[Docket Number]	**:**	**STATE OF CONNECTICUT**
STATE OF CONNECTICUT	**:**	**J.D. OF HARTFORD**
v.	**:**	**AT HARTFORD**
TANEISHA IRVING	**:**	**FINAL**

DEFENDANT'S MOTION TO EXCLUDE BITE MARK EVIDENCE AND REQUEST FOR A *PORTER*/*DAUBERT* HEARING

The defendant hereby moves this Court to exclude any expert testimony regarding bite mark evidence as scientifically unsound or, in the alternative, to hold a pretrial hearing pursuant to *State v. Porter*, 241 Conn. 57 (1997), *Daubert v. Merrill Dow Pharmaceuticals*, 509 U.S. 579 (1993), and *Kumho Tire Co. Ltd. v. Carmichael*, 526 U.S. 137, 152 (1999) to determine the admissibility of such evidence. Alternatively, this Court should exclude the evidence as more prejudicial than probative pursuant to Connecticut Code of Evidence Section 4-3.

Involvement of Innocence Project

The Innocence Project is acting as co-counsel in this matter to promote the use of validated and reliable scientific evidence in criminal trials. Notably, bite mark evidence of the type that the State intends to offer at trial in this case was proffered to the jury in at least 17 cases (including two death penalty cases) where innocent individuals were wrongfully convicted and later exonerated. An additional seven innocent defendants were wrongfully indicted based on bite mark evidence but exonerated prior to trial. (*See* App. A.)

BACKGROUND[1]

On or around Wednesday, March 2, 2011, Lorenzo Foster and Taneisha Irving picked up Mr. Foster's 21 month-old son, JM, from Jewel Murchison, JM's mother, at a hotel in Harford. (*See* Application for Arrest Warrant of T. Irving (Dec. 22, 2011) ("Warrant"); Connecticut Department of Children and Families: Investigation Protocol re: T. Irving (rev. Sept. 27, 2008) ("DCF")). According to Ms. Murchison, JM was teething and running a fever at the time. (Warrant at 2.) In addition, at the time of the drop-off, JM had a bruise on his forehead that was caused by a fall that occurred while he was in Ms. Murchison's care. (DCF at 11; *see also id.* at 8.)

Over the next few days, JM stayed at Ms. Irving's home with Mr. Foster, and her two children. (*Id.* at 7.) Ms. Irving's son and daughter were three and five years old, respectively. According to various reports, including statements by Ms. Murchison and observations by DCF, the children, particularly the three-year-old boy, lacked discipline and may have been "rough" around JM. (DCF at 5.) Indeed, when a DCF social worker attempted to interview the three-year-old, she found that "he would not respond to [her] questions. He was rough, fighting, and kicking the glass table in the living room." (DCF at 13). As a result, the social worker discontinued the interview and left the apartment. (*Id*.)

At approximately 1:00 p.m. on Friday, March 4, 2011, Ms. Irving left the three children with babysitter Barbara Pennington and Ms. Pennington's niece while Ms. Irving and Mr. Foster's aunt "Christine" ran various errands. (*Id.* at 8, 15, 18.) Ms.

[1] Defendant does not adopt any of the allegations cited in the following background section as "facts"; the information is based exclusively on information provided by the State through discovery.

Pennington later told DCF that when JM arrived at her house, he had an injury under his eye and a bruise on his forehead. (*Id.* at 8, 18.) Ms. Irving retrieved the children at approximately 6:00 p.m. and returned home.

Later that night, upon finding that JM was running a fever, Mr. Foster and Ms. Irving decided to take him to Saint Francis Hospital, where JM was admitted into the emergency room. (Warrant at 3; DCF at 6-7.) At the time, the attending physician Dr. Paula Cinti observed some bruising to JM's forehead and an abrasion under JM's eye. (DCF at 4, Warrant at 7-8.) The injuries were not determined to be significant, and JM was ultimately sent home with flu-like symptoms. (Warrant at 7.) JM was given a prescription for Motrin and prescription eye drops "because he was scratching his eyes," making the abrasion worse.[2] (DCF at 16.)

