

**920 N.E.2d 845  
455 Mass. 840  
COMMONWEALTH**

**v.**

**Alexander MATTEI.  
SJC-10390**

**Supreme Judicial Court of Massachusetts, Essex.  
Argued October 6, 2009.  
Decided February 1, 2010.**

Bonny M. Gilbert for the defendant.

Catherine Langevin Semel, Assistant District Attorney, for the Commonwealth.

Dana Alan Curhan, Boston, for Committee for Public Counsel Services, amicus curiae, submitted a brief.

Present: MARSHALL, C.J., IRELAND, SPINA, COWIN, CORDY, BOTSFORD, & GANTS, JJ.

MARSHALL, C.J.

We granted the defendant's application for further appellate review to consider his claim that the trial judge committed reversible error by admitting expert testimony that deoxyribonucleic acid (DNA) tests could not exclude the defendant as the source of DNA taken from the scene of the crime without accompanying testimony explaining the statistical import of those results.<sup>1</sup> The defendant also claims that there was insufficient evidence to convict him of home invasion and assault by means of a dangerous weapon because the duct tape used in the attack was not a "dangerous weapon";<sup>2</sup> that his constitutional rights to confrontation were impermissibly restricted when the judge limited the scope of certain cross-examination; and that he received ineffective assistance of counsel.<sup>3</sup> We reject the defendant's sufficiency of the evidence claim. We conclude, however, that expert testimony that DNA tests could not exclude the defendant as a potential source of DNA found at the crime scene, absent testimony regarding statistical findings explaining the import of such a result, was likely to confuse and mislead the jury such that any probative value of the test results was substantially outweighed by their prejudicial effect. Because the error in admitting such evidence was prejudicial, we remand for a new trial and provide guidance on issues that may then arise.<sup>4</sup>

1. Facts. The facts as they properly could have been found by the jury are set forth in the decision of the Appeals Court, Commonwealth v. Mattei, 72 Mass.App.Ct. 510, 511-513, 892 N.E.2d 826 (2008). We repeat here the basic details, focusing on facts relevant to the defendant's claim of insufficiency.

At approximately 1 P.M., on April 26, 2002, the thirty-six year old victim returned to her apartment in a housing complex operated by the Andover Housing Authority

(housing authority). As she walked down the stairs to her basement apartment, she saw the defendant — a man she did not recognize — mopping the floor in the basement hallway. After a brief exchange, the victim entered her apartment, locking the door behind her. Shortly thereafter, through the locked door,<sup>5</sup> the defendant warned her to be careful if she left the apartment because the floor in the hall was wet and slippery.

One to five minutes later, while she was standing near her bed facing away from her front door, a man grabbed the victim from behind. A struggle ensued, during which the assailant repeatedly pressed his hand over the victim's mouth and nose, making it difficult for her to breathe. During the struggle the assailant tried to place duct tape over the victim's mouth,<sup>6</sup> but was unsuccessful in doing so. Eventually, as she testified, the victim could struggle no more. The assailant then attempted to rape the victim anally, but stopped after ten or fifteen minutes and left the apartment. The victim was unable to see the assailant's face, and could not identify her attacker. She later described the assailant as "white,"<sup>7</sup> and reported that he was wearing a white or light gray sweatshirt.

2. Sufficiency of the evidence. The defendant argues that the judge erred in denying his motion for required findings of not guilty of home invasion and assault by means of a dangerous weapon because the jury could not properly have found that the duct tape as used by the assailant was a "dangerous weapon" within the meaning of those statutes.<sup>8</sup> See Commonwealth v. Doucette, 430 Mass. 461, 465-466, 720 N.E.2d 806 (1999), quoting G.L. c. 265, § 18C (listing elements of home invasion, including "while armed with a dangerous weapon"); Commonwealth v. Appleby, 380 Mass. 296, 305-306, 402 N.E.2d 1051 (1980), citing G.L. c. 265, § 15B (discussing "dangerous weapon" element of assault "by means of a dangerous weapon").<sup>9</sup> On review, "we determine whether the evidence offered by the Commonwealth, together with reasonable inferences therefrom, when viewed in its light most favorable to the Commonwealth, was sufficient to persuade a rational jury beyond a reasonable doubt of the existence of every element of the crime charged." Commonwealth v. Campbell, 378 Mass. 680, 686, 393 N.E.2d 820 (1979). See Commonwealth v. Latimore, 378 Mass. 671, 676-678, 393 N.E.2d 370 (1979).

We agree with the Appeals Court that resolution of this claim is determined in large part by Commonwealth v. Cruz, 430 Mass. 182, 714 N.E.2d 813 (1999), see Commonwealth v. Mattei, 72 Mass.App.Ct. 510, 519, 892 N.E.2d 826 (2008), where we held that duct tape had been used as a dangerous weapon when an assailant used the tape to gag the mouth of a woman and the mouth of her seven year old daughter. See Commonwealth v. Cruz, supra at 184, 195, 714 N.E.2d 813. In that case, the child died of asphyxiation because the duct tape covered her nose and mouth, see id. at 184, 714 N.E.2d 813, and we held that "the jury could permissibly infer from the resulting death that the tape was used as a dangerous weapon." Id. at 195, 714 N.E.2d 813. Cf. Commonwealth v. Scott, 408 Mass. 811, 812-813, 822-823, 564 N.E.2d 370 (1990) (sufficient evidence for jury to find that gag, as used by defendant, was dangerous weapon where victim died "from a combination of head injuries and asphyxia by the gag"); Commonwealth v. Tarrant, 367 Mass. 411, 416 n. 4, 326 N.E.2d 710 (1975) (where "neutral object is in fact used to inflict serious injury it would clearly be a dangerous weapon").

