

SUPREME COURT OF THE STATE OF NEW YORK  
COUNTY OF NEW YORK: PART 42

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THE PEOPLE OF THE STATE OF NEW YORK, :  
 :  
- against- : Index No. 4555-2007  
 :  
CLARENCE DEAN, : Hon. Maxwell Wiley  
 :  
Defendant. :  
----- X

**BRIEF OF AMICUS CURIAE THE INNOCENCE PROJECT IN SUPPORT OF  
DEFENDANT'S MOTION TO EXCLUDE BITE MARK EVIDENCE**

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## **INTEREST OF THE AMICUS CURIAE**

The Innocence Project is a national litigation and public policy organization dedicated to using DNA testing to exonerate wrongfully convicted persons, and to improving the criminal justice system to prevent future miscarriages of justice. To date, three hundred and three people in the United States have been exonerated by DNA testing, including eighteen who served time on death row. As the Innocence Project has demonstrated in courts across the country, the majority of these wrongful convictions were based on an improper use of forensic science. Notably, bite mark evidence of the type that the People intend to offer at trial in this case was proffered to the jury in at least nine cases (including two death penalty cases) where innocent individuals were wrongfully convicted and later exonerated by unambiguous DNA evidence. An even higher number of wrongful arrests have been based, at least in part, on bite mark identification evidence. Accordingly, the Innocence Project has unique expertise and a compelling interest in assisting the Court to perform its essential "gatekeeper" function under *Frye*. For the reasons more fully set forth below, the Innocence Project respectfully urges this Court to exclude the bite mark evidence offered against the Defendant in this case.

## **PRELIMINARY STATEMENT**

The Innocence Project commends this Court for its careful consideration of whether the People's proffered bite mark evidence satisfies New York's *Frye* standard for the admissibility of scientific evidence. The extent of the evidentiary record developed in this case regarding the People's bite mark evidence is, to our knowledge, unprecedented in New York State. It also appears to be the first extensive *Frye* hearing in New York regarding bite mark evidence since the National Academy of Sciences ("NAS") published its authoritative 2009 report entitled



*Strengthening Forensic Science in the United States: A Path Forward* ("NAS Report"),<sup>1</sup> which was the first independent examination of the validity and reliability of bite mark evidence by a neutral committee of scientists. As a result, this case presents a unique opportunity to reassess the application of the *Frye* standard to bite mark evidence—a "forensic" methodology that, despite its prior admission in some cases, is unreliable and no longer accepted as reliable by the scientific community in light of recent developments in scientific learning, as well as the lessons learned through numerous wrongful convictions and arrests.

For many years, bite mark evidence has been admitted into evidence by New York courts to identify criminal defendants by linking them to impressions found on the bodies of victims. However, a close examination of the foundational New York cases allowing bite mark evidence reveals the danger of admitting putative scientific evidence without subjecting it to rigorous *Frye* scrutiny. Moreover, bite mark evidence has become increasingly discredited since New York courts first considered the question of whether such evidence was admissible under *Frye*. Not only is bite mark identifying evidence *not* generally accepted as reliable today by the scientific community, its use in criminal proceedings as evidence of the identity of the perpetrator is also extraordinarily controversial. The scientific deficiencies and unproven assumptions underlying bite mark evidence have increasingly come under attack by the scientific community, legal commentators and courts.

It was not until the NAS Report was issued in 2009 that an independent scientific study truly scrutinized the validity and reliability of bite mark evidence. In determining that bite mark evidence has not been scientifically validated or demonstrated to be reliable, the NAS heard testimony from leading experts (including Dr. David Senn, who also testified in the instant

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<sup>1</sup> Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council (2009).

hearing) and conducted an extensive review of the bite mark literature and research, nearly all of which was developed after the courts had already begun admitting such evidence. Based on these latest scientific findings, the NAS concluded that there is "considerable dispute" in the scientific community "about the value and reliability" of bite mark evidence. (NAS Report at 176.) The NAS Report demonstrates that the scientific community does *not* currently accept the general validity or reliability of bite mark evidence. As the NAS committee further found, this was due to the "inherent weaknesses" and "basic problems inherent in bite mark analysis" which have "led to questioning of the value and scientific objectivity" of the discipline. (*Id.* at 174, 176.) Indeed, the NAS found that there is "no science" establishing how to quantify the probability of a "match," and "no evidence of an existing scientific basis for identifying an individual to the exclusion of all others." (*Id.*) No other forensic discipline received such sweeping criticism from the NAS, and bite mark evidence is, today, clearly not generally accepted as reliable.

While bite mark evidence has always been controversial, the grave doubts expressed by scientists and legal commentators about the reliability of such evidence have become more urgent as a result of an ever-increasing number of criminal defendants whose convictions were obtained at least in part through bite mark evidence only to be exonerated and freed, some after many years, by the Innocence Project and DNA evidence. Indeed, even during the pendency of this Court's *Frye* hearing, two more wrongful convictions based on bite mark evidence—those of Bennie Starks and Douglas Prade—have been overturned. After collectively spending over 30 years in prison, Messrs. Starks and Prade join at least twenty-two other defendants who were wrongfully convicted or arrested, at least in part, based on improper and unsupported bite mark

analysis. (*See below* at 29.) For all these reasons, the bite mark evidence proffered by the People should not be admitted in this case.

## **I. APPLICABLE LEGAL STANDARDS**

### **A. The Frye Standard**

The long-recognized rule in New York is that expert testimony based on scientific principles or procedures is admissible only where the "techniques, when properly performed, *generate results accepted as reliable within the scientific community generally.*" *Parker v. Mobil Oil Corp.*, 7 N.Y.3d 434, 446 (2006) (emphasis added) (citation omitted). Thus, the test is whether the scientific procedures are "found to be generally accepted as reliable in the scientific community." *Id.* at 449. Known as the *Frye* test, this analysis is "intended to 'protect[] juries from being misled by expert opinions that may be couched in formidable scientific terminology but that are based on fanciful theories.'" *Styles v. Gen. Motors Corp.*, 20 A.D.3d 338, 342 (1st Dep't 2005) (alteration in original) (citation omitted).

The People bear the burden of establishing that bite mark evidence is admissible; the Defense does *not* bear the burden to show inadmissibility. *See In re Bausch & Lomb Contact Lens Solution Prod. Liab. Litig.*, 87 A.D.3d 913, 913 (1st Dep't 2011); *Lara v. NYC Health & Hosps. Corp.*, 305 A.D.2d 106, 106 (1st Dep't 2003); *People v. Kanani*, 272 A.D.2d 186, 187 (1st Dep't 2000).

#### **1. What Constitutes the "Relevant Scientific Community"**

The *Frye* test requires the Court to strike a balance in properly defining the "relevant" scientific community in which the reliability of a forensic technique must have gained (or have maintained) general acceptance:

In defining the relevant scientific field, the court must seek to comply with the *Frye* objective of containing a consensus of the scientific community. If the field is too narrowly defined, the judgment of the scientific community will devolve into the opinion of a few experts. The field must still include scientists who would be expected to be familiar with the particular use of the evidence at issue, however, whether through actual or theoretical research.

*People v. Wesley*, 83 N.Y.2d 417, 438 (1994) (Kaye, J., concurring) (citation omitted). A court must be wary of the "pitfalls of self-validation by a small group"; before being considered generally accepted, methods must have been subjected to the "scrutiny of fellow scientists, unimpeded by commercial concerns." *Id.* at 339 (citation omitted).

In this case, the relevant scientific community is not limited to the insular community of forensic dentists, as both the People's and Defense experts conceded. (*See* Testimony of Dr. Senn ("Senn Tr.") at 182, 186-87 (other disciplines aside from bite mark experts are implicated in bite mark analysis, including pathology, physics, chemistry and statistics); Declaration of Dr. Michael Saks at ¶ 2 ("Saks Decl.") ("The relevant scientific community in bitemark analysis . . . includes statisticians, cognitive scientists, forensic pathologists, and perhaps others."); Testimony of Dr. Kafadar ("Kafadar Tr.") at 108:13-109:7.) Significantly, the experts agreed that statistics is vital to assessing the validity of bite mark evidence, and, in this case, one of the nation's leading statisticians, Dr. Kafadar, concluded there was no scientific basis for bite mark analysis.

## 2. What Constitutes "Generally Acceptable as Reliable"

"[T]he test is not whether a particular procedure is unanimously indorsed by the scientific community, but whether it is generally acceptable as reliable." *People v. Middleton*, 54 N.Y.2d 42, 49 (1981). "The court's job is not to decide who is right and who is wrong, but rather to decide whether or not there is sufficient scientific support for the expert's theory." *Gallegos v. Elite Model Mgmt. Corp.*, 195 Misc. 2d 223, 225 (Sup. Ct. N.Y. Cnty. 2003). In assessing whether there is sufficient scientific support for the reliability of an expert theory, courts

generally look to scientific texts, laboratory standards, scholarly articles, the testimony of experts in the field and judicial opinions. *See Wesley*, 83 N.Y.2d at 437 (Kaye, J., concurring).

"[G]eneral acceptance does not necessarily mean that a majority of the scientists involved subscribe to the conclusion. Rather it means that those espousing the theory or opinion have followed *generally accepted scientific principles* and methodology in evaluating clinical data to reach their conclusions." *Zito v. Zabarsky*, 28 A.D.3d 42, 44 (2d Dep't 2006) (emphasis added) (citation omitted). "It seems clear though, in principle, that if a well-respected minority within a given scientific community rejects as unreliable a particular procedure, technique, or theory, the court possesses the authority to agree with that minority view and exclude the evidence offered." *People v. Mohit*, 153 Misc. 2d 22, 24 (Westchester Cnty. Ct. 1992).

Although certain forensic dentists (also known as forensic odontologists) have long maintained, without any foundational research or empirical evidence, that positive bite mark evidence was reliable and scientifically valid, a major shift has now occurred.<sup>2</sup> The so-called scientific bases of bite mark evidence have been discredited by, inter alia, a committee of this country's leading scientists (who produced the NAS Report) and by recent peer-reviewed research studies by Dr. Mary Bush, a forensic dentist and tenured research professor at State University of New York at Buffalo (who testified at this Court's hearing); by the research of Dr. Karen Kafadar, the Rudy Professor of Statistics and Physics at Indiana University (who also testified at this Court's hearing); and by the significant number of known wrongful convictions based on bite mark evidence. As a result, the reliability of bite mark evidence is not generally accepted by the relevant scientific community, flunking the *Frye* standard.

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<sup>2</sup> As disclosed in more detail in Appendix A below, "board-certified" forensic dentists testified that a bite mark matched a defendant in the overwhelming majority of wrongful arrests and convictions that were based on bite mark evidence.