The next morning, Mr. Foster stated that he bathed JM and gave him ginger ale and Tylenol. (Warrant at 4.) JM then slept for most of the day in Ms. Irving's children's room. (DCF at 16; Warrant at 4.) When JM woke up later that evening, Mr. Foster attempted to give JM a popsicle, but noticed that JM's arms and hands were swollen. (DCF at 16; Warrant at 4.) Ms. Irving and Mr. Foster promptly called Mr. Foster's aunt who took Ms. Irving, Mr. Foster, and JM to the emergency room at Saint Francis Hospital. (DCF at 16.) JM was found to have two broken wrists, various bruises and bumps, and a bite mark on his chest. (*Id.*)

[2] Even the Hartford Police Department Officer who examined JM on the evening he arrived at the hospital noted in his report that the bite mark was "small." Hartford Police Dept. Incident Rpt: Incident Supp. at 3, Mar. 5, 2011, Ofc. Dzierzgowski.

Dr. Radman noted the bite mark appeared to be from another child. (*Id.*) This impression was echoed by CCMC social worker Ann Marriott-Sitek and nurse April Davis, who stated that the bite mark was small and most likely caused by a child.[3] (*Id.* at 9.) Despite these statements, approximately seven months later, on October 21, 2011, Hartford police collected dental impressions exclusively of Mr. Foster and Ms. Irving; dental impressions of the other children JM had been staying with were not taken. (Warrant at 8.)

The dental impressions and photographs of the alleged bite mark were provided to Dr. Adam Freeman, a forensic dentist. (*Id.*) Dr. Freeman compared the two impressions to the photographs and excluded Mr. Foster as the person who caused the bite mark. (*Id.*) In Dr. Freeman's opinion, Ms. Irving's dental impressions were "more consistent" with the bite mark. (*Id.*) Although the alleged bite mark was in the "healing stages" and was caused while JM was "possibly clothed," Dr. Freeman claimed that he was able to identify specific "matching" characteristics between Ms. Irving's dentition (the biting surface of teeth) and the alleged bite mark. (Hartford Police Dept. Incident Rpt: Incident Supp. at 1, Jan. 18, 2012, Det. Sarju ("HPD Supp. Rpt.")).

Indeed, Dr. Freeman concluded that the bite mark was "caused by" Ms. Irving. He bolstered this opinion by noting that the "space/gap" in Ms. Irving's front teeth "matched the bite mark" and that "certain aspect[s] of her upper right canine tooth matched the lower bite mark (HPD Supp. Rpt. at 1). Notably, Dr. Freeman also

[3] S Hartford Police Department Officer who examined JM on the evening he arrived at the hospital also noted in his report that the bite mark was "small." Hartford Police Dept. Incident Rpt: Incident Supp. at 3, Mar. 5, 2011, Ofc. Dzierzgowski.

concluded the bite mark appeared to be in the healing stages and was one to two days old when the pictures from the hospital visit were taken. (Warrant at 8.)

Police had long suspected Mr. Foster was the perpetrator of JM's injuries, noting that when informed of his son's medical condition he appeared "unmoved" and that his "emotional state was very unusual." Police wrote, "at one point [Mr. Foster] made an attempt to shed tears, which appeared not to be genuine" (Warrant at 5.) On the night of the incident, Mr. Foster had become so enraged at the hospital staff that he was escorted from the premises. Nevertheless, Ms. Irving, who has no criminal record and has never been accused of harming her children, was indicted on felony assault charges, apparently on the basis of the bite mark evidence alone. No charges were filed against Mr. Foster.

BITE MARK EVIDENCE

Bite mark analysis is generally performed by "forensic odontologists" who attempt to identify the "biter" by comparing a bite mark, typically an injury in human skin, to characteristics found in a dental cast of suspected "biters."[4] Although bite mark evidence has been admitted for many years in criminal trials, it was not until 2009, when the National Academy of Sciences ("NAS") published its authoritative report entitled *Strengthening Forensic Science in the United States: A Path Forward* ("NAS Report"),[5]

[4] 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.

[5] Because the NAS is a neutral institution comprised of this country's most accomplished scientists, courts have frequently looked to the reports of the NAS for guidance as to the state of general acceptance in the relevant scientific community. *See, e.g., Clemons v. Maryland*, 896 A.2d 1059, 1066-70 (Md. 2006) (citing an NAS report questioning the scientific basis for CBLA evidence in determining that evidence should be excluded); *In re Jordan R.*, 140 Cal. Rptr. 3d 222, 238 (Ct. App. 2012) (affirming a (….continued)

that an independent scientific body truly scrutinized the validity and reliability of bite mark evidence. Noting the number wrongful convictions attributable to bite mark evidence, the NAS Report concluded that, due to inherent problems with the discipline and the lack of research into the most basic assumptions underlying the discipline, bite mark evidence has been scientifically validated or demonstrated reliable.