Our reliance on *Commonwealth v. Cruz*, supra, is based not entirely on the fact that the object at issue here, as in that case, is duct tape. As we noted in *Commonwealth v. Appleby*, supra at 307 n. 5, 402 N.E.2d 1051, the use of a particular object in one case "should not be construed to mean that any intentional unjustified touching with an object previously held in a different case to have been capable of being a dangerous weapon constitutes a crime.... A reasonable jury might well reach a different conclusion as to [an object] when used in different circumstances." (Emphasis in original.) Thus the "essential question" is "whether the object, as used by the defendant, is capable of producing serious bodily harm." *Commonwealth v. Tevlin*, 433 Mass. 305, 310, 741 N.E.2d 827 (2001), quoting *Commonwealth v. Mercado*, 24 Mass.App.Ct. 391, 397, 509 N.E.2d 300 (1987). That question is for the jury to determine, "taking into account the purposes for which the object is intended and the manner in which it is used." *Commonwealth v. Scott*, supra at 822, 564 N.E.2d 370, and cases cited. See *Commonwealth v. Cruz*, supra at 195, 714 N.E.2d 813, quoting *Commonwealth v. Appleby*, supra ("the question whether a weapon is dangerous as used is always one for the fact finder"). Here the jury were correctly instructed that, in order to find the defendant guilty of home invasion or assault by means of a dangerous weapon, they had to find beyond a reasonable doubt that the defendant used the duct tape "with the intent to use it in a dangerous or potentially dangerous fashion," i.e., that the duct tape was "intentionally used in a way that it is reasonably capable of causing serious injury or death to another person."<sup>10</sup> It was for the jury to consider, for example, the evidence of the victim's trouble with breathing during the assault when the assailant placed his hand over her mouth and nose, and the fact that the assailant attempted to use duct tape measuring two to two and one-half inches wide to cover and close her mouth, as they considered whether the use of the duct tape in this case met the definition of a "dangerous weapon" as instructed by the judge.

That the victim in this case did not die or suffer serious bodily harm from the attempted use of the duct tape to cover her mouth is not dispositive.<sup>11</sup> The "relevant behavior" for the offense of assault by means of a dangerous weapon "is an outward demonstration of force," and requires "only apparent ability to injure." *Commonwealth v. Appleby*, supra at 305, 402 N.E.2d 1051, citing *Commonwealth v. Henson*, 357 Mass. 686, 692-693, 259 N.E.2d 769 (1970). See *Commonwealth v. Tarrant*, supra at 414, 326 N.E.2d 710 (relevant focus in evaluation whether item is "dangerous weapon" is "instrumentality's potential for harm as it might have objectively seemed to a reasonable individual"). An analysis focusing on the object's apparent ability to injure is equally appropriate under the home invasion statute.<sup>12</sup> "Apparent ability to injure" of necessity encompasses the particular use that the defendant made of the object. In this case the jury permissibly could find that the assailant used the duct tape to cover the victim's mouth, potentially cutting off her oxygen supply. "The law need not wait until the instrument actually does cause serious bodily harm in order to classify the weapon as dangerous." *Commonwealth v. Appleby*, supra at 307, 402 N.E.2d 1051.

3. Admissibility of evidence that defendant could not be excluded by a DNA test without accompanying statistics. The defendant argues that it was error to admit expert testimony that the defendant could not be excluded as a potential source of DNA found on the interior doorknob of the victim's apartment, and that the victim could not be

excluded as a potential source of DNA found on the defendant's sweatpants, without accompanying testimony explaining the statistical relevance of those nonexclusion results. For the reasons that follow, we agree.<sup>13</sup>

At trial, the Commonwealth presented expert testimony from a forensic chemist from the DNA unit at the State police crime laboratory, who testified that she had conducted DNA tests on various pieces of evidence collected from the crime scene. The test results fell into two groups: tests of DNA taken from a sweatshirt showed a "match" with DNA samples from the defendant and the victim;<sup>14</sup> other tests did not result in "matches" but "[could not] exclude" the defendant or the victim as a possible contributor to the sample. There were no "matches" between the defendant and DNA from any samples taken from inside the victim's apartment, and there were no matches between the victim and DNA from samples taken from the defendant's clothes when apprehended.

Turning to the evidence of a "match," the expert first testified, without objection, that DNA from a sample taken from the sleeve of a white sweatshirt found in a trash barrel in the basement laundry room across the hall from the victim's apartment "matched" the DNA in a sample taken from the victim, and that DNA from a sample taken from the front of the sweatshirt "matched" the DNA in a sample taken from the defendant.<sup>15</sup> The expert explained that the DNA tests she used assigned numbers to particular locations, or allele sites, on the DNA molecule belonging to the profile being tested.<sup>16</sup> A "match" occurred when the results from all thirteen allele sites and a gender test in the two samples being compared were identical. The expert further testified as to the probability that a randomly selected member of the population would have a DNA profile that "matched" the DNA profiles in the samples from the sweatshirt.<sup>17</sup> The defendant does not challenge the "match" testimony.

The defendant's challenge focuses on the expert's testimony concerning two other samples, one taken from the defendant's sweatpants and the second from an interior doorknob within the victim's apartment. As to the sample taken from the defendant's sweatpants, the expert first testified that this was a "mixture" that contained DNA from at least two sources.<sup>18</sup> Over the defendant's objection, the expert then testified that the victim was "included" or "could not be excluded" as a potential source of DNA in the sample taken from the defendant's sweatpants.<sup>19</sup> As to the swabbing of blood found on the interior doorknob of the door to the victim's apartment, the expert testified that this also showed the presence of DNA from more than one source, and a DNA test showed the mixture was "consistent with" DNA from the victim and from the defendant. According to the expert, the victim and the defendant were both "included" as "potential contributor[s]" to the mixture, i.e., neither the victim nor the defendant "were excluded as a potential contributor to the DNA mixture on the interior of the doorknob."<sup>20</sup> The expert explained that a result that certain profiles were "not excluded" meant that "the numbers that are present in those profiles are also present in the [sample profile] being compared." The nonexclusion results here were not "matches," she explained, because either not enough DNA was available to test all thirteen allele sites or it was not possible to distinguish the major from the minor profile at one allele site.<sup>21, 22</sup> The expert did not testify as to the probability that an individual randomly selected from the population

would also "not be excluded" by these tests, nor did she provide any other indication as to the meaning of a "not excluded" result. She merely displayed charts to the jury illustrating the numerical results of the tests at each tested location and stated generally that the alleles at the sites she tested "are extremely variable between people."<sup>23</sup>

We now consider the defendant's objection to this testimony. A judge generally is accorded substantial discretion in deciding whether evidence is relevant, and if so, whether it nevertheless should be excluded as less probative than prejudicial. See Commonwealth v. Mathews, 450 Mass. 858, 872 n. 15, 882 N.E.2d 833 (2008), quoting Commonwealth v. Talbot, 444 Mass. 586, 589 n. 2, 830 N.E.2d 177 (2005). In this respect DNA test results are generally no different from other evidence, and a judge's decision to admit or exclude the evidence will be accorded substantial deference. See Commonwealth v. Mathews, supra.