Moreover, to add further fuel to this controversy, it now appears that even bite mark examiners themselves do not all agree that bite mark evidence is reliable. For example, one of the foremost public advocates of bite mark evidence, Dr. Michael West—a forensic dentist who testified in at least thirty-eight trials that bite marks found on victims matched the dentition of particular suspects (including some that resulted in later exonerations based on DNA evidence)—has renounced his prior position and has explained that he now considers bite mark evidence to be unreliable. Jerry Mitchell, *Bite evidence in doubt*, The Clarion Ledger, Aug. 6, 2012. Specifically, Dr. West testified that "I no longer believe in bite-mark analysis. I don't think it should be used in court. I think you should use DNA. Throw bite marks out." *Id.* Dr. West renunciation is echoed by Dr. Michael Bowers, who has noted that "human skin is incapable of consistently being referenced to a known biter's dentition . . . and that dental uniqueness assumptions are not supported." C. Michael Bowers, *Forensic Dental Evidence: An Investigator's Handbook* 150 (2d ed. 2011). Drs. West and Bower's repudiation of bite mark evidence comports with the findings of the scientific community, as presented by the NAS Report, that bite mark evidence has not been shown to be reliable.

**B. Standards for Evaluating Probative Value Versus Prejudicial Effect**

Even where the *Frye* test is satisfied, New York courts must still exclude scientific evidence where its probative value is substantially outweighed by its prejudicial effect. *See, e.g., People v. LeGrand*, 196 Misc. 2d 179, 188 (Sup. Ct. N.Y. Cnty. 2002) (recognizing that "even if the court determines that the evidence" otherwise satisfies the *Frye* test and that the expert's opinion is relevant to the facts of the individual case, the evidence may still be excluded "if its probative value is substantially outweighed by the danger that it will unfairly prejudice the other side or mislead the jury" (citation omitted)), *aff'd*, 28 A.D.3d 318 (1st Dep't 2006), *rev'd on*

*other grounds*, 8 N.Y.3d 449 (2007); *see also State v. Rosado*, 25 Misc. 3d 380, 384 (Sup. Ct. Bronx Cnty. 2009) (same). For instance, in *People v. Taylor*, 75 N.Y.2d 277, 293-94 (1990), the Court of Appeals reversed the lower court and held that evidence of rape trauma syndrome, although generally accepted under *Frye*, would unacceptably prejudice the defendant and therefore should be excluded.

The U.S. Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), is also instructive here. The *Daubert* court stated:

Throughout, a judge assessing a proffer of expert scientific testimony under Rule 702 should also be mindful of other applicable rules . . . . Rule 403 permits the exclusion of relevant evidence "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury. . . ." Judge Weinstein has explained: "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses."

*Id.* at 595 (second alteration in original) (citation omitted). Thus, even if bite mark evidence could be found to satisfy New York's *Frye* standard, which it cannot, the Court must also separately assess and weigh its probative value against the unquestioned potential for unfair prejudice. Because bite mark evidence purports to provide proof that the suspect violently and viciously assaulted a victim, but lacks any basis in science, it should also be separately excluded on this ground. (*See below* at 25-28.)

## **II. POSITIVE BITE MARK COMPARISON EVIDENCE DOES NOT SATISFY *FRYE***

### **A. Bite Mark Comparison Evidence Is Scientifically Unsound**

As an initial matter, and as developed by both the Defense and the People's witnesses in the course of this Court's hearing, positive bite mark evidence—that is, evidence that a bite mark

could only have been made by a specific defendant<sup>3</sup>—is scientifically unreliable for a number of reasons.

**1. The Two Foundational Hypotheses of Bite Mark Evidence Are Scientifically Invalid**

Testing a forensic discipline's hypotheses through the scientific method<sup>4</sup> is the only way to validate the discipline and establish its reliability. Bite mark analysis rests on two hypotheses. The first hypothesis is that a properly trained forensic dentist can determine that a bite mark and a suspect's dentition (the biting surface of teeth) are indistinguishably similar. The second hypothesis underlying bite mark evidence is that once an association is made, a forensic dentist can provide a scientifically valid estimate of the rareness or frequency of that association. Neither of these hypotheses has ever been validated. In fact, there are no criteria and no objective standards by which to render conclusions about whether a particular suspect's dentition can be associated with a bite mark. As Dr. Karen Kafadar confirmed in her testimony, these two hypotheses are the two "deficiencies" of bite mark analysis. (Kafadar Tr. at 33:1-34:8.)

As to the first hypothesis, in order for a comparison or measurement between two objects (such as between a person's dentition and a bite mark left on a victim's skin) to be scientifically

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<sup>3</sup> Hereinafter, the terms "bite mark evidence" or "bite mark analysis" are used to describe "positive bite mark evidence," or testimony from a forensic dentist that a bite mark is either consistent with the dentition of an alleged perpetrator, or that the bite mark was in fact made by an alleged perpetrator. This should be distinguished from evidence that establishes that a given individual was *not* the person who produced the bite mark in question.

<sup>4</sup> The FBI defines the scientific method as follows: "The scientific method involves generating a hypothesis and testing it to determine if it is false. In order for the hypothesis to be valid, it must be able to be supported repeatedly via reproducible experiments. This process distinguishes science from other professional endeavors. By establishing a reliable, repeatable set of procedures and criteria by which the results are evaluated, an objective scientific methodology can be achieved. This, coupled with a properly trained, qualified examiner operating within a rigorous quality assurance/quality control program, provides credible and reliable results." Cary T. Oien, *Forensic Hair Comparison: Background Information for Interpretation*, 11 Forensic Sci. Commc'ns 2 (Apr. 2009), available at [http://www.fbi.gov/about-us/lab/forensic-science-communications/review/2009\\_04\\_review02.htm](http://www.fbi.gov/about-us/lab/forensic-science-communications/review/2009_04_review02.htm).



valid, there must be an objective, standardized method for measuring the two items and declaring them to be indistinguishably similar. Thus, there must be an objective process, based on standard metrics, to measure a bite mark against teeth that is not "dependent on the specific person who is conducting the measurement" or "subject to an individual's interpretation." (*Id.* at 34:22-35:3.)<sup>5</sup> In the context of bite mark evidence, however, no studies have even been conducted to determine what aspects of the teeth and bite mark should be measured to make any such comparison. Moreover, no studies have been done to determine how precise or reliable the instruments that dentists use to assess bite marks are, whether the measurements these instruments yield are reliable under a wide variety of conditions, or whether, after a measurement is taken, that measurement would be considered "unique" or "different" enough to distinguish the bite mark or teeth from the general population. (*See id.* at 41:23-46:3.) Thus, as Professor Kafadar concluded, the dentists who purport to be able to assess bite marks *have no objective standard by which to measure bite marks.* (*See id.* at 41:23-42:14.)<sup>6</sup>

The lack of an objective measurement process in bite mark evidence is made manifest by the variety of arbitrary, subjective terms used by bite mark examiners to describe their findings.<sup>7</sup> And because there is no criterion for bite mark analysis, even board certified dentists examining

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<sup>5</sup> As Professor Kafadar explained, a valid scientific measurement process requires three steps. First, an instrument to conduct the measurement is selected. (Kafadar Tr. at 37:11-13.) For example, to measure height, a scientist must decide if she is going to use a ruler, yard stick, tape measure, scale at a doctor's office or other instrument. (*Id.* at 38:15-22.) Second, the preciseness and reliability of the instrument, and how reproducible the measurements produced by the instrument are, must also be determined. (*Id.* at 37:17-18.) Reliability and reproducibility require that the ruler or yard stick produce the same measurement each time it is used to measure the same person. (*See, e.g., id.* at 42:20-25.) Third, the distribution in the population of the measurements produced by the instrument must also be ascertained. (*Id.* at 37:19-23.)

<sup>6</sup> Unsurprisingly, when the NAS tested dentists' ability to match suspects' dentition with bite marks, it determined that "forensic odontology suffered from potential for large bias." (Kafadar Tr. at 32:18-19.)

<sup>7</sup> For example, forensic dentists have used terms such as "consistent with," "cannot be excluded," "similar to," "probable biter," "highly probable biter" and "a match" to describe a positive association between an alleged bite mark and a particular dentition. As Dr. Saks noted, these terms are deliberately ambiguous and lack precise meaning. (Saks Decl. ¶ 19.)

the same data and using the same instruments routinely come to opposite conclusions, a phenomenon that is virtually unheard of in other pattern and impression evidence disciplines. Compounding this lacuna of standards is the fact that, as Dr. Saks notes, "bite mark analysis [] is the only pattern and impression discipline that does not have and has never had a [Scientific Working Group]," or group established by the FBI "to improve discipline practices and build consensus," demonstrating, indeed, that there is little interest among bite mark practitioners to even create the necessary objective standards. (Saks Decl. ¶¶ 25-27.) Accordingly, there is no *objective* basis to conclude that an individual's dental impression is indistinguishable from a particular bite mark.

The second unproven hypothesis upon which positive bite mark evidence depends is that the probability of a given "match" of a biter to a bite mark can be quantified. Even if one could validate the first hypothesis, without validation of the second, the expert testimony would not be helpful to the fact finder as there would be no way to scientifically estimate the likelihood that the alleged biter made the mark at issue.

This hypothesis remains unproven for two reasons. *First*, and most significantly, there have been no population studies that establish how rare or common the variables in human dentition are; therefore, there is no way of knowing how many other persons could also be associated with or excluded from the mark. For this reason, forensic dentists who "assess" the likelihood of a match between a suspect and a bite mark do so only on gut-feeling, instinct and what law enforcement informs them about the case. (*See below* at 15-16.) Bite mark evidence simply does not have the statistical research to determine the significance or uniqueness of the features of dentition or the bite mark. *Second*, there are also no established error rates for bite

mark evidence, because even board-certified forensic odontologists are not required to take, and do not take, proficiency tests.

The lack of population studies or known error rates renders any claimed association between a bite mark and a particular suspect entirely speculative. The trier of fact simply cannot know—and the bite mark examiner cannot testify to—the statistical significance of a purported association between dentition and a bite mark. (*See, e.g., Kafadar Tr. at 111:14-20.*) Essentially, bite mark analysis is a subjective process in which dentists "eyeball" alleged bite marks and offer speculative conclusions based on their personal experiences, experiences which are not probative of the reliability of their opinions since the discipline has not been scientifically validated and dentists have no basis upon which to measure their own competence.

## **2. The Field of Bite Mark Analysis Lacks a Known Error Rate**

When a forensic dentist testifies in a criminal trial, the trier of fact has only the results of the forensic dentist's subjective conclusions to consider without any way to measure the error rate—i.e., how likely it is that such conclusions may be wrong. Error rates measure, under controlled conditions, the ability of an expert to declare a "match" between a bite mark and a known sample. There is no evidence that experts can reliably associate a known dentition with a bite mark. Indeed, the number of wrongful convictions based in part on bite mark evidence and the few proficiency test results for forensic odontologists suggest unacceptably high false positives.

The fundamental unreliability of bite mark evidence has been noted by numerous dental, scientific and legal experts. For example, scholars have noted that bite mark examiners often fail to actually match bite marks to the dentition that made those bite marks, even in the context of

controlled studies. Thus, as one forensic dentist has noted, bite mark evidence is subject to a "disturbingly high false-positive error rate,"<sup>8</sup> as evidenced by:

- a 1975 study finding that bite mark examiners made "incorrect identification[s] of . . . bites" on pig skin 24% of the time when the bites were made "under ideal laboratory conditions" and 91% of the time when "the bites were photographed 24 h[ours] after the bites were made";
- a 1999 American Board of Forensic Odontology Bitemark Workshop "where ABFO diplomats attempted to match four bitemarks to seven dental models [and] found 63.5% false positives";
- a 2001 study of "bites made in pig skin, 'widely accepted as an accurate analogue of human skin'," which resulted in 11.9-22.0% "false positive identifications . . . for various groups of forensic odontologists."<sup>9</sup>

Because there is no meaningful proficiency testing, the "years of experience" forensic dentists rely upon mean very little because there is no way of their knowing how often they have been right or wrong. Forensic dentists perform analyses and reach conclusions as to probable "matches" without any proven track record of accurately doing so.