The NAS documented a myriad of basic and irresolvable problems associated with the discipline; most fundamentally, that skin is simply not a suitable medium to record bite marks: "[B]ite marks on the skin will change over time and can be distorted by the elasticity of the skin, the unevenness of the surface bite, and swelling and healing." (*Id.* at 174.) In addition, analysis is often inaccurate because of "distortions in photographs and changes over time in the dentition[—the biting surface of teeth—]of suspects." (*Id.*) In this way, NAS called into question whether it is appropriate, in the first instance, to compare the raw materials that form the basis of the forensic science.

After taking testimony from leading experts and conducting an extensive review of the bite mark literature and research – nearly all of which was developed *after* courts began admitting the evidence – the NAS concluded that there is "considerable dispute" within the scientific community "about the value and reliability" of bite mark evidence. This, the committee found, was due to the "inherent weakness" and "basic problems inherent in bite mark analysis" which has "led to questioning of the value and scientific objectivity" of the discipline. The NAS went on to find that there is "no science" on the reliability of different methods of analysis used to draw conclusions concerning the

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(continued….)

lower court's exclusion of polygraph evidence based in part on a 2003 NAS report criticizing the scientific underpinnings of such polygraph testing).

probability of a "match"; and that there is "no evidence of an existing scientific basis for identifying an individual to the exclusion of all others." (NAS Report, *supra,* at p. 173-176.) Thus, a "match" could mean that one in ten people might also be "matched" to the bite mark or one in ten million.

The NAS is not alone in its criticism of bite mark evidence. Indeed, courts have begun to question the use of the evidence in criminal trials. *See State v. Prade*, No. CR 1998-02-0463, slip op. at 13-14 (Ohio Com. Pl. Jan. 29, 2013)*; 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 "**[r]econsideration of the admissibility of bite mark testimony seems appropriate**") (emphasis added). Further, as noted above, bite mark evidence was, at least in part, responsible for multiple wrongful convictions that, with the aid of DNA evidence, have been exonerated.

ARGUMENT

I. Expert Testimony Regarding Bite Mark Evidence Is Inadmissible

Based on the NAS Report, extraordinary number of exonerations involving bite mark evidence, new scientific research, and other developments, including court cases recognizing the flaws inherent in bite mark evidence, the Court should reevaluate the use of expert bite mark evidence in criminal trials, and specifically find that such evidence, in this case, is irrelevant and, therefore, inadmissible.[6]

[6] Expert testimony is only admissible if "(1) the witness has a special skill or knowledge directly applicable to a matter in issue, (2) that skill or knowledge is not common to the average person, and (3) the testimony would be helpful to the court or jury in considering the issues." *State v. Guilbert*, 306 Conn 218, 230 (2012); *State v. Reid*, 254 Conn. 540, 550 (2000). As the Court notes in *Reid*, the third prong of the analysis "is essentially a relevancy requirement," which requires the proffered evidence to "tend to support a relevant fact even to a slight degree." *Reid*, 254 Conn. at 550.

Bite mark analysis presumes with no evidence that the human dentition is unique and that human skin is capable of recording this uniqueness with sufficient fidelity that the biter can be identified. However, the inability of skin to record dental impressions accurately, the possibility of defects in relevant photographs, and shifts or other changes to a suspect's teeth undermine the basic ability of the expert testimony to support a relevant fact, "even to a slight degree." *See Reid*, 254 Conn. at 550. Thus, expert evidence would not show, with any confidence, that Ms. Irving "caused" the alleged bite mark on JM's chest. *See id.* at 551.

In addition, according to Ms. Irving's arrest affidavit, Dr. Freeman, the forensic dentist, stated that the bite mark was in the healing phases and likely one to two days old as of March 5, and, according to the detective's notes, Dr. Freeman went so far as to speculate that the bite mark was inflicted through clothing, further eroding an evidentiary value of the alleged bite mark.[7] (Warrant at 8; HPD Supp. Rpt. at 1.) And, Ms. Irving's dental impressions were not taken until almost seven months later. (Warrant at 8; HPD Supp. Rpt. at 1.) These factors only exacerbate the fundamental flaws in the potential expert evidence and undermine the possibility that such evidence would be, in any way, "helpful to the court or jury in considering the issues." *See Reid*, 254 Conn. at 550.