We have also held that in a criminal trial we will "not permit the admission of test results showing a DNA match (a positive result) without telling the jury anything about the likelihood of that match occurring." Commonwealth v. Curnin, 409 Mass. 218, 222 n. 7, 565 N.E.2d 440 (1991).<sup>24</sup> See Commonwealth v. Daggett, 416 Mass. 347, 357, 622 N.E.2d 272 (1993) (Abrams, J., concurring) ("expert testimony concerning a DNA match must be accompanied by some background information indicating the probability that the match in question might have occurred by chance"); Commonwealth v. Thad T., 59 Mass.App.Ct. 497, 505-506, 796 N.E.2d 869 (2003) (same). We have explained our approach by stating that "[e]vidence of a match based on correctly used testing systems is of little or no value without reliable evidence indicating the significance of the match, that is, evidence of the probability of a random match of [the victim's or] the defendant's DNA in the general population." Commonwealth v. Rosier, 425 Mass. 807, 813, 685 N.E.2d 739 (1997), quoting Commonwealth v. Lanigan, 419 Mass. 15, 20, 641 N.E.2d 1342 (1994). See Commonwealth v. Curnin, supra at 230, 565 N.E.2d 440 (Appendix) ("The fact that two DNA samples produce the same DNA prints, and therefore contain the same alleles, is of little probative value in a criminal prosecution until it is determined how often that combination of alleles occurs in a given population").

The same reasoning applies to evidence that a DNA test, although resulting in less than a complete "match," could not exclude a particular individual as a potential contributor.<sup>25, 26</sup> Without reliable accompanying evidence as to the likelihood that the test could not exclude other individuals in a given population, the jury have no way to evaluate the meaning of the result.<sup>27</sup> As the dissent in Commonwealth v. Mattei, 72 Mass.App.Ct. 510, 522, 892 N.E.2d 826 (2008) (Rubin, J., dissenting), noted, there is no way to determine whether the results of nonexclusion in this case mean "that half the people in the world could have left the DNA that was found in the mixture[s]" on the interior doorknob or on the defendant's sweatpants. We simply do not know.

Further, admitting evidence of a failure to exclude without accompanying evidence that properly interprets that result creates a greater risk of misleading the jury and unfairly prejudicing the defendant than admission of a "match" without accompanying statistics. As to "matches," it is "generally well known that DNA testing often allows

scientists to identify a particular individual from among millions." Peters v. State, 18 P.3d 1224, 1227 (Alaska Ct.App. 2001). Jurors are routinely presented with exceedingly infinitesimal random match probabilities. See, e.g., Commonwealth v. Gaynor, 443 Mass. 245, 249, 820 N.E.2d 233 (2005) ("one in 64 quadrillion African-Americans"); Commonwealth v. Girouard, 436 Mass. 657, 669 n. 4, 766 N.E.2d 873 (2002) ("one in fifty-seven trillion" Caucasians); Commonwealth v. Thad T., 59 Mass.App.Ct. 497, 505, 796 N.E.2d 869 (2003) ("one in 320 trillion" African-Americans). Indeed in this case, as to the "matches" identified on the sweatshirt, the Commonwealth's expert testified to random match probabilities as small as one in 13.51 quintillion. See note 17, supra. If the jury are not provided with similar statistical evidence where the DNA test result is a "nonexclusion," there is a real risk that jurors will be misled into thinking that these DNA test results are similarly significant and that the nonexclusion evidence is similarly conclusive as to the "matched" contributor's identity, when in fact the actual meaning of such results can vary substantially. See, e.g., State v. Patton, 280 Kan. 146, 154, 120 P.3d 760 (2005) (probability of selection of unrelated individual at random having DNA profile that could not be excluded as contributor to various blood samples was one in 431,000 for blood on murder weapon, one in 27,880 for blood on sheets and pillow, and one in seven for blood on dryer door).<sup>28</sup>

The Commonwealth's reliance on Commonwealth v. Mathews, 450 Mass. 858, 882 N.E.2d 833 (2008) (Mathews), is misplaced. In Mathews, we permitted the admission of inconclusive DNA test results without accompanying statistics to rebut the defendant's challenge of "the integrity of the police investigation," and "its use of forensics." Id. at 872, 882 N.E.2d 833. We used the term "inconclusive" to refer to results that provide no information whatsoever due to insufficient sample material, contamination, or some other problem.<sup>29</sup> See id. at 864, 882 N.E.2d 833 (according to chemist's testimony, DNA test results were "inconclusive" where "there was just not enough DNA information" in one DNA profile "to either include or exclude" two known individuals, and where minor profile in mixture from another sample did not "contain enough DNA to make a conclusion, either an inclusion or exclusion"). See also Commonwealth v. Nesbitt, 452 Mass. 236, 253, 892 N.E.2d 299 (2008) (describing as "inconclusive" DNA test that "yielded `no results,' meaning that `very little DNA [was] present' or that it was `very degraded,' or both").<sup>30</sup> The question before us is not whether it was error to admit inconclusive DNA test results; Mathews is inapposite.<sup>31</sup>

The Commonwealth's reliance on Commonwealth v. McNickles, 434 Mass. 839, 753 N.E.2d 131 (2001) (McNickles), is similarly unavailing.<sup>32</sup> The defendant's argument in McNickles was not, as here, that the test results were unduly confusing and prejudicial without accompanying statistics. Rather, in McNickles, "the defendant conceded that the test results yielded some reliable, relevant information, challenging only whether the test could be read to yield a more precise result." Id. at 850, 753 N.E.2d 131. See Commonwealth v. O'Laughlin, 446 Mass. 188, 208, 843 N.E.2d 617 (2006) (rejecting similar argument that DNA tests showing random match probability of one in two were insufficiently probative to be admissible); Commonwealth v. Benoit, 382 Mass. 210, 221, 415 N.E.2d 818 (1981) (rejecting argument that admission of defendant's blood type was prejudicial because that type was shared by "a large segment of the world population"). In

McNickles, *supra* at 849-855, 753 N.E.2d 131, we did not have occasion to consider whether the probative value of DNA nonexclusion testimony might be outweighed by the prejudicial possibility of jury confusion. As to that question, DNA test results are not the same as descriptive information about physical traits such as height, weight, and hair color described in McNickles, *supra* at 854, 753 N.E.2d 131. Because jurors can "readily observe" physical traits within the general population, "the jury is presumed to have a grasp of the frequency of these characteristics within the general population. DNA evidence is different. Because a juror is unable to observe a person's DNA, the juror has no idea of the frequency of a particular DNA profile." Peters v. State, 18 P.3d 1224, 1228 (Alaska Ct.App. 2001).

