly designated and that it had the hallmarks of correct binning and good peak morphology. See note 13, supra. Moreover, the potential allele occurred at a smaller locus, making it more efficiently amplified and, the defendant contends, reliable. The defendant argues that excluding Carita's opinion because of factors such as potential DNA degradation²¹ is improper, as both experts agreed that degradation would not change the defendant's allele at DYS456.

Second, the defendant argues that Carita's opinion was reasonable, and that Carita's reliance on a single potential allele is "merely application of accepted methodology to a specific context." He contends that Carita did follow the Y-STR interpretation guidelines set forth by the DNA working group, as promulgated in January, 2009, which state that interpreting evidence is a matter of "professional judgment and expertise" and "[n]ot every situation can or should be covered by a preset rule." Further, the defendant contends that Carita's conclusion

²¹ As the motion judge found, degradation "relates to the DNA molecule breaking up . . . over time," or due to exposure to certain other factors. A proper environment for DNA storage is in breathable material (e.g., paper) and in a cool, dark, dry environment. Degradation of DNA can occur as a result of ultraviolet light, chemicals, or microbes, in addition to improper packaging and handling.

aligns with § 1.1.1.1. of the DNA working group's Y-STR guidelines, which states that the "analytical thresholds are defined as the minimum and maximum intensity thresholds between which data are reliable for use in allele designations."

Accordingly, he contends that the lack of a specific DNA working group guideline governing exclusion on single potential alleles is of no import.

Last, the defendant argues that the motion judge misunderstood her gatekeeping role under Daubert-Lanigan. He contends that the motion judge's issue with Carita's interpretation of the data and her concerns over factors such as possible degradation ought to have gone only to the opinion's weight, rather than its admissibility, and remained a question for a jury to determine.

After reviewing the record before the judge below, we cannot say that she abused the discretion afforded to her under Daubert-Lanigan in excluding Carita's testimony. Carita's opinion that the defendant was excluded as the contributor of the sperm fraction of stain 13 was based solely on a single below-threshold peak. He acknowledged that this potential allele did not meet the crime laboratory's calling threshold, which would have provided "absolute confirmation that a genetic marker is DNA and not a possible artifact," but nevertheless was

"probably true" DNA.²² Although it is undisputed that such potential alleles may be used for interpretational purposes along with other data when examining an individual's DNA profile, it was not an abuse of discretion to find that, in the absence of any authority substantiating Carita's opinion, a single potential allele without any other data is not enough to exclude an individual. As Lemire testified, "[T]here's just not enough data . . . to generate any comparison"

Based on the record on appeal, Carita provided virtually no support for his opinion except to testify that the DNA working group does not explicitly prohibit this practice and that he once before had rendered a similar exclusion opinion based on a single potential allele. Aside from this testimony, the defendant offered no evidence to establish that Carita's opinion was generally accepted by the relevant scientific community or otherwise was sufficiently reliable. Carita cited to no scientific authority, in either his affidavit or in his hearing

²² The motion judge appears to have erred in her finding that Carita admitted that he had not complied with DNA working group guidelines in reaching his opinion. Although it is accurate that Carita did not comply with the crime laboratory's protocols that had been promulgated in accord with the DNA working group's advice that each laboratory "prepare guidelines for formulating conclusions resulting from comparisons of evidentiary samples and known reference samples," see § 4.1 of the DNA working group's Y-STR guidelines, he did not violate any explicit DNA working group provision. However, this fact does not change our over-all assessment that, for a myriad of other reasons, the judge did not abuse her discretion in ruling Carita's opinion inadmissible.

testimony, to support his ultimate conclusion, instead relying solely on his "judgment and expertise."²³ Nor did the defendant supply the judge with written guidelines for Carita's laboratory in Connecticut or any other laboratory which supported the reliability of Carita's opinion. See Canavan's Case, 432 Mass. at 315, quoting Kumho Tire Co. v. Carmichael, 526 U.S. 137, 157 (1999) (no rule requires court "to admit opinion evidence that is connected to existing data only by the ipse dixit of the expert").