### **3. Skin Does Not Accurately Record Bite Marks**

Bite mark evidence presumes that the human dentition is unique and that human skin records this uniqueness with sufficient fidelity that the biter can be identified. This latter proposition has never been demonstrated. (*See below* at 20.) Unlike all other pattern and impression disciplines, such as fingerprints, tool marks and ballistics, bite mark analysis attempts to interpret data from an ever-changing, pliable and unpredictable substrate. As the NAS Report noted: "[B]ite marks on the skin will change over time and can be distorted by the elasticity of

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<sup>8</sup> C. Michael Bowers, *Problem-Based Analysis of Bitemark Misidentifications: The Role of DNA*, 159S Forensic Sci. Int'l S104, S107 (2006).

<sup>9</sup> *Id.* at S106. In addition, "bite mark experts have benefited from their ability . . . to do few proficiency studies and to keep secret the results of such proficiency studies." D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 Alb. L. Rev. 99, 142 (2000).

the skin, the unevenness of the surface bite, and swelling and healing. These features may severely limit the validity of forensic odontology." (NAS Report at 174.) Objective standards for bite mark analysis have not been developed because "[t]he effect of distortion on different comparison techniques is not fully understood and therefore has not been quantified." (*Id.* at 175.) Further undermining the reliability of bite mark evidence is the fact that, unlike forensic pathologists (for instance), bite mark examiners receive no formal training on the healing or decomposition properties of skin or how injuries appear different depending on such variables as the victim's age, skin pigmentation and other environmental factors influencing the way an injury presents.

The forensic dentist and tenured research professor Dr. Mary Bush testified concerning her research team's studies on the ability of skin to faithfully record a bite mark, even without the distortion caused by the reaction of a living victim to the bite. Even under these sterile laboratory conditions, which were *not* designed to replicate "real world" scenarios involving, for instance, a struggle or rapid movement, Dr. Bush's experiments demonstrate that the same set of teeth did not leave identical marks on skin on repeated impressions. (*See, e.g.*, Testimony of Dr. Bush ("Bush Tr.") at 114:24-115:2.) Indeed, Dr. Bush's studies demonstrate that bite marks created by the same dentition on the same individual will appear substantially different, depending on the angle of the body and whether the mark is made parallel or perpendicular to langer lines.<sup>10</sup> (*E.g., id.* at 113:12-20 & 115:15-19.)<sup>11</sup>

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<sup>10</sup> The term "langer lines" refers to the direction within human skin along which the skin has the least flexibility. (Bush Tr. at 91:25-96:13.)

<sup>11</sup> Consider the example of a bite mark on a taut thigh. If the same individual made another bite mark on the side of the thigh with the leg fully extended, it would appear different because the skin will be looser and skin on the side of the thigh stretches differently than skin on the front of the thigh.

#### 4. Bite Mark Examiners Do Not Make Blind Determinations

Finally, bite mark examiners do not operate in (and are not required to operate in) conditions that reduce the effects of cognitive bias, biasing information or other contextual distortions that would improperly influence their conclusions. As noted by Dr. Saks:

[t]he need for "blind" or "masked" testing to prevent the influence of biasing "observer," or "context," effects, has become so widely recognized in scientific research and practice that it long ago spread to numerous areas of societal practice beyond science (e.g., law school examinations are graded "blind" and the concept of "blind taste tests" has long been a part of public awareness).

(Saks Decl. ¶ 7.) Forensic examiners, including bite mark examiners, should avoid learning about the underlying context of their examination, lest biases influence their final determinations.<sup>12</sup> Bite mark examiners should not be instructed that there is other evidence pointing to the suspect as the perpetrator, or that without their determination, the prosecution does not think it could win the case, as that would create pressure on the bite mark examiner to make a positive identification. Despite this common sense approach, however, as Dr. Saks relates, "forensic examiners generally resist blind examination" and are presented cases by prosecutors who have already developed their case of guilt against the accused. (*See id.*) This problem is exacerbated by the lack of any objective standards for declaring a "match," making the bite mark examiner's subjective opinion all the more vulnerable to improper influence from biasing information.

In sum, because skin is an unreliable and unpredictable substrate to record bite marks, and because there are no standards for declaring a positive association, no information about how

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<sup>12</sup> For example, "[c]ontextual bias' occurs when 'the forensic scientist uses other evidence to believe that the specific evidence being analyzed is related to a particular reference sample(s)' and when the contextual information prompts a biased selection or weighting of the features in the samples." Expert Working Group on Human Factors in Latent Print Analysis, *Latent Print Examination and Human Factors: Improving the Practice Through a Systems Approach*, Nat'l Inst. of Standards & Tech. (2012) (citation omitted).

rare or common variables of the human dentition are, and no information about how often experts correctly associate an injury with the dentition that made the mark, bite mark analysis is not generally accepted as reliable science. Instead, the discipline relies upon highly subjective opinion testimony, as evidenced by the convictions of innocent people discussed below.

**B. Bite Mark Comparison Evidence Is Not Generally Accepted as Reliable in the Relevant Community**

**1. The NAS Report Establishes That a Biter Cannot Be Reliably Identified by Performing Bite Mark Comparison**

The 2009 NAS Report was the culmination of nearly four years of work by a select committee of members of the forensic, scientific and legal communities, who were directed by Congress to assess the current state of forensic science in this country and make recommendations to strengthen it. The committee heard extensive testimony from a vast array of scientists, law enforcement officials, medical examiners, crime laboratory officials, investigators, attorneys and leaders of professional and standard-setting organizations.

The NAS Report is the most comprehensive assessment of bite mark evidence to date, and was conducted by highly-respected members of the scientific and legal communities, including a federal judge, prosecutor and defense attorney. While the NAS Report notes that some in the forensic dentist community continue to assert that bite mark comparison can reliably identify the individual who produced a bite mark, the members of this discrete and insular community (with a vested interest in the continued use of their purported expert testimony in court) are dwarfed by the overwhelming consensus of the scientific community that positive bite mark comparison evidence is not reliable and should not be used in court.

In fact, in the recent decision exonerating Douglas Prade (*see below* at 29), the Ohio Court of Common Pleas held that "new [bite mark] research and studies cast serious doubt to a

degree that was not able to be raised by the expert testimony presented at the original determination of guilt by the fact-finder." *State v. Prade*, No. CR 1998-02-0463, slip op. at 13-14 (Ohio Com. Pl. Jan. 29, 2013) (citation omitted). The *Prade* court based its recognition that "forensic odontology is a field in flux" in part on the NAS Report. *Id.* at 14. Due to the shift in the general acceptance in the relevant scientific community, as evidenced by the NAS Report and the experts who testified at the post-conviction hearing, the court concluded that "the new evidence goes to the credibility and the weight of the State's experts' testimony at the underlying trial" such that a reasonable jury would not have convicted Prade. *Id.*

Indeed, courts applying the *Frye* standard have previously excluded formerly admissible categories of scientific evidence, based on the judgment of the NAS that such evidence was not reliable. For example, in 2004, and in the face of over three decades of judicial precedent admitting such evidence, the NAS issued a report (as it has now done regarding bite mark evidence) on Comparative Bullet Lead Analysis ("CBLA"), a so-called forensic "science" that purported to be able to match, through trace chemicals, a particular bullet from a crime scene with particular ammunition in a defendant's possession.<sup>13</sup> In fact, as the 2004 NAS Report on CBLA detailed, "[t]he available data [did] not support any statement that a crime bullet came from a particular box of ammunition." National Research Council, Committee on Scientific Assessment of Bullet Lead Elemental Composition Comparison, *Forensic Analysis: Weighing Bullet Lead Evidence* 7 (2004).<sup>14</sup> In response to the NAS's CBLA report, state courts applying

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<sup>13</sup> See *United States v. Davis*, 103 F.3d 660, 666 (8th Cir. 1996) ("An expert testified that such a finding is rare and that the bullets must have come from the same box or from another box that would have been made by the same company on the same day."); see also *Commonwealth v. Daye*, 587 N.E.2d 194, 207 (Mass. 1992); *State v. King*, 546 S.E.2d 575, 584 (N.C. 2001).

<sup>14</sup> Just as bite mark evidence lacks research into the uniqueness of dental characteristics in the general population (see above at 10), CBLA evidence also had no scientific research concerning the statistical uniqueness of the

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both the *Frye* and *Daubert* tests began excluding such evidence, recognizing that they could not blindly adhere to the thirty years of judicial precedent in the face of the NAS's conclusions.<sup>15</sup>

Similarly, this Court should reject the proffered bite mark evidence in this case, based on the NAS Report's conclusions that such evidence is unreliable.<sup>16</sup> Although the Innocence Project is unaware of any judicial decision excluding all forms of positive bite mark testimony, the combined effect of the NAS Report and recent scrutiny of the field of forensic science in general are beginning to chip away at the lock-step approach to bite mark evidence that courts have thus far taken. *See, e.g., Poole v. Woods*, No. 08-cv-12955, 2011 WL 4502372, at \*1 (E.D. Mich. Aug. 9, 2011) (citation omitted) (noting that beginning in the 1990s, judges began to consider bite mark evidence to be "more art than science"); *see also State v. Lopez-Martinez*, 256 P.3d 896 (table), 2010 WL 2545626, at \*4 (Kan. Ct. App. 2010) (Leben, J., concurring) (per curiam) (citing the NAS Report and noting that although the Kansas Supreme Court had previously endorsed admission of bite mark evidence, "reliance solely on past cases can be a problematic

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chemical content of a bullet as compared to the general population of bullets, even when the bullet was said to match a specific box of ammunition.

<sup>15</sup> *See, e.g., Clemons v. State*, 896 A.2d 1059, 1070 (Md. 2006) ("CBLA is not admissible under the *Frye-Reed* standard because it is not generally accepted . . . as valid and reliable."); *accord Ragland v. Commonwealth*, 191 S.W.3d 569, 580 (Ky. 2006); *State v. Behn*, 868 A.2d 329, 331 (N.J. Super. Ct. App. Div. 2005).

<sup>16</sup> For cases that scrutinize other types of forensic evidence, *see, e.g., State v. Ward*, 694 S.E.2d 738, 743 (N.C. 2010) (citing the NAS Report and observing that "[r]ecently, the field of forensic science has come under acute scrutiny on a nationwide basis. When articulating the right of a criminal defendant under the Sixth Amendment of the United States Constitution to confront forensic analysts as witnesses at trial, the Supreme Court of the United States in *Melendez-Diaz v. Massachusetts* . . . commented that '[f]orensic evidence is not uniquely immune from the risk of manipulation,' and '[s]erious deficiencies have been found in the forensic evidence used in criminal trials.'" (second and third alterations in original) (citations omitted); *see also United States v. Smallwood*, No. 5:08-CR-38, 2010 WL 4168823, at \*10 (W.D. Ky. 2010) (alterations in original) (citation omitted) (departing from federal court precedent in excluding tool mark evidence on the grounds that Association of Firearm and Tool Mark Examiners (AFTE) standards "'acknowledge that these decisions involve subjective qualitative judgments . . . and that the accuracy of examiners' assessments is highly dependant on their skill and training . . . the decision of the [tool mark] examiner remains a subjective decision based on unarticulated standards[.]'" ), *aff'd*, 456 F. App'x 563 (6th Cir. 2012).

method for continued acceptance of scientific tests," and that "[r]econsideration of the admissibility of bite mark testimony seems appropriate"); *see also Prade*, slip op. at 13-14.