The challenged expert testimony concerning the nonexclusion results should not have been admitted without accompanying statistical explanation of the meaning of nonexclusion. We therefore must determine whether the error "did not influence the jury, or had but very slight effect," in other words whether we can say, "with fair assurance, after pondering all that happened without stripping the erroneous action from the whole, that the judgment was not substantially swayed by the error." Commonwealth v. Flebotte, 417 Mass. 348, 353, 630 N.E.2d 265 (1994), quoting Commonwealth v. Peruzzi, 15 Mass.App.Ct. 437, 445, 446 N.E.2d 117 (1983).

The error was prejudicial. First, the prosecutor emphasized the importance of the nonexclusion DNA evidence in her closing argument. She described the evidence as "very important in this case." It "create[d] links in the chain," and "help[ed] to put all of those pieces of other evidence together," into "a big, clear picture." The prosecutor specifically encouraged the jury to "draw an inference" from the evidence that the defendant could not be excluded as a potential source of DNA on the doorknob inside the victim's apartment that the defendant was "in fact, the assailant in this case."<sup>33</sup> She pointed specifically to the "different areas of concordance" linking the defendant to the interior doorknob. Her emphasis on the doorknob DNA was hardly surprising, as no other evidence placed the defendant inside the victim's apartment; the victim twice told the dispatcher in her 911 call that she had locked her door; the defendant did not have a key to the apartment;<sup>34</sup> and there were no signs of a break-in. The prosecutor focused on the nonexclusion of the victim as a potential source of DNA on the defendant's sweatpants, telling the jury that the DNA profile found on the sweatpants was "consistent at numerous locations on the DNA with [the victim's] DNA profile." Her emphasis on this evidence is similarly unsurprising, as no other evidence linked the victim to the defendant through clothing that the defendant was wearing when apprehended. Cf. note 16, *supra*. That linkage was crucial to the Commonwealth's case because the victim could not identify her assailant. The Commonwealth concedes in its brief that the nonexclusion DNA results were the "most damaging" DNA results for the defense.

The lack of statistical evidence concerning the nonexclusion test results was particularly harmful to the defendant because the prosecutor, in effect, encouraged the jury to act as their own experts, arguing to them that the results from tests of the defendant's sweatpants (which could not exclude the victim as a potential contributor) were "consistent" at "numerous locations on the DNA" with the victim's DNA profile.

"You can look at that chart," she said, "and you can think about what that means, when you analyze the evidence. Those were the defendant's sweatpants."

The "matches" between DNA from both the defendant and the victim and DNA samples on the sweatshirt discovered by the police in the trash barrel outside the victim's apartment does not mandate a contrary result. The defendant's DNA could have been deposited on the sweatshirt before the attack (there was testimony that he had been given the sweatshirt earlier in the week). Although there was testimony that the defendant had been seen wearing the sweatshirt on the morning of the attack, there was also testimony that a photograph from a bank surveillance camera showed the defendant later that morning, before the attack, without the sweatshirt. We therefore cannot say that the jury were not substantially swayed by the nonexclusion DNA results into discounting the possibility that someone other than the defendant wore the sweatshirt during the attack.<sup>35</sup> A new trial is warranted.

4. Limit on cross-examination. Because a similar issue may recur at any new trial, we address the defendant's claim that his rights to confront witnesses under the Sixth Amendment to the United States Constitution and art. 12 of the Declaration of Rights of the Massachusetts Constitution were violated by limitations placed by the judge on his cross-examination of certain witnesses. The defendant was one of four inmates from the Correctional Alternative Center in Lawrence assigned to work that day doing maintenance and cleaning for the housing authority. At trial, the defendant sought to show that the police had focused on him prematurely because he was a convict on work release, and that the police had conducted a flawed investigation by failing to fingerprint, conduct DNA testing, or investigate the background of three employees of the housing authority, two of whom had significant criminal records.<sup>36</sup> The judge permitted defense counsel to elicit from the investigating police officers that they had not asked the housing authority employees whether they had criminal records, that they had not run criminal background checks on the employees, and that the lead police investigator had learned only after the investigation that two of the employees had criminal records. The judge did not allow defense counsel to ask the officers whether it would have been important to them to know that one housing authority employee had been convicted of murder in the second degree and another charged with aggravated rape.<sup>37</sup>

Both the Sixth Amendment and art. 12 "guarantee a criminal defendant's right to confront the witnesses against him through cross-examination." Commonwealth v. Farley, 443 Mass. 740, 748, 824 N.E.2d 797, cert. denied, 546 U.S. 1035, 126 S.Ct. 733, 163 L.Ed.2d 577 (2005), quoting Commonwealth v. Miles, 420 Mass. 67, 71, 648 N.E.2d 719 (1995). That right, of course, is not "absolute." Commonwealth v. Miles, supra, citing Commonwealth v. Barnes, 399 Mass. 385, 393, 504 N.E.2d 624 (1987). See Commonwealth v. Farley, supra, quoting Commonwealth v. Francis, 375 Mass. 211, 214, 375 N.E.2d 1221, cert. denied, 439 U.S. 872, 99 S.Ct. 205, 58 L.Ed.2d 185 (1978) (right to cross-examine "may, in appropriate cases, bow to accommodate other legitimate interests in the criminal trial process"). We conclude that the cross-examination of the officers should not have been limited as it was.