Carita pointed to no error in Lemire's analysis and did not challenge Cellmark's conclusions that it found no DNA at all in the sperm fraction of stain 13. Although it is accurate that Lemire agreed that the potential allele in question was likely real human DNA, she explained that, under the DNA working group and the crime laboratory's protocols, she could not confirm this conclusion, as the potential allele registered below the call threshold and she had no other results to interpret. She explained that although the peak in question resembled real DNA, it could have just been noise given its registration below the

²³ In support of Carita's opinion, the defendant's brief cites to a single article entitled "DNA for the Defense Bar," issued by the Department of Justice's National Institute of Justice (2012), which was not before the motion judge and to which the Commonwealth objects. The defendant neither argues that this publication qualifies as a learned treatise nor that it would have been admissible at the evidentiary hearing. As such, it does not affect our calculus as to whether the judge abused her discretion in deeming Carita's opinion inadmissible.

call threshold. Further, while acknowledging that a potential allele may be used for interpretation, Lemire repeatedly testified that in order to use potential alleles below threshold in her analysis she would need additional information at any given profile in order to utilize that information for an interpretation.²⁴ This was all the more convincing to the judge given Lemire's testimony that the tested sample is "low template DNA," and it is possible that inhibition²⁵ and degradation may have been factors in the sample.²⁶

b. Stain 14. The defendant also argues that Carita's opinion regarding the nonsperm fraction of stain 14 ought to be admissible. Testing indicated that this fraction was likely a

²⁴ The defendant takes issue with the fact that Lemire used alleles below threshold to support a conclusion of inclusion in her testimony in a different case. However, there, unlike here, Lemire had "additional information beyond simply . . . a potential allele below threshold" to aid her analysis. The judge concluded that the cases were sufficiently dissimilar such that Lemire's conclusions are not inconsistent.

²⁵ As the motion judge found, inhibition "relates to the ability to generate an STR profile." In the quantification system, there is an internal positive control that is used as an indicator as to "whether inhibitors or chemicals or anything intrinsic to the DNA . . . sample may be compromising or not allowing the method to work effectively." However, even where inhibition is not detected at the quantification stage, it may be present at different sites and affect the analysis.

²⁶ Although Carita testified that he saw no evidence of these factors in the sample, he also qualified his testimony to state that the sample involved a very small amount of DNA, so he could see no appearance of inhibition, and "the profile's too low to determine whether there could or could not have been degradation."

mixture of DNA from more than one male. Data were retrieved at just four loci and only two alleles (out of a potential seventeen or eighteen) were called. Of these two called alleles, one at DYS393 matched the defendant, while the other at DYS389I was inconsistent with his profile. Two other potential alleles (one at DYS389I and the other at DYS391) were also consistent with the defendant. Of chief significance to Carita's opinion was the identification of two additional potential alleles at another locus, DYS458, which did not match the defendant. Lemire and Carita agreed that the presence of these two potential alleles at the same location likely indicated a mixture of DNA from more than one source. Carita, however, inferred from these two potential alleles that the defendant definitively could be excluded as the contributor of the nonsperm fraction of stain 14. Lemire, on the other hand, testified that the data obtained were insufficient for comparison. Cellmark's test results agreed with Lemire's conclusion.

As with the sperm fraction from stain 13, discussed above, we cannot say that it was an abuse of discretion for the judge to rule Carita's opinion inadmissible. As an initial matter, the two potential alleles at DYS458 that form the basis of Carita's opinion were just fifteen RFUs above the crime laboratory's noise threshold. Lemire testified that sufficient

DNA was not found such that one could eliminate the possibility of "stutter" from this mixed sample.²⁷ She explained that the two potential alleles in question, at just fifteen RFUs, gave rise to the possibility of a peak which would be consistent with the defendant's known DNA profile at DYS458 in a "stutter" position.²⁸ She explained that if there were sufficient DNA in the sample, which there was not, an analyst could determine whether there was DNA present from something other than a stutter artifact. However, Lemire explained that here the defendant could not be excluded because the data were too limited to evaluate whether there was something more than stutter present.²⁹ Carita testified that "there was no stutter available for evaluation," as it was a "low-level sample."