It should be emphasized that the NAS Report was especially critical of positive bite mark comparison evidence, concluding that it suffers from "inherent weaknesses" and that there is "considerable dispute" within the scientific community "about the value and reliability of the collected data for interpretation." (NAS Report at 176.) As noted by the NAS Report, because bite mark analysis has "never been exposed to stringent scientific scrutiny," it is not surprising that bite mark analysis has "substantial rates of erroneous results." (*Id.* at 42, 47.) According to the NAS Report, bite mark evidence has not "been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source" (*id.* at 7), and thus one should only assume that it will "sometimes" exclude suspects (but cannot confirm a match to a suspect) (*id.* at 176). Moreover, there is no way to determine the probability of a match, namely, "there is no established science indicating what percentage of the population or subgroup of the population could also have produced the bite." (*Id.* at 174.)

Further, the NAS found positive bite mark comparison to be fundamentally unreliable, specifically citing wrongful convictions overturned through DNA evidence that were "based mainly on testimony by experts indicating the identification of an individual based on a bite mark." (*Id.* at 175.) The NAS's conclusions are thus consistent with the robust legal scholarship in this area, which is virtually unanimous that positive bite mark evidence is inherently unreliable, prone to error, and should be excluded from juries as not probative and unduly prejudicial. (*See below* at 20-21.)

## 2. **Bite Mark Evidence Is Widely Recognized Outside the Courtroom As Unreliable**

The results of studies by dental, scientific and legal experts confirm that forensic odontologists cannot reliably testify that a specific bite mark was made by a specific individual. It is widely recognized that human skin is not a reliable recorder of an individual's bite mark, a point that was even conceded by the People's expert in this case. (Senn Tr. at 215:18-218:3.) Thus, a medical school dean has opined that "[i]t is well known that human skin is an extremely poor medium for the accurate recording of bite mark injury," Allen P. Wilkinson & Ronald M. Gerughty, *Bite Mark Evidence: Its Admissibility Is Hard to Swallow*, 12 W. St. U. L. Rev. 519, 550 (1984-85), and an article in the nation's leading dentistry journal has confirmed that "[n]ot only is skin a poor medium for accurate impressions, but human tissues often contain curves and other irregularities that produce intrinsic distortion," Bruce R. Rothwell, *Bite Marks in Forensic Dentistry: A Review of Legal, Scientific Issues*, 126 J. Am. Dental Ass'n 223, 228 (1995).<sup>17</sup>

There continues to be significant doubt among the relevant experts that bite marks are even capable of "captur[ing] the unique and individual characteristics of teeth with good fidelity." Paul C. Giannelli, *Bite Mark Analysis*, 43 Crim. L. Bull. 930, 933 (2007).<sup>18</sup> See also Beecher-Monas, *supra*, at 1387. As a result, there is absolutely *no* consensus as to the

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<sup>17</sup> See also *id.* at 226 (further noting that "the clarity and shape of the [bite] mark may change in a relatively short time in both living and dead victims"); Risinger, *supra*, at 136 (noting that the "ideal conditions" necessary for skin to record a bite are never "commonly present"); see also Erica Beecher-Monas, *Reality Bites: The Illusion of Science in Bite-Mark Evidence*, 30 Cardozo L. Rev. 1369, 1383-84 (2009) (noting the dearth of evidence that skin properly records bite marks, and noting that "[g]iven the inevitability of distortions, comparisons of marks on skin with dentition are highly suspect").

<sup>18</sup> See also Wilkinson & Gerughty, *supra*, at 554 ("[T]he strongest argument to support the contention that bite marks are not demonstrably unique . . . and therefore should not be accorded judicial approval is the fact that it has been discovered that two individuals may possess the same bite pattern."); Michael J. Saks & David L. Faigman, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 Ann. Rev. L. & Soc. Sci. 149, 154-60 (2008) (remarking on how certain "nonscience [forensic] sciences[.]" including bite mark identification, assume the possibility of individualization without any proof and noting the lack of objective standards in the forensic identification fields); Rothwell, *supra*, at 231 ("There is no consensus on the appropriate technical methods for evaluating the bite mark and potentially associated dental composition.")

fundamental assumption of bite mark evidence—that skin records the impression of a bite mark which an examiner can then uniquely match to a single individual's dentition.

Finally, legal commentators have increasingly stated that the use of bite mark evidence should be discarded or severely curtailed in criminal proceedings. *See* Beecher-Monas, *supra*, at 1370 ("Nonsense masquerading as science has no place in being admitted into evidence to prove an issue disputed at trial."); Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 Va. L. Rev. 1, 67-71 (2009) (discussing wrongful convictions involving bite mark evidence); Adam Deitch, *An Inconvenient Tooth: Forensic Odontology Is An Inadmissible Junk Science When It Is Used To 'Match' Teeth to Bitemarks in Skin*, 2009 Wis. L. Rev. 1205, 1220 (2009) (Student Comment); *see also* Giannelli, *supra*, at 954 ("Given . . . the number of unresolved issues associated with [bite mark analysis], and the DNA exonerations in bite mark cases, vigorous attacks on bite mark evidence should be expected.").

**C. Prior New York Rulings Do Not Mandate That Bite Mark Evidence Be Admitted In This Case**

**1. In Applying *Frye*, Courts Must Acknowledge Scientific Development and Advancement**

There is now agreement in the scientific community—as exemplified by the NAS Report, virtually unanimous scientific and legal articles, new research, and Dr. West's and Dr. Brower's high-profile recantation of the reliability of bite mark analysis—that bite mark analysis lacks sufficient acceptance standards, population studies and other empirical evidence to be reliably used in court. As such, even if at some point in the past bite mark evidence was viewed as generally accepted as reliable, it has since become the subject of such raging controversy that it cannot satisfy the *Frye* standard today and should be excluded.

Due to advances in scientific understanding and knowledge, certain scientific fields that once were "generally accepted as reliable" are now recognized to be inherently unreliable. Once

a court has reached a determination that a body of evidence is generally accepted, that cannot and does not establish for all time that it will be accepted unquestionably in all cases. Courts cannot ignore changing science and burgeoning skepticism. Trial courts must consider evidentiary issues individually as to each case and cannot merely rely on *stare decisis* as a basis for admitting discredited expert evidence.<sup>19</sup> As one federal court applying the *Daubert* standard noted, "[i]n order to fulfill the gatekeeping obligation placed upon it, a court cannot simply rely upon a *Daubert* ruling from a prior case in determining whether opinion evidence should be presented to a jury in the case before it. This is so even where the issues and the expert witnesses are the same in both cases. A new *Daubert* ruling must be made for each case." *Ramirez v. Avery Berkel, Inc.*, No. 02 Civ. 6887(JSR)(KNF), 2005 WL 1683534, at \*1 (S.D.N.Y. July 15, 2005).

## **2. Past Bite Mark Evidence Rulings Were Based on Incomplete Analysis and Do Not Reflect Current Scientific Knowledge**

Until this Court's proceedings on this matter, New York courts have admitted bite mark evidence in criminal proceedings based on two New York Court of Appeals rulings, from 1981 and 1984.<sup>20</sup> But neither of these earlier decisions reflects the current science or the emerging

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<sup>19</sup> As the U.S. Supreme Court has recognized, *stare decisis* is not an "inexorable command," *Citizens United v. Federal Election Comm'n*, 130 S.Ct. 876, 920 (2010) (citation omitted) (internal quotation marks omitted), and may be disregarded if the "facts have so changed, or come to be seen so differently, as to have robbed the old rule of significant application of justification." *Planned Parenthood of Se. Pa. v. Casey*, 505 U.S. 833, 855 (1992) (citing *Burnet v. Coronado Oil & Gas Co.*, 285 U.S. 393, 412 (1932) (Brandeis, J., dissenting)). See also *Fed. Comm'n's Comm'n v. Fox Television Stations, Inc.*, 556 U.S. 502, 534 (2009) (Thomas, J., concurring); *Am. Trucking Ass'ns, Inc v. Scheiner*, 483 U.S. 266, 302 (1987) (O'Connor, J., dissenting).

<sup>20</sup> A summary of the cases that led to the New York courts' admission of bite mark evidence is attached hereto as Appendix C. In particular, the chart demonstrates visually both the lack of *Frye* scrutiny in bite mark jurisprudence, and that what these early cases decided was that *the techniques* for performing bite mark analysis were "generally accepted" by forensic dentists, *not whether the conclusions drawn from these techniques were generally accepted as reliable* in the relevant scientific community. Because virtually none of the most basic hallmarks of science exist in bite mark analysis, this second question, which courts in this state have not

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judicial skepticism that bite mark comparison evidence is no longer generally accepted evidence. In addition, it appears that the primary emphasis of prior bite mark evidence jurisprudence was *not* regarding its scientific reliability as a means of identifying a suspect, but was primarily concerned with establishing whether the bite mark could be photographed in a meaningful way—suggesting that the issue of the scientific soundness of a bite mark comparison simply has not been addressed by the courts. (*See below* at 24-25.)

The Court of Appeals first addressed the admissibility of bite mark evidence in *People v. Middleton*, and denied a motion to exclude the sort of bite mark evidence that the prosecution intends to introduce here. *See* 54 N.Y.2d at 51. In so doing, the Court of Appeals concluded that the procedures involved in obtaining a bite mark impression were accepted and approved by a majority of the experts in the field.<sup>21</sup> However, the nature of acceptance of bite mark comparison techniques has changed dramatically in the more than three decades since *Middleton*. (*See above* at 16-21.) Moreover, the *Middleton* court conflated bite mark evidence, which purports to identify a biter who made a bite mark, with victim identification evidence that is used to identify a victim based on his or her dental records (and relies, for example, on more teeth and points of comparison). *See* 54 N.Y.2d at 49. Not only was this conflation improper, but it also reveals that the *Middleton* court did not grapple with the underlying assumptions or difficulties in making a positive match through bite mark evidence.

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considered, must be answered "no," as further demonstrated by the testimony of Dr. Kafadar and Dr. Saks. (*See above* at 16-20.)

<sup>21</sup> To establish that bite mark evidence was generally accepted, the Court of Appeals relied on three "academic" sources, but none of these sources contained any empirical research. *See Middleton*, 54 N.Y.2d at 49 (citing John Beckstead, Raymond D. Rawson & William S. Giles, *Review of Bite Mark Evidence*, 99 J. Am. Dental Ass'n 69 (1979); Warren Harvey, *Dental Identification & Forensic Odontology* (1976); D.G. MacDonald, *Bite Mark Recognition and Interpretation*, 14 J. FORENSIC SCI. SOC'Y 229 (1974)).