Moreover, Dr. Freeman determined that the bite mark was "caused by" Ms. Irving. However, the Dr. Freeman did not eliminate the other children in the house, despite the fact there is evidence that they were "rough" with the victim, that they all slept in the same room, that the youngest child was so violent a social worker called off

[7] Indeed, it is unclear based on the record whether the bite mark was made before or after Ms. Irving took custody of JM on March 2.

an attempted interview with the child, and that a doctor and a nurse both thought the bite mark was made by a child. This evidence not only undermines further the relevancy of the bite mark evidence, but also showcases the danger of allowing such evidence.

Finally, Connecticut case law upholding the use of bite mark evidence pre-dates every one of the 24 wrongful bite mark convictions and arrests attributable to bite mark evidence, the damning conclusions of the NAS and the new research discussed below. [8] And since Connecticut law gives the trial court wide discretion to determine the admissibility of evidence, this antiquated jurisprudence does not and should not cause this Court to overlook these developments which clearly undermine the basis of the decisions. *See Guilbert*, 306 Conn. a t229, 234 (overturning prior precedents regarding eyewitness identification based on the developments in the scientific consensus regarding the reliability of such evidence).[9] For these reasons, this Court should exclude any expert testimony regarding bite mark evidence as inadmissible.

II. Expert Testimony Regarding Bite Mark Evidence Is the Type of Evidence Contemplated by *Porter*

Even if the Court is unwilling to exclude expert testimony relating to bite mark evidence on its face, the Court should, at a minimum, conduct a *Porter* hearing in order

[8] Amanda Lee Myers, *Once Key in Some Cases, Bite Mark Evidence Now Derided as Unreliable*, ASSOC. PRESS, Jun. 17, 2013; Amanda Lee Myers, *Men Wrongly Convicted or Arrested on Bite Evidence*, ASSOC. PRESS, Jun.16, 2013 (detailing 24 cases,).

[9] Indeed, the last Connecticut Supreme Court case to deal with this issue directly was *State v. Ortiz* in 1985, fully five years before the first wrongful conviction attributable to bite mark analysis was revealed through post-conviction DNA evidence. *See* 198 Conn. 220 (1985). While the 2011 case, *State v. Ingram*, also touches on bite mark evidence, the holding there was different. 132 Conn. App. 385 (2011). In that case, evidence was presented at trial relating to the use of a dog trained to identify and bite the perpetrator of a robbery. *Id.* at 402. However, none of the witnesses testified that the bite on the defendant's ankle came from the dog. *Id.* The testimony instead related to the dog's training and to the nature of the wound. *Id.*

to determine for itself whether the expert testimony should be admitted. In *Porter*, the Connecticut Supreme Court held that the federal "*Daubert* approach should govern the admissibility of scientific evidence." *State v. Porter*, 241 Conn. 57, 68 (1997). The *Porter* court emphasized the important role the trial judge plays as a "gatekeeper," responsible for determining the validity and reliability of such evidence. In doing so, the *Porter* court recognized that "a judge is in a much better position than a juror to assess accurately the fundamental validity of [scientific] evidence." *Id.* at 70-71. This reasoning is based, in part, on the different roles played by the judge and by the jury. For instance, a juror's understanding of scientific evidence is "largely dependent on the presentations of the parties and their experts." *Id.* at 71. However, "expert presentations may often be misleading" and "cross-examination may often be difficult and ineffective in bringing out flaws in the expert's reasoning." *Id.* at 72. Judges, on the other hand, "have the benefit of reviewing briefs and other documents" and demanding "supplemental briefing on any issue that needs clarification." *Id.* Judges also have the advantage of developing "judicial expertise through repeated exposure to and familiarity with similar scientific issues." *Id.* at 73.

While the role of the judge as a gatekeeper is clearly laid out in *Porter*, the *Reid* court highlighted the trial court's ability to determine how and when to apply the *Porter* factors. *Reid*, 254 Conn. at 546. As the *Reid* court stated, "[i]n order to maintain flexibility in applying the [*Porter*] test, [the Connecticut Supreme Court] did not define what constitutes 'scientific evidence'" and left the question instead to the trial courts to determine based on the evidence in question. *Id.*

To this end, Connecticut courts have looked at two possible areas of exception to the requirement of a *Porter* hearing. *See Maher v. Quest Diagnostics, Inc.*, 269 Conn. 154, 170 (2004). First, a *Porter* hearing may not be necessary where the "scientific evidence [is] so well established that a formal *Porter* inquiry is rendered unnecessary." *State v. Martinez*, 143 Conn. App. 541, 559 (2013) (quoting *Maher*, 269 Conn. at 170). With respect to this exception, however, the Supreme Court has warned that "few" scientific principles fall into this category. *Martinez*, 143 Conn. App. at 550; *see also Porter*, 241 Conn. at 85 n. 30 (citing the Montana case, *State v. Cline*, 275 Mont. 46, 55 (1996), for the premise that ordinary fingerprint identification evidence does not require a *Daubert* analysis).[10]