One focus of the defense was on the inadequacy of the police investigation, and we have concluded that, in such circumstances, a limitation on cross-examination such as occurred here is not proper. See *Commonwealth v. Miles*, supra at 72-73, 648 N.E.2d 719. In that case, we concluded that a restriction on the defendant's cross-examination of the police about their "investigation of other suspects"<sup>38</sup> was error because "testimony about the police investigation that led to the defendant's arrest" after an attack in which the victim did not see her assailant's face was "highly material to one of the most important issues at trial, the identification of the defendant as the perpetrator of the crimes." Id. at 72, 73 n. 1, 648 N.E.2d 719. We recognize that the judge in this case did accommodate in part the defendant's "legitimate purpose in seeking to inquire about other suspects." Id. at 72, 648 N.E.2d 719.<sup>39</sup> Nevertheless, the judge's refusal to permit the defendant to question the police about their knowledge of the criminal histories of the housing authority employees denied the defendant the opportunity to show that a central defense — that the police investigation was inadequate in that the police prematurely focused on him to the exclusion of investigating other potential suspects — was not based purely on speculation. The limitations prevented the defendant from establishing that the housing authority employees — Dion in particular — may have had an incentive to misdirect the police during the investigation to deflect attention away from themselves.<sup>40</sup> Dion and Roman both gave their names and dates of birth to police at the outset of the investigation. It would be reasonable to infer that each knew it was likely that the police could learn of their criminal records, that each may have feared becoming a suspect in the investigation, and that each may have had an incentive to deflect police attention away from himself during the immediate investigation. Cf. *Commonwealth v. Graziano*, 368 Mass. 325, 330, 331 N.E.2d 808 (1975) (evidence that witness "thought he was suspected was relevant to his motive in testifying and therefore to his credibility").<sup>41</sup> Such an inference would have had particular weight as to Dion (previously indicted for aggravated rape), who had a master key that could provide access to the victim's apartment and who, around the approximate time of the attack, drove alone to a building next to the building where the victim was attacked, and returned shortly thereafter. Cf. id. (evidence that witness's "conduct made it likely that he would be a suspect ... was relevant to his motive in testifying"). Evidence that the police investigation may have suffered from misdirection that went unnoticed due to the failure to investigate the criminal records of certain individuals was critical to the defendant's core theory of misidentification. Such evidence should not be excluded at any new trial.

5. Ineffective assistance of counsel. The defendant claims ineffective assistance of counsel because trial counsel failed to "seek either dismissal of the charges or some other appropriate remediation" for the Commonwealth's failure to take possession of a roll of duct tape found in the victim's bedroom, an omission that the defendant claims constituted a loss of potentially exculpatory evidence. We agree with the Appeals Court that the "situation was not one calling for sanctions," and that the defendant was not deprived of effective assistance of counsel. *Commonwealth v. Mattei*, 72 Mass.App.Ct. 510, 518, 892 N.E.2d 826 (2008). See *Commonwealth v. Williams*, 455 Mass. 706, 718-721, 919 N.E.2d 685 (2010).

6. Conclusion. For the foregoing reasons, the defendant's convictions cannot stand. The judgments are reversed, the verdicts are set aside, and the cases are remanded to the Superior Court for a new trial.

So ordered.

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Notes:

1. The defendant was found guilty by a jury of home invasion, in violation of G.L. c. 265, § 18C; breaking and entering with intent to commit a felony, in violation of G.L. c. 266, § 17; assault with intent to rape, in violation of G.L. c. 265, § 24; indecent assault and battery on a person fourteen years of age or older, in violation of G.L. c. 265, § 13H; and assault by means of a dangerous weapon, in violation of G.L. c. 265, § 15B (b). The defendant was also found guilty of assault and battery, in violation of G.L. c. 265, § 13A; that indictment was placed on file with the defendant's consent. The Appeals Court affirmed. Commonwealth v. Mattei, 72 Mass. App.Ct. 510, 519, 892 N.E.2d 826 (2008).

2. The home invasion statute, G.L. c. 265, § 18C, provides: "Whoever knowingly enters the dwelling place of another knowing or having reason to know that one or more persons are present within or knowingly enters the dwelling place of another and remains in such dwelling place knowing or having reason to know that one or more persons are present within while armed with a dangerous weapon, uses force or threatens the imminent use of force upon any person within such dwelling place whether or not injury occurs, or intentionally causes any injury to any person within such dwelling place shall be punished by imprisonment in the state prison for life or for any term of not less than twenty years" (emphasis added).

The statute prohibiting assault by means of a dangerous weapon, G.L. c. 265, § 15B (b), provides: "Whoever, by means of a dangerous weapon, commits an assault upon another shall be punished by imprisonment in the state prison for not more than five years or by a fine of not more than one thousand dollars or imprisonment in jail for not more than two and one-half years" (emphasis added).

3. The Appeals Court rejected the defendant's arguments concerning a recording of a 911 telephone call made by the victim that was admitted in evidence and played for the jury. See *Commonwealth v. Mattei*, supra at 513-514, 892 N.E.2d 826. The defendant does not pursue those claims before this court.

4. We acknowledge the amicus curiae brief filed by the Committee for Public Counsel Services.

5. There was testimony that would permit the jury to infer that the victim had failed to lock the door properly on this occasion. There was also evidence that certain employees of the Andover Housing Authority (housing authority) had "master" keys that could open her apartment door.

6. Two pieces of duct tape found at the scene were admitted in evidence. The duct tape was two to two and one-half inches wide.

7. The victim described her attacker as "white" and "Caucasian," but also said that he "may or may not have been Spanish." During the voir dire of the jurors, the judge described the defendant as Hispanic, and defense counsel stated in his opening statement that the defendant was Hispanic. At trial there was no testimony as to the defendant's ethnicity. See note 17, *infra*.

8. The defendant argues that "there was only a single attempt to place one piece of tape across only the mouth of the victim, and no attempt to replace it when it fell off." The defendant also argues that the victim was not "bound by tape," that there was "no attempt to wrap the tape around the victim's mouth," and that the victim was "not threatened with the tape, nor did she hear it being ripped prior to its use."

9. The judge denied the defendant's motion for required findings of not guilty on all counts at the close of the Commonwealth's case, and the defendant's renewed motion at the close of the evidence. The defendant challenges here only the denial of his motions for a required finding as to his convictions of home invasion and assault by means of a dangerous weapon.