The *Middleton* court also noted that the reliability of bite mark comparison evidence had been accepted by all of the appellate courts that had addressed the issue. Yet, the trial court in *Middleton* did not hold a *Frye* hearing, and in only two of the fourteen cases cited by *Middleton* was there a pretrial *Frye* hearing. Even in those two cases with *Frye* hearings, the relevant courts failed to subject bite mark evidence (and its underlying assumptions) to any meaningful scrutiny, and instead assessed only whether dentists agreed on acceptable techniques for capturing bite mark evidence, i.e., recording the bite mark and suspect's dentition. Appendices B and C to this brief demonstrate further the flawed foundation of bite mark evidence jurisprudence. Thus, while the judicial community may have been unanimous in admission of bite mark testimony in the late 1970s, none of those courts independently examined whether the hypotheses inherent in bite mark analysis were in fact generally accepted as reliable by the scientific community.

The only other decision from the Court of Appeals came three years later, in *People v. Smith*, 63 N.Y.2d 41 (1984). In *Smith*, the court determined that "[t]he techniques employed in *Middleton* (photography, freezing of tissue specimens, taking of dental molds, visual observation) were approved by the majority of experts in the field as well as by appellate courts and therefore were accepted as generally reliable." *Id.* at 63. Although a *Frye* hearing was held, the *Smith* court relied only on *Middleton*, and considered only whether a photograph-to-photograph comparison (as opposed to a photograph-to-dental cast comparison) would be generally accepted. Like *Middleton*, *Smith* left untested the underlying substantive and statistical assumptions inherent in any positive bite mark identification.

Thus, the focus of these decades-old cases was largely misplaced. Rather than assessing the reliability of the *science*—whether there are sufficiently developed standards to govern

whether a positive identification can be made from a bite mark on skin, and whether sufficient research has been done to permit a reliable and valid statistical analysis of such an identification – the court's inquiry focused on the reliability of the *procedures*—whether the techniques for extracting bite mark evidence (such as photography and dental casting) are sufficiently reliable. There can be little question that a photograph is a generally accepted way to gather bite mark evidence. But it remains an open question whether any positive and *statistically significant identification* of a biter can be made from even the most accurate photographic representation. While judicial decisions are certainly part of determining whether a forensic technique is generally accepted, *see Wesley*, 83 N.Y.2d at 437, courts must be wary of crediting decisions based on outdated science, and a stale assessment of the relevant community that no longer reflects the prevailing view as to the reliability of the technique.<sup>22</sup>

### **III. BITE MARK EVIDENCE SHOULD ALSO BE EXCLUDED IN THIS CASE BECAUSE OF ITS SUBSTANTIAL PREJUDICIAL EFFECT**

Bite mark evidence should also be deemed inadmissible because its unknown probative value is substantially outweighed by its overwhelming prejudicial effect. (*See above* at 7-8.)

"As with any other type of expert evidence, [the Court of Appeals] recognize[s] the danger in allowing unreliable or speculative information (or 'junk science') to go before the jury with the weight of an impressively credentialed expert behind it." *Parker*, 7 N.Y.3d at 447.

To assess the putative probative value of bite mark evidence, the Court must examine the two prongs to an expert's opinion on bite mark evidence: (1) whether there is a positive association between the skin tissue impression and the defendant's dentition; and (2) whether any

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<sup>22</sup> For example, as the NAS Report notes, many judges, although acknowledging that techniques like bite mark evidence did not receive due scrutiny when they were first introduced and are no longer generally accepted, nevertheless feel constrained to admit such evidence. (*See* NAS Report at 107-08.)



statistically accurate conclusion can be drawn of how rare or common the specific bite mark is in the general population. Without this second prong in the analysis, an expert cannot testify as to how likely it is the defendant made the bite mark and certainly cannot testify as to whether a bite mark can be said to be that of the defendant to the exclusion of all other people in the world, or how many other people in the world might have left a similar mark.

As to the first prong of the analysis (as previously discussed and as confirmed by both the People's and Defense's witness, *see above* at 13-14), bite mark evidence on skin tissue is inherently unreliable as a means to identify a particular defendant as the one who made the bite impression. *See, e.g.,* Wilkinson & Gerugthy, *supra*, at 550 (stating that "[i]t is well known that human skin is an extremely poor medium for the accurate recording of bite mark injury"); Giannelli, *supra*, at 933 (observing that there continues to be significant doubt among the relevant experts that bite marks are capable of "captur[ing] the unique and individual characteristics of teeth with good fidelity").

And as to the second prong, there is no database on the frequency of characteristics regarding bite marks and thus no way that a forensic odontologist is qualified to opine on the likelihood of the bite mark being rare or common. As Professor Kafadar testified, "[t]here was no thorough study of large populations to establish the uniqueness of bite marks. No central repository of bite marks and patterns. No established science indicating what percentage of the population could also have produced the bite." (Kafadar Tr. 32:13-17.) In fact, Professor Kafadar found that not only were there no studies available on the uniqueness of human dentition, but there were not even any reliable measurements which scientists could use to conduct such studies (*id.* at 44:22-45:1), and, moreover, the error rate of bite mark evidence remains unknown (*see above* at 12-13).

Accordingly, even if a forensic dentist were permitted to opine that there was a positive association between the bite mark and the defendant, without the statistical second prong to gauge the significance of the positive association, there is no probative value of the positive association opinion. Furthermore, phrases such as "consistent with," which are often used to describe the strength of the linkage between a bite mark and a particular defendant, are imprecise and may mislead a fact finder as to the degree of association. (Saks Decl. ¶¶ 19-24.)<sup>23</sup> As the Vermont Supreme Court has pointed out in a related context (agreeing with the National Research Council), "[t]o say that two patterns match, without providing any scientifically valid estimate . . . of the frequency with which such matches might occur by chance, is meaningless." *State v. Tester*, 968 A.2d 895, 906-07 (Vt. 2009) (referring to DNA evidence) (alteration in original); *accord Turpin v. Merrell Dow Pharms., Inc.*, 959 F.2d 1349, 1359-60 (6th Cir. 1992) (drug is "'consistent with causing' birth defects" is legally insufficient because it "testif[ies] to a possibility rather than a probability."); *Commonwealth v. Mattei*, 455 Mass. 840, 848, 850-52 & n.25 (Mass. 2010) (DNA "consistent with" suspect held inadmissible because no evidence as to significance of match.); *Deloney v. State*, 938 N.E. 2d 724, 729-30 (Ind. Ct. App. 2010); *Peters v. State*, 18 P.3d 1224, 1225-26, 1228 (Alaska Ct. App. 2001).

The unknown probative value of either prong of bite mark evidence must be weighed against the substantial prejudicial effect on a jury from testimony by a so-called "expert witness" that a defendant has been positively identified with a bite mark on the victim, especially since a bite mark—by itself—demonstrates extreme violence, perhaps even torture, in the commission

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<sup>23</sup> As Professor Saks testified, "[a]lthough the term 'consistent (with)' was defined by the [American Board of Forensic Odontology] to be a weak estimate of an association, samples of laypersons interpreted it (76 on a 100-point scale) to indicate a degree of association that was as strong or stronger than terms intended to convey much higher degrees of certainty." (Saks Decl. ¶ 24.)

of the crime. In this regard, media reports issued after the exoneration of Mr. Prade (*see below* at 29 & App'x A) demonstrate the effect of bite mark evidence on a juror. Despite video evidence showing someone who did not meet Mr. Prade's build or description entering the victim's van, the jury nonetheless convicted, based largely on bite mark evidence. Even after DNA evidence exonerated Mr. Prade, it was reported that one juror, "Stow resident Anne Lapuh [could not] shake the images of the bite-mark evidence, she says, because forensic dental impressions of the captain's teeth fit into place perfectly." As she commented "'the image of his teeth fit right in . . . He had crooked teeth and they fit right in, like a little puzzle.'" Ed Meyer, *Former Prade jurors speak about evidence leading to 1998 conviction*, Akron Beacon Journal (Feb. 28, 2013). Of course, because Mr. Prade was exonerated, in fact, his teeth did not "fit right in." The violent, disturbing image of the bite mark—with a proffered expert stating that the bite was inflicted by the defendant—is simply too prejudicial to be allowed into evidence, especially when bite mark evidence, as discussed above, is inherently unreliable.

Under similar circumstances, New York courts have excluded such highly prejudicial evidence when its probative value was questionable at best. *See Taylor*, 75 N.Y.2d at 286, 293 (holding that, although rape trauma evidence otherwise satisfies *Frye*, its helpfulness is outweighed by undue prejudice when introduced solely for the purpose of proving that a rape occurred); *Rosado*, 25 Misc. 3d at 384 (even if the trial court determines that evidence satisfies *Frye* and that expert's testimony is "relevant to the issues and facts of the individual case," the court "may exercise its discretion and preclude 'technically relevant' evidence 'if its probative value is substantially outweighed by the danger that it will unfairly prejudice the other side or mislead the jury'" (quoting *People v. Scarola*, 71 N.Y.2d 769, 777 (1988))). The Court should do the same here, and exclude the proffered bite mark evidence as unfairly prejudicial.

#### **IV. MANY WRONGFUL CONVICTIONS AND ARRESTS HAVE BEEN BASED ON FLAWED BITE MARK EVIDENCE**

Based on its work exonerating wrongfully convicted prisoners using DNA evidence, the Innocence Project is aware of an alarmingly high number of wrongful convictions based, in whole or in part, on bite mark evidence testimony. Collectively, the men who were wrongfully convicted on the basis of bite mark evidence spent over a century in prison for crimes they did not commit. For example:

- Just this January, while the Innocence Project was drafting this brief, Douglas Prade—who had spent over fifteen years in jail for the murder of his wife—was shown by DNA evidence to be wrongfully convicted, despite bite mark evidence presented at his trial that the bite mark on the victim was an exact match to Mr. Prade. (*Cf. above* at 2-3; 16-17.)
- Robert Lee Stinson spent over twenty-three years in jail for the rape and murder of 63-year-old Iona Cychosz. The only physical evidence against Mr. Stinson was the testimony of *two* certified ABFO Diplomates, Drs. Lowell Thomas Johnson and Raymond Rawson, that there was "no margin for error" that Mr. Stinson was the source of a bite mark on the victim, concluding that their bite mark evidence was "high quality," "overwhelming" and comported with the "standards of the American Board of Forensic Odontology."

Numerous other wrongful convictions and arrests, which were based on bite mark evidence that was later shown to be false, are summarized in Appendix A to this brief. In each case, subsequent forensic evidence established that the convicted or arrested individual could not have been the person who produced the mark that was analyzed by the forensic dentist and deemed a match by flawed science.

#### **CONCLUSION**

Comparison bite mark evidence does not pass *Frye* scrutiny, is unduly prejudicial, and is inadmissible. As demonstrated herein, this evidence is not generally accepted as reliable by the scientific community and has been discredited by the NAS, scientists, legal scholars and even former supporters. Bite mark evidence's unreliability is made clear by the tragic experiences of

numerous exonerees and wrongful arrestees whose lives have been devastated by the "high quality" and purportedly incontrovertible bite mark evidence subsequently shown to be entirely wrong. As a result, and for the reasons set forth in the Defendant's brief, the Innocence Project respectfully submits that the purported expert testimony about bite mark evidence should be excluded from the trial of this matter.