The appellate record is devoid of any reliable authority to support Carita's conclusion that an individual can be excluded

²⁷ In mixed samples, stutter and alleles can overlap, thereby complicating interpretation.

²⁸ Stutter occurs when, during the amplification process, a fragment one repeat unit smaller or larger than the true allele is produced. As a result, stutter generates a peak that is actually one repeat unit off from the main peak. A stutter artifact of a 15 allele (such as that of the defendant at the DYS458 locus) could appear at a 16 allele because of the stutter effect. See note 17, supra.

²⁹ Lemire testified that, according to the crime laboratory's Y-STR guidelines, had there been peaks present above the call threshold at this loci she would have been able to evaluate whether the potential alleles at fifteen RFUs were more than just stutter.

as a donor based on these two potential alleles that (1) are in a low-level mixed sample, (2) register merely fifteen RFUs above the noise threshold, and (3) may represent a stutter peak. He does not point to any DNA working group or crime laboratory guideline or other scientific authority that permits his conclusion. Carita did not merely use these potential alleles to aid in his over-all interpretation of a DNA profile, but instead he made below-threshold peaks the sole basis for his opinion.

2. Admissible evidence as factor in jury deliberations.

We also must consider whether the defendant has established that the DNA evidence that is admissible casts meaningful doubt on the justice of his conviction. See Commonwealth v. Grace, 397 Mass. 303, 305 (1986); Mass. R. Crim. P. 30 (b) ("trial judge . . . may grant a new trial at any time if it appears that justice may not have been done"). See also Commonwealth v. Cintron, 435 Mass. 509, 516 (2001), overruled on other grounds by Commonwealth v. Hart, 455 Mass. 230 (2009); Commonwealth v. Pike, 431 Mass. 212, 218 (2000).

The relevant question is not whether the verdict would have necessarily been different, but "whether the new evidence would probably have been a real factor in the jury's deliberations." Grace, 397 Mass. at 306. Additionally, the new evidence must demonstrate such materiality, weight, and significance that the

motion judge could find that "there is a substantial risk that the jury would have reached a different conclusion had the evidence been admitted at trial." Id. As rule 30 (b) motions are attacks on final decisions, they are "granted only in extraordinary circumstances," Commonwealth v. Comita, 441 Mass. 86, 93 (2004), and the defendant has the burden of producing a "credible reason" to reverse the final decision that "outweighs the risk of prejudice to the Commonwealth." Commonwealth v. Lopez, 426 Mass. 657, 662 (1998), quoting Fanelli, 412 Mass. at 504.

Both the crime laboratory and Cellmark agreed that the defendant was excluded as the source of the DNA recovered from the nonsperm fraction of stain 13. The defendant argues that this stain must have been deposited by the assailant's urine at the time of the attack, by virtue of the victim's trial testimony that the assailant urinated "on and around me" and that she slipped in urine while attempting to stand.³⁰

Accordingly, the defendant argues that because these cells

³⁰ Although urea, a substance typically found in urine, was not detected in the sample, the defendant argues that this substance might have dissipated in the intervening twenty-three years between when the pants were collected in evidence and when they were submitted for DNA testing. We note that this is possible, as a crime laboratory's chemist averred in her report that the failure to detect semen and urine is unremarkable as such fluids do not have cell walls and break down more easily than epithelial cells.

indisputably do not belong to him, he could not have been the assailant.

However, as noted by the judge, there is no scientific method of ascertaining whether these cells were deposited by the assailant or by any one of the many individuals who handled the evidence after the commission of the crime. The pants in question were taken from the victim at the hospital, turned over to the police, and admitted in evidence at trial. For over twenty years the evidence was indisputably stored in plastic bags, an environment incapable of protecting against contamination.³¹ The defendant's argument that the epithelial cells present in stain 13 necessarily came from the assailant's urine is a statement of conjecture, at best.