10. The defendant does not challenge the instructions.

11. The defendant argues that no Massachusetts case concerning home invasion has upheld a conviction "on the basis of a neutral object serving as a dangerous weapon where the object was not used to cause serious harm to a victim." The defendant's focus is misplaced. He cites to no case, and we are aware of none, where the issue was not submitted to the jury. Cf. Commonwealth v. Howard, 386 Mass. 607, 608, 436 N.E.2d 1211 (1982) (insufficient evidence for conviction of robbery while "armed with a dangerous weapon," G.L. c. 265, § 17, where "robber had no instrumentality at all"). The determination whether a neutral object is a dangerous weapon "has invariably turned on 'use,' and our courts have repeatedly held that ordinary innocuous items can be considered dangerous weapons when used in an improper and dangerous manner." Commonwealth v. Sexton, 425 Mass. 146, 149, 680 N.E.2d 23 (1997), and cases cited. The "only explicit restriction" that we have identified "on our use-based categorization of dangerous weapons" holds that "human teeth and other parts of the human body" are "not dangerous weapons because they are not 'instrumentalities apart from the defendant's person.'" *Id.* at 150, 680 N.E.2d 23, quoting Commonwealth v. Davis, 10 Mass.App.Ct. 190, 193, 406 N.E.2d 417 (1980). Cf. Commonwealth v. Sexton, supra at 148-152, 680 N.E.2d 23 (pavement and ocean may be dangerous weapons despite inability of individual "to possess the ocean [or pavement] or exercise authority over it in a traditional sense").

12. The "meaning of 'dangerous weapon' depends to a certain extent on the context in which it is used." Commonwealth v. Appleby, 380 Mass. 296, 305, 402 N.E.2d 1051 (1980). The appropriate standard for determining whether a neutral object was used as a dangerous weapon focuses on the object's "apparent ability to inflict harm" and "whether the victim reasonably so perceived it," Commonwealth v. Tarrant, 367 Mass. 411, 417, 326 N.E.2d 710 (1975), where the crimes at issue were: (1) assault by means of a dangerous weapon, see Commonwealth v. Appleby, supra at 305-306, 402 N.E.2d 1051, citing Commonwealth v. Tarrant, supra at 416, 326 N.E.2d 710, and Commonwealth v. Henson, 357 Mass. 686, 693, 259 N.E.2d 769 (1970); (2) assault and battery by means of a dangerous weapon, see Commonwealth v. Appleby, supra at 306-307, 402 N.E.2d 1051; and (3) armed robbery, G.L. c. 265, § 17, see Commonwealth v. Tarrant, supra. We see no reason to adopt a different approach for the crime of home invasion. Cf. Commonwealth v. Mahar, 430 Mass. 643, 651, 722 N.E.2d 461 (2000) (home invasion statute "clearly designed to protect occupants of a dwelling from ... entry by an armed person who, once inside, assaults and traumatizes the occupants" [emphasis added]).

13. Contrary to the Commonwealth's claim, the objection was preserved at trial. Defense counsel objected to the expert witness's testimony regarding nonexclusion results, arguing that testimony that a DNA test "cannot exclude" the defendant "would be too confusing to this jury. They may use the failure to exclude as inculpatory of him when that is not...." Defense counsel did not argue explicitly that the nonexclusion results would be too confusing because they were not accompanied by statistical evidence to explain their import, but the defendant's claim to that effect on appeal was fairly encompassed by his objection at trial.

14. There were other "matches" to the victim's DNA on a mattress and two cuttings from a bedspread in her apartment; and there was a "match" to the defendant's DNA on the T-shirt he was wearing when he was arrested. Those "matches" are not at issue in this appeal.

15. A housing authority employee identified the sweatshirt as one he had given to the defendant earlier in the week. The defendant had been seen wearing the sweatshirt the morning of the attack, but he had also been seen later that same morning, before the attack, without the sweatshirt.

16. The expert explained that each location on an individual's DNA molecule has two alleles. The test results thus show two numbers for each location, each number representing one of the alleles. For descriptions of DNA testing, see Commonwealth v. Rosier, 425 Mass. 807, 810-817, 685 N.E.2d 739 (1997); Commonwealth v. Vao Sok, 425 Mass. 787, 789-792, 683 N.E.2d 671 (1997); Commonwealth v. Curnin, 409 Mass. 218, 227-231, 565 N.E.2d 440 (1991) (Appendix).

17. The expert testified that the probability of a randomly selected person having a DNA profile that, like the victim's, matched the profile of the DNA in the sample from the sweatshirt sleeve was one in 1.373 quadrillion for the Caucasian population, one in 135.9 quadrillion for the African-American population, and one in 662.3 quadrillion for the Hispanic population. The probability of a randomly selected person having a DNA profile that, like the defendant's, matched the profile of the DNA in the sample from the sweatshirt front was one in 631.7 quadrillion for the Caucasian population, one in 5.152 quintillion for the African-American population, and one in 13.51 quintillion for the Hispanic population.

18. The expert testified that the tests she used could distinguish between profiles in a mixture because one contributor (the major profile contributor) contributed more DNA to the mixture than the other contributor (the minor profile contributor).

19. The expert testified that the victim was "included as a potential source of the major female profile in the DNA mixture." When asked by the prosecutor if "it would be fair to say that [the victim] could not be excluded as a source of that profile," the expert responded, "That's correct."

20. Again, the expert used the term "included" in her testimony, and then answered affirmatively when asked by the prosecutor whether it was "fair to say" that neither the victim nor the defendant "were excluded." See note 19, *supra*.

21. The expert testified that the results of the test of the swab of the interior doorknob showed that at all thirteen tested allele sites, and at the gender site, the major profile in the swab was "concordant with" the defendant's profile, and the numbers at each allele site in the victim's profile were "represented" in the minor profile. However, at one allele site the major and minor profiles in the swab could not be distinguished. Concerning the expert's use of the term "concordant with," see note 23, *infra*.

There was some inconsistency in the expert's testimony regarding the results of the test of the sample from the defendant's sweatpants. During direct examination, the expert testified that she tested the DNA from the sweatpants at only nine allele sites plus the gender site, because only "a small amount of DNA ... was extracted from the sample." Further, according to the expert there was not enough DNA from the minor profile contributor in the sample to be able to compare that profile to a known exemplar. On redirect, however, the expert testified that she tested thirteen allele sites on the sweatpants, found twelve "consistent" with the victim's DNA profile, and could not distinguish the major and minor profiles at one allele site.

The charts submitted in evidence suggest that the expert's initial testimony was correct, and that she mistakenly testified as to the results from the doorknob swab on redirect when she was in fact being questioned about the sweatpants. In an appendix, the Commonwealth's brief reproduces the charts that were submitted in evidence, together with an affidavit of the assistant district attorney that the reproductions are identical to the charts that were used at trial. The defendant makes no objection to our consideration of the reproductions.