Dated: April 17, 2013  
New York, New York

Respectfully submitted,



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**CERTIFICATION OF SERVICE**

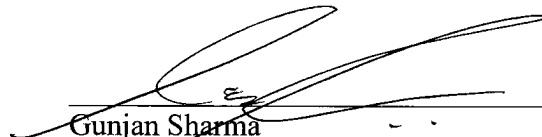
I hereby certify that on April 17, 2013, copies of the foregoing Brief of Amicus Curiae The Innocence Project in Support of Defendant's Motion to Exclude Bite Mark Evidence, with Appendices, were served via hand delivery to:

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# APPENDIX A

## DESCRIPTION OF BITE MARK EXONERATIONS

1. **Robert Lee Stinson:** Robert Lee Stinson served over 23 years in a Wisconsin prison for the brutal rape and murder of 63-year-old victim Ione Cychosz. The only physical evidence against Stinson at his 1985 trial was the bite mark testimony of two board-certified ABFO Diplomates, Drs. Lowell Thomas Johnson and Raymond Rawson. Dr. Johnson concluded that the bite marks "had to have been made by teeth identical" to Stinson's, and claimed that there was "no margin for error" in his conclusion. Dr. Rawson, the chairman of the Bite Mark Standards Committee of the ABFO testified that the bite mark evidence was "high quality" and "overwhelming." Both experts testified "to a reasonable degree of scientific certainty," that the bite marks on the victim had been inflicted at or near the time of death, and that Stinson was the only person who could have inflicted the wounds. After examining Dr. Johnson's workup, Dr. Rawson stated that the methods Dr. Johnson used in gathering the evidence complied with the "standards of the American Board of Forensic Odontology."

The Wisconsin Innocence Project accepted Stinson's case in 2005, and sought DNA testing of saliva and blood-stains on the victim's sweater, which ultimately excluded Stinson. On January 30, 2009, Stinson, then 44, was freed and his conviction was vacated.<sup>1</sup>

2. **Willie Jackson:** On May 26, 2006, Willie Jackson was exonerated after post-conviction DNA testing proved his innocence in a 1986 sexual assault case. He had spent 17 years in prison for a crime he did not commit. At Jackson's trial, Dr. Robert Barsley, past president of the American Board of Forensic Odontology (ABFO), told the jury that the bite marks on the victim matched Jackson, testifying: "My conclusion is that Mr. Jackson is the person who bit this lady." Ultimately, DNA evidence showed that it was Willie Jackson's brother, Milton Jackson, who attacked and raped the victim.<sup>2</sup>
3. **Roy Brown:** In January 2007, Roy Brown was exonerated of stabbing and strangling Sabina Kulakowski after spending 15 years in prison. He was convicted of her murder in January 1992 based on bite mark evidence which was the centerpiece of the prosecution's case against Brown. Kulakowski's body had been discovered with multiple bite marks on her back, arm and thigh, all of which board-certified ABFO Diplomat Dr. Edward Mofson<sup>3</sup> claimed matched Brown's teeth. Mofson testified to a "reasonable degree of dental certainty" that Brown's dentition was "entirely consistent" and "completely

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<sup>1</sup> *The Innocence Project – Know the Cases: Browse Profiles: Robert Lee Stinson*, [http://www.innocenceproject.org/Content/Robert\\_Lee\\_Stinson.php](http://www.innocenceproject.org/Content/Robert_Lee_Stinson.php); *State v. Stinson*, 134 Wis. 2d 224, 228, 231, 397 N.W.2d 136, 137-38 (Ct. App. 1986).

<sup>2</sup> *The Innocence Project – Know the Cases: Browse Profiles: Willie Jackson*, [http://www.innocenceproject.org/Content/Willie\\_Jackson.php](http://www.innocenceproject.org/Content/Willie_Jackson.php); *Jackson v. Day*, No. Civ. A. 95-1224, 1996 WL 225021, at \*1 (E.D. La. May 2, 1996), *rev'd*, 121 F.3d 705 (5th Cir. 1997); Barsley 1989 trial court testimony, *transcript available at* <http://www.law.virginia.edu/pdf/faculty/garrett/innocence/jackson.pdf>.

<sup>3</sup> All representations that the dentists at issue in this appendix were "board-certified ABFO Diplomates" are based on the *American Board of Forensic Odontology Diplomat Information*, available at <http://www.abfo.org/wp-content/uploads/2012/08/ABFO-Diplomate-Information-revised-November-2012.pdf>.



consistent" with all of the bite marks, noting that the bite marks depicted the absence of the same two teeth Brown was missing.

15 years after the conviction, however, DNA testing performed on saliva stains left by the perpetrator excluded Brown and matched another suspect, Barry Bench. Nevertheless, citing the prosecution's bite mark evidence at the original trial, which the jury asked to review during deliberations, the judge in the case initially refused to release Brown. Ultimately, in January 2007, the district attorney acknowledged Brown's innocence and he was exonerated after spending 15 years in prison for a murder he did not commit.<sup>4</sup>

4. **Ray Krone:** On December 31, 1991, Ray Krone was arrested and charged with the murder, kidnapping, and sexual assault of a woman who worked at a bar he frequented. Police had a Styrofoam impression made of Krone's teeth for comparison to bite marks found on the victim's body and, thereafter, he became known in the media as the "Snaggle Tooth Killer" due to his crooked teeth. Dr. Raymond Rawson, a board-certified ABFO Diplomate, testified that the bite marks found on the victim's body matched Krone's teeth. Based on this, Krone was convicted of murder and kidnapping, and sentenced to death.

In 1996, Krone won a new trial on appeal, but was convicted again based mainly on the state's supposed expert bite mark testimony. This time, however, the judge sentenced him to life in prison, citing doubts about whether or not Krone was the true killer. It was not until 2002, after Krone had served more than 10 years in prison, that DNA testing proved his innocence.<sup>5</sup>

5. **Calvin Washington & Joe Sidney Williams:** Calvin Washington was convicted of capital murder in 1987 after a woman was found beaten, raped, and murdered in Waco, Texas. It was alleged that Washington and Williams murdered and sexually assaulted the victim in the course of committing a burglary. Forensic dentist and former president of the American Academy of Forensic Sciences, Dr. Homer Campbell, testified that a bite mark found on the victim was "consistent with" Williams' dentition. While Campbell excluded Washington as the source of the bite mark, his bite mark testimony about Williams (which was given at Washington's trial) tied Washington to the crime.

After serving more than 13 years of this sentence, Washington was finally exonerated in 2000 when DNA testing showed that blood on a shirt found in Washington's home did not come from the victim, as previously asserted; testing conducted a year later pointed to

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<sup>4</sup> Fernando Santos, *In Quest for a Killer, an Inmate Finds Vindication*, N.Y. Times (Dec. 21, 2006), [http://www.nytimes.com/2006/12/21/nyregion/21brown.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2006/12/21/nyregion/21brown.html?pagewanted=all&_r=0); *The Innocence Project - Know the Cases: Browse Profiles: Roy Brown*, [http://www.innocenceproject.org/Content/Proven\\_Innocent\\_by\\_DNA\\_Roy\\_Brown\\_Is\\_Fully\\_Exonerated.php](http://www.innocenceproject.org/Content/Proven_Innocent_by_DNA_Roy_Brown_Is_Fully_Exonerated.php); Brandon L. Garrett, *Convicting the Innocent: Where Criminal Prosecutions Go Wrong* 108-09 (Harvard University Press 2011); Mofson 1992 trial court testimony, transcript available at <http://www.law.virginia.edu/pdf/faculty/garrett/innocence/brown1.pdf>; David Lohr, *Quest for Freedom: The True Story of Roy Brown*, [http://www.trutv.com/library/crime/criminal\\_mind/forensics/ff311\\_roy\\_brown/5.html](http://www.trutv.com/library/crime/criminal_mind/forensics/ff311_roy_brown/5.html).

<sup>5</sup> *The Innocence Project – Know the Cases: Browse Profiles: Ray Krone*, [http://www.innocenceproject.org/Content/Ray\\_Krone.php](http://www.innocenceproject.org/Content/Ray_Krone.php).

another man as the perpetrator.<sup>6</sup> Prior to Washington's exoneration, the Texas Court of Criminal Appeals had set aside Williams' conviction in 1992 and charges against him were dismissed on June 30, 1993.

6. **James O'Donnell:** James O'Donnell was convicted in 1998 of attempted sodomy and second-degree assault. Board-certified ABFO Diplomate Dr. Harvey Silverstein opined that a bite mark on the victim's hand was consistent with O'Donnell's dentition. Based on the eyewitness identification and the bite mark evidence, and despite testimony from his wife and son that he had been at home with them when the crime occurred, the jury convicted O'Donnell. He was sentenced to three-and-a-half to seven years in prison.

In 2000, after DNA samples from a rape kit excluded O'Donnell as the source of the semen found on the victim, his conviction was formally vacated.<sup>7</sup>

7. **Levon Brooks:** Levon Brooks spent 16 years in prison for the rape and murder of a three-year-old girl that he did not commit. Forensic dentist Dr. Michael West claimed that the marks on the victim's body were human bite marks and he testified at Brooks' trial that, of 13 suspects whose bite marks he had compared to the ones on the victim's body, Brooks' teeth "matched" the marks on the victim. As he explained, "it could be no one but Levon Brooks that bit this girl's arm." Based on this, Brooks was convicted of capital murder and sentenced to life in prison.

In 2001, DNA testing and a subsequent confession revealed that Justin Albert Johnson committed the murder. Johnson had been one of the 12 other suspects whose dental impressions Dr. West had determined did not match the bite marks on the victim's body. Following Johnson's confession, Brooks was freed on February 15, 2008.<sup>8</sup>

8. **Kennedy Brewer:** In 1992, Kennedy Brewer was arrested in Mississippi and accused of killing his girlfriend's three-year-old daughter. The medical examiner who conducted the autopsy, Steven Hayne, testified that he had found several marks on the victim's body that he believed to be bite marks. Hayne called in Dr. West to analyze the marks and Dr. West concluded that 19 marks found on the victim's body were "indeed and without a doubt" inflicted by Brewer. Brewer was convicted of capital murder and sexual battery on March 24, 1995, and sentenced to death. His conviction was based almost entirely on the bite mark evidence.

In 2001, DNA tests proved that Justin Albert Johnson, not Kennedy Brewer, committed

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<sup>6</sup> *The Innocence Project – Know the Cases: Browse Profiles: Calvin Washington*, [http://www.innocenceproject.org/Content/Calvin\\_Washington.php](http://www.innocenceproject.org/Content/Calvin_Washington.php); Michael Hall, *The Exonerated*, Texas Monthly (Nov. 2008), available at <http://www.texasmonthly.com/story/exonerated>.

<sup>7</sup> *The Innocence Project – Know the Cases: Cases Where DNA Revealed That Bite Mark Analysis Led to Wrongful Arrests and Convictions*, [http://www.innocenceproject.org/Content/Cases\\_Where\\_DNA\\_Revealed\\_that\\_Bite\\_Mark\\_Analysis\\_Led\\_to\\_Wrongful\\_Arrests\\_and\\_Convictions.php](http://www.innocenceproject.org/Content/Cases_Where_DNA_Revealed_that_Bite_Mark_Analysis_Led_to_Wrongful_Arrests_and_Convictions.php); Silverstein 1998 trial court testimony, transcript available at <http://www.law.virginia.edu/pdf/faculty/garrett/innocence/odonnell.pdf>.