It remains the defendant's burden to demonstrate the importance of newly available evidence, see Grace, 397 Mass. at 306, and there is simply no way of determining when and under what circumstances the male DNA obtained from the nonsperm fraction of this stain was deposited. Lemire specifically testified that she was unable to draw any conclusions as to the time or manner by which the DNA was deposited and she had no scientific way of assessing whether the evidence had been

³¹ The crime laboratory's DNA Y-STR report states, "[e]xtraneous DNA may be present on common articles such as clothing, shoes, etc. This extraneous DNA often manifests itself as a low level minor male contributor in a DNA result, and may have no probative value in a case."

contaminated prior to its arrival at the crime laboratory. Accordingly, the judge could not determine whether the exclusion of the defendant as the contributor of this DNA had any significant probative value, thereby diluting the defendant's argument of materiality and undermining claims that the jury would have reached a different conclusion had the evidence been admitted at trial.

In sum, the newly available, admissible evidence would have shown that (1) the DNA, if any, contained in the sperm cells of both stains and the nonsperm cells of stain 14 were insufficient to either include or exclude the defendant as their donor; and (2) it is not possible to determine the significance of the fact that the defendant was excluded as a source of the nonsperm cells in stain 13. We agree with the judge that this evidence would not be capable of casting meaningful doubt on the jury's verdict that the defendant was the perpetrator of the rape.

3. Additional expert funds. The defendant first filed a motion for funds to do comparison DNA testing in January, 2006. In May of that year, the motion was granted in the amount of \$4,000. Subsequently, in July, 2006, the defendant filed a motion for funds in the amount of \$5,000 for his defense expert at the time (Fedor) to observe the inventory and assessment of evidence at the crime laboratory. This motion was granted.

Nearly two years later, in March, 2008, the defendant filed a substitute motion for funds and access to do comparison DNA testing by the defendant's expert, or, in the alternative, for further testing by the Commonwealth and for funds for observation of such testing by the defendant's expert. A second motion for funds was filed in September, 2008, and the judge permitted the defendant's motion in the amount of \$6,575 to have Cellmark take custody of usable samples from the crime laboratory and subject them to independent DNA testing.

In October, 2009, the defendant moved for funds in the amount of \$5,500 for the attendance of Fedor and "a like amount" for the attendance of a representative from Cellmark at an evidentiary hearing. As of March, 2010, the motion judge did not believe, based on the record as it existed (which included an affidavit submitted by Fedor as well as reports from both the crime laboratory and Cellmark), that the defendant was entitled to an evidentiary hearing on his motion for a new trial.

Subsequently, the defendant filed a document entitled "Submission of New Forensic Analysis and Motion for Immediate Relief," alongside the aforementioned Carita affidavit. The defendant had not sought court approval to retain Carita, and according to his affidavit, Carita had reviewed test data from the crime laboratory's analysis on a voluntary basis up until that point. The Commonwealth filed an opposition, but in April,

2010, the judge found that, notwithstanding certain limitations, the Carita affidavit stated an opinion that might be admissible in evidence. Accordingly, the motion judge granted an evidentiary hearing, ordering the parties to "explore the possibility of minimizing the cost to the Commonwealth" by taking video testimony of Fedor and a Cellmark representative.

The defendant filed, and the judge allowed, a motion for funds for the attendance of an expert witness in the amount of \$4,500 for Carita to attend the evidentiary hearing. In his motion, the defendant made clear that this request was "an all inclusive authorization, covering preparation, travel, and court time." The hearing took place on July 9 and 23, 2010, at which both Carita and Lemire testified. As discussed above, the motion judge ultimately found that Carita's opinions would not be admissible at trial.

Approximately one year later, in May, 2011, the defendant sought additional funds to cover the remainder of Carita's bill, explaining that the original funds sought constituted an underestimate based on an expected one-day evidentiary hearing. The motion judge denied the motion without prejudice to renew. On September 1, 2011, the defendant filed a renewed motion for funds with an accompanying affidavit detailing Carita's dates of service, work performed, and time spent traveling. The defendant asserted that Carita was retained because the cost of

transporting Fedor and an expert from Cellmark was "substantial," and counsel had been "unsuccessful" in making video conferencing arrangements. The motion judge denied this motion as well, basing her decision on the defendant's failure to seek prior approval to retain Carita and her view that Carita's testimony was unreliable, inadmissible, and put forth solely "to supplement an inadequate record."