22. The expert distinguished nonexclusion results from "inconclusive" results. For example, while the victim "could not be excluded" as a potential source of the major DNA profile found on the defendant's sweatpants, there was not enough DNA from the minor profile contributor in that sample to be able to compare that profile to the defendant's, or anyone else's, DNA profile. Thus, "the minor profile in the DNA mixture yielded inconclusive results for comparison with" the defendant (emphasis added); in other words, according to the expert, as to the minor profile in the sample, "there has been no conclusion made."

23. At various points in her testimony, the expert used the word "concordant" to describe both a "match" and a result of "not excluded." The expert stated that "the samples that are concordant with [the known sample from the defendant] ... include the sweatshirt front" (a match); "the numbers [on the profile from the sweatpants] are concordant with [the victim's] profile" (a nonexclusion); and the results from the doorknob swab are "concordant" with the defendant's profile (a nonexclusion). The expert earlier testified that "check[ing] for concordance" between the two profiles being compared in a DNA test means "see[ing] if there is a match between all the locations, from the evidence profile and the known profile" (emphasis added).

24. As to inconclusive results, in Commonwealth v. Curnin, 409 Mass. 218, 222 n. 7, 565 N.E.2d 440 (1991) (Curnin), we stated that "evidence of the absence of a match (a negative result) could properly be admitted without any need for a showing of the likelihood of a match occurring. In certain circumstances, the results of a DNA test may be inconclusive. If so, the consequences of the test are inadmissible." (Emphasis added.) In Commonwealth v. Mathews, 450 Mass. 858, 871, 882 N.E.2d 833 (2008), we recognized that the final sentence of this excerpt from Curnin is dicta. See notes 29-31, *infra*, and accompanying text (discussing admission of "inconclusive" results). In contrast, the language in Curnin rejecting the admission of test results showing a DNA "match" without informing the jury of the likelihood of that match occurring, see Curnin, *supra*, is not dicta, but necessary to the conclusion in that case. See *id.* at 221-222, 227, 565 N.E.2d 440.

25. With the exception of the jurisprudence of the State of Washington, see State v. Bander, 150 Wash.App. 690, 718-720, 208 P.3d 1242 (2009) (testimony that subject could not be excluded by DNA test admissible without accompanying statistics); State v. Cauthron, 120 Wash.2d 879, 906-908, 846 P.2d 502 (1993), overruled in part by State v. Buckner, 133 Wash.2d 63, 66, 941 P.2d 667 (1997) (testimony of match inadmissible without statistics), other jurisdictions, like Massachusetts, that have held that DNA test results are inadmissible without accompanying statistical interpretation apply this evidentiary rule whether the DNA result is a "match" or a failure to exclude. See, e.g., Peters v. State, 18 P.3d 1224, 1226-1227 (Alaska Ct.App.2001) (error to admit testimony that results of DNA test of mixed sample were "consistent" with victim's DNA "without evidence that properly interprets the significance" of results); Nelson v. State, 628 A.2d 69, 76 (Del.1993) (evidence of DNA match "meaningless" and inadmissible "without the necessary statistical calculations"); State v. Vandebogart, 136 N.H. 365, 381-382, 616 A.2d 483 (1992) (evidence of DNA match inadmissible where method used to calculate accompanying statistics lacked scientific acceptance, because "[a] match is virtually meaningless without a statistical probability expressing the frequency with which a match could occur"). Cf. State v. Brown, 470 N.W.2d 30, 33 (Iowa 1991) (statistics admissible because "[w]ithout statistical evidence, the ultimate results of DNA testing would become a matter of speculation").

26. Other jurisdictions that have rejected claims that DNA test results should not be admitted without accompanying statistics have similarly not distinguished between tests resulting in a "match" and those resulting in a failure to exclude. See State v. Boles, 188 Ariz. 129, 132, 933 P.2d 1197 (1997); Sholler v. Commonwealth, 969 S.W.2d 706, 710 (Ky. 1998); People v. Watley, 245 A.D.2d 323, 667 N.Y.S.2d 376 (1997). Cf. Young v. State, 388 Md. 99, 100, 879 A.2d 44 (2005) (evidence of DNA match without accompanying statistical evidence admissible where random match probability "infinitesimal"). Other courts have found nonexclusion results admissible where the defendant did not object on the ground that such results were irrelevant or confusing without accompanying statistics. See United States v. Mitchell, 502 F.3d 931, 969-970 (9th Cir.2007), cert. denied, \_\_\_ U.S. \_\_\_, 128 S.Ct. 2902, 171 L.Ed.2d 843 (2008); State v. Edelman, 593 N.W.2d 419, 424-425 (S.D.1999). Still other courts have held that trial judges did not abuse their discretion by admitting nonexclusion results without statistics where experts from both the State and the defense agreed that population-frequency statistical information "was not usually calculated for mixed samples." Turner v. State, 924 So.2d 737, 763-766 (Ala.Crim.App.2002), cert. denied, 547 U.S. 1056, 126 S.Ct. 1653, 164 L.Ed.2d 399 (2006). See Watts v. State, 733 So.2d 214, 223-224 (Miss.1999). The Commonwealth conceded at oral argument that such statistics are available for the results in this case.

27. In Commonwealth v. Gaynor, 443 Mass. 245, 250, 820 N.E.2d 233 (2005), two series of DNA tests were conducted on certain mixed samples. Statistical analysis was provided as to the first series of tests, and the "second series of tests produced similar results [i.e., could not exclude the defendant], but frequency calculations were not performed because" in those tests "a primary contributor" to the mixed samples "could not be identified." *Id.* In his objection to the admission of the DNA evidence, the defendant in that case did not argue that it was error to admit in evidence nonexclusion results from the second series of tests because those results were unaccompanied by statistics. See *id.* at 263, 820 N.E.2d 233. We need not decide whether it would be error to admit the result that a second test could not exclude an individual as a potential contributor to a sample without accompanying statistics, where statistical testimony is presented accompanying the result of a first test of the same sample and the second test "produced similar results."

28. The Commonwealth argues that requiring the presentation of statistical analysis as an accompaniment to testimony that DNA test results could not exclude an individual as a potential source "could prove highly damaging to defendants as a class," given advancements in technology allowing results short of a complete "match" nevertheless to be strongly discriminating among potential contributors. There is nothing in the record to support the claim, and our own precedents reveal that not all DNA tests result in extremely low random match

probabilities. See, e.g., Commonwealth v. O'Laughlin, 446 Mass. 188, 197, 843 N.E.2d 617 (2006) ("one in two of any randomly selected individuals"); Commonwealth v. Gaynor, supra at 250, 820 N.E.2d 233 ("one in 490 African-Americans"); Commonwealth v. McNickles, 434 Mass. 839, 851, 753 N.E.2d 131 (2001) ("one out of eighty-three Hispanics").