<sup>8</sup> *The Innocence Project – Know the Cases: Browse Profiles: Levon Brooks*, [http://www.innocenceproject.org/Content/Levon\\_Brooks.php](http://www.innocenceproject.org/Content/Levon_Brooks.php).

the crime. Johnson was the same perpetrator responsible for murdering the child in the Levon Brooks case. As a result of the DNA testing, Brewer's conviction was overturned. He had served seven years on death row and one year in jail awaiting trial.<sup>9</sup>

9. **Bennie Starks:** Bennie Starks was convicted of raping and assaulting a 69-year-old woman in 1986, based in part on testimony by two forensic dentists, Drs. Russell Schneider and Carl Hagstrom. Both dentists testified that a bite mark on the victim's shoulder matched Starks' dentition. Starks spent 20 years in prison before an appeals court ordered a new trial, after DNA testing on semen recovered from the victim excluded Starks. On January 7, 2013, the district attorney dismissed all charges against Starks.<sup>10</sup>
10. **Douglas Prade:** Douglas Prade, a former Akron police captain, was convicted in 1998 of the murder of his ex-wife, Dr. Margo Prade, and sentenced to life in prison. The victim's body was discovered slumped behind the wheel of her car in her office parking lot. She had been shot six times and there was a bite mark on her arm. Dr. Thomas Marshall, a forensic dentist from Akron, Ohio, testified that the bite mark was an exact match to Mr. Prade's dentition. Another dentist, Dr. Lowell Levine, said that – although he could not say with certainty that Prade had caused the bite mark – Prade's dentition was "consistent with" with the bite mark on the victim.

After DNA taken from the bite mark excluded him as a possible source, Prade was cleared of murder charges in January 2013. He had spent nearly 15 years in prison for the crime. Jurors in his original trial said they relied heavily on the bite mark evidence to convict Mr. Prade. One juror said, "[Prade] had crooked teeth and they fit right in, like a little puzzle. And it was just so exact."<sup>11</sup>

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<sup>9</sup> *The Innocence Project – Know the Cases: Browse Profiles: Kennedy Brewer*, [http://www.innocenceproject.org/Content/Kennedy\\_Brewer.php](http://www.innocenceproject.org/Content/Kennedy_Brewer.php).

<sup>10</sup> *The Innocence Project – Innocence Blog: Bennie Starks Exonerated After 25 Year Struggle to Clear His Name*, [http://www.innocenceproject.org/Content/Bennie\\_Starks\\_Exonerated\\_After\\_25\\_Year\\_Struggle\\_to\\_Clear\\_His\\_Name.php](http://www.innocenceproject.org/Content/Bennie_Starks_Exonerated_After_25_Year_Struggle_to_Clear_His_Name.php); Lisa Black, *Exonerated Man's Ordeal Ends: 'I Am Overwhelmed with Joy'*, *Chicago Tribune* (Jan. 7, 2013), [http://articles.chicagotribune.com/2013-01-07/news/chi-bennie-starks-lake-county-charges-dropped\\_1\\_bennie-starks-mike-nerheim-ordeal-ends](http://articles.chicagotribune.com/2013-01-07/news/chi-bennie-starks-lake-county-charges-dropped_1_bennie-starks-mike-nerheim-ordeal-ends); Donna Domino, *Dentists Sue Over Bite Mark Testimony*, <http://www.drbcuspids.com/index.aspx?sec=nws&sub=rad&pag=dis&ItemID=309572>.

<sup>11</sup> Staff, *Crimesider, Douglas Prade, Former Ohio Police Captain, Exonerated in Ex-wife's Murder after Nearly 15 Years in Prison*, *CBSNews* (Jan. 30, 2013), [http://www.cbsnews.com/8301-504083\\_162-57566533-504083/douglas-prade-former-ohio-police-captain-exonerated-in-ex-wifes-murder-after-nearly-15-years-in-prison/](http://www.cbsnews.com/8301-504083_162-57566533-504083/douglas-prade-former-ohio-police-captain-exonerated-in-ex-wifes-murder-after-nearly-15-years-in-prison/); Rick Armon, Ed Meyer & Phil Trexler, *Former Akron Police Captain Douglas Prade Cleared in Murder, Released from Prison*, *Akron Beacon Journal Online* (Jan. 30, 2013), <http://www.ohio.com/news/break-news/former-akron-police-captain-douglas-prade-cleared-in-murder-released-from-prison-1.368825>; Ed Myer, *Former Prade Jurors Speak About Evidence Leading to 1998 Conviction*, *Akron Beacon Journal Online* (Feb. 28, 2003), <http://www.ohio.com/news/local/former-prade-jurors-speak-about-evidence-leading-to-1998-conviction-1.377105>; Dennis McEanene, *Bite Evidence Lines Up: Forensic Dental Expert Testifies That Wound on Slain Doctor's Arm Matches Ex Husband's Lower Front Teeth*, *Akron Beacon Journal Online* (Sept. 15, 1998), <http://www.ohio.com/news/1998-trial-coverage-bite-evidence-lines-up-forensic-dental-expert-testifies-that-wound-on-slain-doctor-s-arm-matches-ex-husband-s-lower-front-teeth-every-mark-lined-up-akron-dentist-says-1.368882>.

11. **Michael Cristini & Jeffrey Moldowan:** In 1991, Michael Cristini and Jeffrey Moldowan were convicted of the rape, kidnapping, and attempted murder of Moldowan's ex-girlfriend, Maureen Fournier. At trial, two board-certified ABFO Diplomates, Drs. Allan Warnick and Pamela Hammel, testified that bite marks on the victim's body had to have come from both defendants, to the exclusion of all others. Both men were convicted. Cristini was sentenced to 44 to 60 years, and Moldowan to 60 to 90 years.

After the conviction, an investigator hired by the Moldowan family found a witness who said he had seen four black men standing around a naked woman at the scene of the crime. The witness' story contradicted Fournier's, as Cristini and Moldowan are both white. Dr. Hammel then recanted her testimony, saying that she had been uncertain that either defendant had in fact been responsible for the bite marks. According to Dr. Hammel, she had agreed to testify only when Dr. Warnick had assured her that a third odontologist had also confirmed that the bite marks could be matched to Cristini and Moldowan to the exclusion of all others.

On October 20, 2003, the Macomb County Circuit Court granted Cristini a new trial, citing the new eyewitness evidence, Dr. Hammel's recantation, and stronger alibi evidence. Cristini was acquitted by a jury on April 8, 2004, after having served 13 years in prison. Later, Cristini filed wrongful conviction lawsuits against the city of Warren, Macomb County, and Dr. Warnick. The suit against Dr. Warnick was settled quickly for an undisclosed amount.

In 2002, the Michigan Supreme Court reversed Moldowan's conviction. On retrial, in February 2003, Moldowan was acquitted of all charges and released, having served nearly twelve years in prison. Moldowan's lawsuit was settled for \$2.8 million in 2011.<sup>12</sup>

12. **Anthony Keko:** Anthony Keko was convicted in 1994 for the 1991 murder of his estranged wife Louise Keko. Dr. Michael West testified that a bite mark on the victim's shoulder matched Anthony Keko's dentition. Dr. West's testimony was the only direct evidence linking Keko to the crime, and prosecutors conceded that without the bite mark evidence there was no case. Keko was found guilty and sentenced to life in prison. In December 1994, however, the trial judge became aware of previously undisclosed disciplinary proceedings against Dr. West. The judge began to express doubts regarding

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<sup>12</sup> *People v. Moldowan*, 466 Mich. 862, 643 N.W.2d 570 (2002); *Moldowan v. City of Warren*, 578 F.3d 351 (6th Cir. 2009); Ed White, *Warren Settles Rape Case Lawsuit for \$2.8 Million – Falsely Imprisoned Man Sued for Violation of His Civil Rights*, Detroit Legal News (Oct. 19, 2011), <http://www.legalnews.com/detroit/1109085>; Jameson Cook, *Michael Cristini Wants Bigger Settlement than Jeffrey Moldowan*, Macomb Daily (Dec. 25, 2012), [http://www.macombdaily.com/article/20121225/NEWS01/121229769/michael-cristini-wants-bigger-settlement-than-jeffrey-moldowan#full\\_story](http://www.macombdaily.com/article/20121225/NEWS01/121229769/michael-cristini-wants-bigger-settlement-than-jeffrey-moldowan#full_story); Michael S. Perry, *Exoneration Case Detail: Michael Cristini*, Nat'l Registry of Exonerations, <http://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=3133> (last visited Apr. 12, 2013); Hans Sherrer, *Prosecutor Indicted For Bribery After Two Men Exonerated of Kidnapping and Rape*, Justice: Denied, no. 27, 2005, at 10, available at [http://www.justicedenied.org/issue/issue\\_27/Moldowan\\_cristini\\_exonerated.html](http://www.justicedenied.org/issue/issue_27/Moldowan_cristini_exonerated.html).

West's forensic abilities and ultimately reversed Keko's conviction.<sup>13</sup>

13. **Harold Hill & Dan Young Jr.:** Harold Hill was 16 when he and his codefendant, Dan Young, Jr., were convicted of the rape and murder of 39-year-old Kathy Morgan in 1990. Both men would end up spending 15 years in prison for a crime they did not commit. At trial, board-certified ABFO Diplomate Dr. John Kenney linked a bruise and a bite mark on the victim's body to Hill and Young. Both were found guilty and sentenced to life in prison without parole. It wasn't until 2004 that DNA tests excluded both Hill and Young as the source of DNA evidence found on the victim. In 2005 prosecutors finally dismissed the charges against both men. Dr. Kenney later said that the prosecution pushed him to exaggerate his results.<sup>14</sup>
14. **Greg Wilhoit:** Greg Wilhoit's wife, Kathy, was murdered in Tulsa, Oklahoma in June 1985. Wilhoit was left to raise his two daughters—a 4-month-old and a 1-year-old. A year later, he was arrested and charged with the murder based on the opinions of two forensic odontologists that his dentition matched a bite mark on his wife's body. Wilhoit was found guilty and sentenced to death.