Rule 30 (c) (5) of the Massachusetts Rules of Criminal Procedure, as appearing in 435 Mass. 1501 (2001), and as explained by the Reporters' Notes to Rule 30, Mass. Ann. Laws Court Rules, Rules of Criminal Procedure, at 1710-1711 (LexisNexis 2014), "gives judges discretion to allow for the payment of costs associated with the preparation and presentation of a new trial motion" (quotations and citation omitted). Commonwealth v. Mitchell, 438 Mass. 535, 555, cert. denied, 539 U.S. 907 (2003). See Commonwealth v. Evans, 439 Mass. 184, 204, cert. denied, 540 U.S. 923, and cert. denied, 540 U.S. 973 (2003). Further, where an indigent defendant seeks to obtain additional evidence in connection with a motion for postconviction relief that would likely raise a meritorious defense warranting a new trial, the judge has discretion to grant a motion for funds to hire an expert. See Mitchell, 438 Mass. at 555. A judge considering such a motion for expert funds must consider "not only the potential admissibility of the

expert's testimony and its cost, but also the 'desirability or necessity' of the testimony to the requesting party's case."

Commonwealth v. Zimmerman, 441 Mass. 146, 153 (2004), quoting Commonwealth v. Lockley, 381 Mass. 156, 161 (1980).

The judge likely factored the above considerations into her assessment when granting the initial \$4,500 for Carita to appear and testify at the evidentiary hearing, given that she ordered the hearing only after receiving Carita's affidavit and finding that Carita presented an opinion that "might be admissible." At that point, the motion judge had before her the substance of Carita's testimony, which did not vary at the hearing.

Although the judge would have had discretion to deny the defendant's initial request for funds, see Zimmerman, 441 Mass. at 152-153, her initial approval strongly supports the inference that she deemed Carita's services to be reasonably necessary. And although the defendant did not seek explicit permission to retain Carita, the judge implicitly provided such permission when granting \$4,500 for Carita to appear and testify at the evidentiary hearing.

Accordingly, it appears that the judge predicated the grant of additional expert funds on whether she ultimately agreed with the substance of Carita's opinion, and when denying the defendant's renewed motion for funds, she explicitly stated that "[h]ad the Court realized the extent to which the opinions of

Mr. Carita that led to the evidentiary hearing were not based on any accepted or reliable scientific methodology, the Court would not have allowed" the original funds for Carita's attendance and testimony.

Carita adequately documented the services he performed and the time spent assisting the defendant's case. He testified on behalf of the defendant over the course of an (unanticipated) two-day evidentiary hearing and assisted defense counsel in drafting proposed findings of fact. Additionally, although the judge took issue with the fact that the defendant did not obtain explicit permission to retain Carita, up until the point at which the defendant sought and the judge granted funds, Carita had provided his services pro bono. Once the judge granted the funds requested by the defendant so that Carita could attend the evidentiary hearing, it was not unreasonable for the defendant to believe he had the judge's permission to retain Carita. Although the defendant's initial request assured the judge it would be an "all inclusive authorization," the evidentiary hearing lasted one day longer than anticipated.

It was only in hindsight, after her ultimate finding on the admissibility of his opinion, that the judge denied additional funds. This is impermissible. See Zimmerman, 441 Mass. at 152-153 (judge should consider not only potential admissibility of expert testimony, but also "desirability or necessity" to the

requesting party's case). See also Lockley, 381 Mass. at 161. Accordingly, it was an abuse of discretion to deny the defendant's supplemental request to pay Carita for additional services rendered.³²

Conclusion. The denial of the defendant's motion for a new trial is affirmed and the denial of supplemental expert funds is reversed. The case is remanded for further proceedings consistent with this opinion.

So ordered.

³² It would have been permissible for the judge to deny the request for additional funds if they were not justified because the additional expenses had been foreseeable (but not approved in advance) or because the amount was unreasonably high for the services rendered.