29. The Commonwealth's expert in this case distinguished between nonexclusion and inconclusive results, using the term "inconclusive" the same way the term was used in Commonwealth v. Mathews, 450 Mass. 858, 864, 882 N.E.2d 833 (2008). See note 22, supra.

30. Some confusion may have been caused by our use of the term "inconclusive" in, for example, Commonwealth v. O'Laughlin, supra at 208, 843 N.E.2d 617, and Commonwealth v. Benoit, 382 Mass. 210, 221, 415 N.E.2d 818 (1981). In Commonwealth v. O'Laughlin, supra, we referred to the nature of the DNA test results that showed a random match probability of one in two as "inconclusive." Similarly, in Commonwealth v. Benoit, supra, we referred to evidence that both the defendant and the victim had type O blood as "inconclusive" because "a large segment of the world population" shared that characteristic. In both cases it would have been preferable to describe those results as not excluding the defendant.

31. In Commonwealth v. Nesbitt, 452 Mass. 236, 254, 892 N.E.2d 299 (2008), we held that "for inconclusive DNA evidence to be admissible, it must be probative of an issue of consequence in the case." In this case, the Commonwealth's expert testified that there was insufficient DNA from the minor profile contributor in the sample from the defendant's sweatpants, and thus, "the minor profile in the DNA mixture yielded inconclusive results for comparison with" the defendant. The defendant did not object to this testimony and does not challenge it on appeal.

32. In Commonwealth v. McNickles, supra, the Commonwealth's expert testified that tests showed that the contributor to DNA taken from swabs from a rape victim was homozygous at a particular allele site (i.e., that each of the contributor's two alleles at that site were identical). See id. at 851, 753 N.E.2d 131. The defendant challenged the reliability of the underlying technology and the reliability of the results because the sample size was too small. See id. at 849, 753 N.E.2d 131. The defendant also presented an expert who testified that the test did not show that the contributor was homozygous, but who agreed that the test showed that "at least one of the contributor's alleles at that site was a 4.2/3, and that the defendant therefore could not be excluded." Id. at 852, 753 N.E.2d 131. We concluded that the test results were relevant and admissible, even if the defense expert's view were accepted, because "the test still provided descriptive information about the perpetrator." Id. at 854, 753 N.E.2d 131.

33. The prosecutor encouraged the jury to look at the charts showing the nonexclusion results, which were in evidence, and to "see how those numbers line up."

34. As the defendant points out, while there was uncontroverted evidence that the defendant had been outside the apartment immediately before the attack, there was also uncontroverted evidence that at least two housing authority employees were in the vicinity, one of whom had a master key and both of whom had criminal records.

35. The Commonwealth argues that there can be no prejudice because the defendant "has avoided every opportunity to bring to light what the relevant statistics would or might be," and thus this court may infer that any such statistics would be "highly unfavorable" to him, citing Commonwealth v. Little, 453 Mass. 766, 775 n. 8, 906 N.E.2d 286 (2009). That case is inapposite. The issue here is whether any relevance of the nonexclusion DNA evidence was outweighed by the likelihood of prejudicially misleading and confusing the jury in the absence of a statistical explanation of the meaning of the test results. That burden falls to the Commonwealth.

36. Francisco Roman was convicted in Puerto Rico of murder in the second degree in 1995. Robert Dion was charged with aggravated rape in 1986 in Essex County, and ultimately pleaded guilty to the lesser included offense of assault and battery. The judge permitted the jury to consider Francisco Roman's conviction in their evaluation of his credibility as a witness.

37. The judge did not permit defense counsel to elicit Robert Dion's criminal history.

38. In Commonwealth v. Miles, 420 Mass. 67, 72, 648 N.E.2d 719 (1995), the judge precluded the defendant from questioning police about an investigation they had conducted of another suspect.

39. The judge permitted the defendant to establish that the police did not investigate the criminal backgrounds of other individuals working at the housing complex on the day of the attack and to establish that, unknown to the investigating police, two of the three housing authority employees working there on the day of the assault did in fact have criminal records. Although the jury also learned that one of those employees, Francisco Roman, had been convicted of murder in the second degree, the judge instructed the jury that the stipulation of the parties as to Roman's conviction was admitted "solely insofar as it affect[ed] his credibility" as a witness, and therefore could not be considered by the jury on the defense of an inadequate police investigation.

40. We reject the defendant's argument that evidence of Dion's criminal records was admissible to show the potential for bias in his testimony at trial. Defense counsel conceded that Dion's conviction of assault and battery in 1986 was "beyond the statutory scheme for impeaching him." See G.L. c. 233, § 21 (imposing limits on when "[t]he conviction of a witness of a crime may be shown to affect his credibility ...").

We also reject the defendant's related argument — not made at trial — that the judge should have allowed the admission of Roman's and Dion's convictions as "evidence to show that another person committed the crime or had the motive, intent and opportunity to commit it." Commonwealth v. Graziano, 368 Mass. 325, 329, 331 N.E.2d 808 (1975). To be admissible, such "evidence should not be too remote in time or too weak in probative quality, and it should be closely related to the facts of the case against the defendant." *Id.* at 329-330, 331 N.E.2d 808. Dion's charge and conviction eighteen years before the attack and Roman's conviction seven years before the attack were both "remote in time" and, without further information regarding the details of the prior crimes, "weak in probative quality." *Id.* See Commonwealth v. Keizer, 377 Mass. 264, 267, 385 N.E.2d 1001 (1979), quoting State v. Bock, 229 Minn. 449, 458, 39 N.W.2d 887 (1949) (defendant has "right to show that crimes of a similar nature have been committed by some other person when the acts of such other person are so closely connected in point of time and method of operation as to cast doubt upon the identification of defendant as the person who committed the crime").

41. Dion and Roman both testified that the defendant looked "nervous" just before the police arrived. Dion testified further that as the police arrived, the defendant "grabbed a broom, like he was working," which Dion found "very suspicious." Roman testified that the defendant had blood on his right hand and was covering his right hand with his left hand while the police were asking questions of the maintenance workers at the housing complex.