During his appeal, other forensic odontologists examined the bite mark evidence and independently concluded that the bite mark could not be matched to Wilhoit. He was released on bail for two years and when a retrial was finally held in 1993 the judge issued a directed innocence verdict. In total, Wilhoit dealt with this tragedy for 8 years, fighting a case built entirely on bite mark analysis. Wilhoit's story was documented by John Grisham in "The Innocent Man."<sup>15</sup>

### **DESCRIPTIONS OF WRONGFUL ARRESTS BASED ON BITE MARK EVIDENCE**

1. **Dale Morris, Jr.:** In 1997, Dale Morris, Jr. was arrested based on bite mark analysis matching his dentition to a mark found on a nine-year-old murder victim, Sharra Ferger. Morris was a neighbor to the little girl, who had been found, stabbed, sexually assaulted and bitten, in a field near her Florida home. Board-certified ABFO Diplomates Dr. Richard Souviron and Dr. Kenneth Martin agreed that the bite marks on the girl were a probable match to Morris. Morris spent four months in jail until DNA tests proved his innocence. Highlighting the importance of the bite mark evidence to the police's decision to arrest Morris, Detective John Corbin said that Morris "was probably one of our least

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<sup>13</sup> *A Dentist Takes The Stand*, The Daily Beast, Newsweek & The Daily Beast (Aug. 19, 2001, 8:00 P.M.), <http://www.thedailybeast.com/newsweek/2001/08/20/a-dentist-takes-the-stand.html>; Mark Hansen, *Out of the Blue*, ABA J., Feb. 1996, available at [http://www.abajournal.com/magazine/article/out\\_of\\_the\\_blue/print/](http://www.abajournal.com/magazine/article/out_of_the_blue/print/).

<sup>14</sup> Ctr. on Wrongful Convictions, *Exoneration Case Detail: Harold Hill*, Nat'l Registry of Exonerations, <http://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=3296> (last visited Apr. 12, 2013).

<sup>15</sup> Journey of Hope, Greg Wilhoit, CA, available at <http://journeyofhope.org/who-we-are/exonerated-from-death-row/greg-wilhoit/>; Witness to Innocence, *Exonerees: Greg Wilhoit*, available at <http://www.witnesstoinnocence.org/exonerees/greg-wilhoit.html>.

likely suspects in the neighborhood, but through the forensics that we conducted in the investigation he was linked to the crime."<sup>16</sup>

2. **Edmund Burke:** In 1998, Edmund Burke was arrested for raping and murdering a 75-year-old woman. The victim had bite marks on her breasts and board-certified ABFO Diplomate Dr. Lowell Levine, the same expert involved in Douglas Prade's case (discussed above), "formed an initial opinion that Burke could not be excluded as the source of the bite marks," but asked to see enhanced photos before rendering a final opinion. After examining the enhanced photos, Dr. Levine concluded that Burke's teeth matched the bite mark on the victim's left breast to a "reasonable degree of scientific certainty." DNA testing on saliva taken from the bite mark site excluded Burke as the source of the DNA, however, and prosecutors dropped the case against him. The true killer was later identified when DNA from the bite mark was matched to a profile in the national DNA database. Dr. Levine remains one of the few full-time forensic odontologists in the nation, and is regarded as one of the field's top practitioners.<sup>17</sup>
3. **Anthony Otero:** In 1994, Anthony Otero was charged with larceny and the first-degree murder and rape of a 60-year-old woman, Virginia Airasolo, in Detroit, Michigan. A warrant for Otero's arrest was issued after ABFO Diplomate Dr. Allan Warnick claimed to have matched the bite marks on the victim's body to Otero's dentition. At the preliminary hearing on December 13, 1994, Dr. Warnick testified that Otero was "the only person in the world" who could have caused the bite marks on Airasolo's body.

In January 1995, DNA testing excluded Otero as the source of the DNA found on the victim and he was released in April, after spending 5 months in jail. Following Otero's release, a second forensic odontologist, ABFO Diplomate Dr. Richard Souviron, concluded that the marks on the victim were consistent with human bite marks, but were too indistinct to be used to identify a suspect. Ultimately, the charges against Otero were dismissed.<sup>18</sup>

4. **Johnny Bourn:** In 1992, Johnny Bourn was arrested for the rape and murder of an elderly Mississippi man after Dr. Michael West matched a bite mark on the victim to Bourn. Bourn was imprisoned for 18 months, despite hair and fingerprint evidence pointing to another suspect. Ultimately, Bourn was released when he was excluded as a suspect by DNA testing performed on fingernail scrapings from the victim, but not before

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<sup>16</sup> Ian James & Geoff Dougherty, *Suspect in Girl's Murder Freed after Four Months*, St. Petersburg Times, Feb. 28, 1998, at 1.A, available at [http://www.wearethehope.org/pdf/times\\_02\\_28\\_1998.pdf](http://www.wearethehope.org/pdf/times_02_28_1998.pdf); *Cases Where DNA Revealed That Bite Mark Analysis Led to Wrongful Arrests and Convictions*, Innocence Project, *supra* note 7; Flynn McRoberts & Steve Mills, *From the Start, a Faulty Science*, Chic. Trib. (Oct. 19, 2004), <http://www.chicagotribune.com/news/watchdog/chi-041019forensics,0,7597688.story>.

<sup>17</sup> *Burke v. Town of Walpole*, 405 F.3d 66, 73 (1st Cir. 2005).

<sup>18</sup> *Cases Where DNA Revealed That Bite Mark Analysis Led to Wrongful Arrests and Convictions*, Innocence Project, *supra* note 7; *Otero v. Warnick*, 614 N.W.2d 177, 178-79 (Mich. Ct. App. 2000).

he had spent about one and half years in jail awaiting trial.<sup>19</sup>

5. **Dane Collins:** In 1989, Dane Collins was arrested and charged with the rape and murder of his 22-year-old stepdaughter, based largely on bite mark comparison evidence. The Sante Fe, New Mexico District Attorney declared his intent to seek the death penalty. Despite evidence that Collins could not produce sperm and therefore could not have been the perpetrator, the DA gave several public interviews stating that while there was not enough evidence to try the case, he believed Collins was guilty of the crime. Fifteen years later, Chris McClendon was matched to DNA found on the victim. He pled "no contest" to the crime in exchange for describing how he had committed the rape and murder. (McClendon was already serving life in prison after he was convicted of kidnapping and raping a 24-year-old woman.)<sup>20</sup>
6. **Ricky Amolsch:** Ricky Amolsch's girlfriend, Jane Marie Fray, was found dead on August 23, 1994. She had been stabbed 22 times and had an electrical cord wrapped around her neck. The arrest warrant for Amolsch was based on a finding by Dr. Allan Warnick that a bite mark that had been found on the victim's left ear was "highly consistent" with Amolsch's dentition. Charges were not dropped until 10 months later when the eyewitness who had identified Amolsch's van at the crime scene was himself arrested for raping another woman in the same trailer park. Amolsch was jailed for 10 months until his trial. During that time, he lost his home, savings and children.<sup>21</sup>

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<sup>19</sup> Hansen, *supra* note 13; *Michael West Responds*, Part 167, *The Agitator* (March 1, 2009), <http://www.theagitator.com/page/167/>; Paul C. Giannelli & Kevin C. McMunigal, *Prosecutors, Ethics, and Expert Witnesses*, 76 *Fordham L. Rev.* 1493 (2007).

<sup>20</sup> Jeremy Pawloski, *Suspect in '89 Slaying to Plead Guilty*, *Albuquerque J.* (Aug. 11, 2005), [http://www.abqjournal.com/north/379728north\\_news08-11-05.htm](http://www.abqjournal.com/north/379728north_news08-11-05.htm).

<sup>21</sup> *Bite Mark Evidence*, *Forensics Under Fire*, Jim Fisher, The Official Website, <http://jimfisher.edinboro.edu/forensics/fire/mark.html> (last updated Jan. 16, 2008); Katherine Ramsland, *Bite Marks as Evidence to Convict – Whose Bite Mark is it, Anyway?*, *Crime Library*, TruTV.com, [http://www.trutv.com/library/crime/criminal\\_mind/forensics/bitemarks/5.html](http://www.trutv.com/library/crime/criminal_mind/forensics/bitemarks/5.html) (last visited Apr. 12, 2013).

# APPENDIX B



*The Human Tool of the Flawed Foundation of Bite Mark Jurisprudence*

The NAS Report:  
“[T]he scientific basis is insufficient to conclude that bite mark comparisons can result in a conclusive match.” (p. 175)

- James O'Donnell Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2000  
2 years in prison
- Calvin Washington Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2001  
13 years in prison
- Ray Krone Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2002  
10 years in prison
- Willie Jackson Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2006  
17 years in prison
- Roy Brown Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2007  
15 years in prison
- Kennedy Brewer Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2008  
7 years in prison
- Levon Brooks Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2008  
16 years in prison
- Robert Lee Stinson Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2009  
23 years in prison
- Bennie Starks Wrongfully Convicted based on bite mark evidence**  
Exonerated in 2013  
20 years in prison
- Douglas Prade, Wrongfully Convicted on bite mark evidence,**  
Exonerated in 2013,  
15 years in prison

People v. Middleton, 54 N.Y. 2d 42, 49-50 (1981)  
“The **techniques employed... are accepted and approved by the majority of the experts in the field.**”

People v. Marx, 54 Cal. App. 3d 100, 107 (Ct. App. 1975)  
In the leading foundational case, no *Frye* hearing was conducted and the court found that there was “**no established science of identifying persons from bite marks.**”

# APPENDIX C

THE FLAWED FOUNDATION OF *MIDDLETON* PRECEDENT: "GENERAL ACCEPTANCE" WITHOUT *FRYE* SCRUTINY

***People v. Middleton,***  
 54 N.Y. 2d 42, 49 (1981)  
 Relies on *People v. Marx*  
 No *Frye* Hearing Conducted  
 "The reliability of the [bite mark identification] procedures has . . . been accepted by all of the appellate courts that have addressed the issue."  
  
 All but two of the cases *Middleton* relied on did not involve a *Frye* hearing; most relied on *People v. Marx*; and none considered the overall scientific validity or reliability of bite mark evidence.

Cases Cited In <i>Middleton</i>	<i>Patterson v. State</i> , 509 S.W.2d 857 (Tex. Crim App. 1974)	<i>U.S. v. Holland</i> , 387 F. Supp. 144 (E.D. Pa. 1974)	<i>People v. Milone</i> , 43 Ill. App. 3d 385 (2d Dist. 1976)	<i>Niehaus v. State</i> , 265 Ind. 655 (1977)	<i>People v. Watson</i> , 75 Cal. App. 3d 384 (Ct. App. 1977)	<i>State v. Routh</i> , 30 Or. App. 901 (1977)	<i>State v. Garrison</i> , 120 Ariz. 255 (1978)	<i>State v. Jones</i> , 273 S.C. 723 (1979)	<i>State v. Peoples</i> , 227 Kan. 127 (1980)	<i>State v. Kleypas</i> , 602 S.W.2d 863 (Mo. Ct. App. 1980)	<i>State v. Temple</i> , 302 N.C. 1 (1981)	<i>State v. Sager</i> , 600 S.W. 2d 541 (Mo. Ct. App. 1980)	<i>People v. Slone</i> , 76 Cal. App.3d 611 (Ct. App. 1978)
<i>Frye</i> Hearing?	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Did Court Consider The Scientific Validity of Bite Mark Evidence?	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No (because no <i>Frye</i> hearing)	No	No
Case Relies on <i>People v. Marx</i> ?	No	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes



***People v. Marx*, 54 Cal. App. 3d 100 (Ct. App. 1975) (leading foundational case)**  
**No *Frye* Hearing Conducted**  
 The California court admitted bite mark identification testimony, even though it acknowledged that there is "**no established science of identifying persons from bite marks,**" that "[t]here was **no evidence of systematic, orderly experimentation in the area** [of bite mark identification analysis]," and that "[t]he field is **relatively new** and **experts do not agree** on the exact number of similarities necessary to make a positive identification." *Id.* at 107-8.