Second, "certain types of evidence, although ostensibly rooted in scientific principles and presented by expert witnesses with scientific training, are not 'scientific' for the purposes of [the] admissibility standard for scientific evidence." *Id.* at 559 (quoting *Maher*, 269 Conn. at 170 n. 22). This type of evidence "simply require[s] the jurors to use their own powers of observation and comparison," and thus, does not require a *Porter* hearing. *Reid*, 254 Conn. at 547; *see also State v. Hasan*, 205 Conn. 485, 490-91 (1987) . Ultimately, "[t]he value of the expert's expertise[, therefore,] lays in its assistance to the jury in viewing and evaluating the evidence." *State v. Griffin*, 77 Conn. App. 424, 437 (2004).

[10] There is some suggestion in *Reid* that in order for scientific evidence to be subject to a *Porter* hearing, it must involve "innovative scientific techniques." *Reid*, 254 Conn. at 546. However, this requirement seems too narrow, given the tendency of scientific developments to challenge previously accepted scientific principals as or more often than they develop new scientific principles. Indeed, the Supreme Court's application of *Porter* in *State v. Guilbert* with respect to eyewitness testimony makes clear that *Porter* is appropriate when there is a change in scientific development that leads to certain accepted principles no longer being accepted.

Because the exception carved out in *Reid* was for hair comparison evidence and bite mark evidence, history and scientific developments have demonstrated that this is a dubious exception. Spurred by at least 72 wrongful convictions involving hair comparison evidence, the FBI recently acknowledged that its hair examiners had been making improper individualization claims and otherwise exaggerating the probative value of an association between a known and a suspected hair for decades, leading to an unprecedented reexamination of thousands of criminal cases.[11] Thus, in failing to act as a gatekeeper for this evidence and scrutinize the theoretical underpinnings and reliability of the forensic discipline, courts across the country allowed the admission of evidence that has since been rejected by the FBI as fundamentally flawed.

In light of these developments and the NAS Report, the *Reid* exception for this type of evidence is not applicable here. First, bite mark evidence is not based on scientific principles "so well established" as to render a *Porter* hearing unnecessary. *See Martinez*, 143 Conn. App. at 559. Far to the contrary, the NAS Report makes clear that the science underlying bite mark evidence has *never* been well established, notwithstanding any case law to the contrary. (*See* NAS Report at 174-76.) Indeed, as explained below, bite mark evidence would likely not survive a *Porter* hearing. *See infra* Part III.

[11] Recognizing the injustice of raising procedural bars to litigating whether the invalid "scientific" evidence they themselves presented to the jury influenced the verdict, the Department of Justice is waiving all post-conviction procedural barriers that might otherwise be applicable. Michael Doyle, *FBI Announces Review of 2,000 Cases Featuring Hair Samples*, McClatchy (July 18, 2013)(available at, http://www.mcclatchydc.com/2013/07/18/197069/fbi-announces-review-of-2000-cases.html#.UgAkXJLCZ8E). *See* http://www.innocenceproject.org/Content/Innocence_Project_and_NACDL_Announce_Historic_Partnership_with_the_FBI_and_Department_of_Justice_on_Microscopic_Hair_Analysis_Cases.php

Second, bite mark evidence cannot fall into the category of expert evidence rooted in science, yet only used to assist jurors in their own comparisons. As noted in the NAS Report, even experts, when applying their methodologies, come to widely different conclusions. (NAS Report at 174.) Because there is no proficiency testing in the field of bite mark analysis, the value of those conclusions further has never been determined. (*Id.* at 175.) It is, therefore, unlikely that a lay juror would be able to look at the same evidence, regardless of the explanation provided by an expert, and make his or her own reasonable assessment. *See Reid*, 245 Conn. at 547; *Hasan*, 205 Conn. at 491.

Moreover, the trial court need not apply this exception. Indeed, the *Porter* court listed the ability of a juror to draw his own conclusions based on expert testimony as one of the many factors that can be considered when conducting a *Porter* hearing. *Porter*, 241 Conn. at 86 ("courts have looked at whether a testifying expert can present and explain the data and methodology underlying his or her scientific testimony in such a manner that the fact finder can reasonably and realistically draw its own conclusions therefrom").

Ultimately, this is the very type of evidence contemplated by *Porter*. Indeed, the NAS Report and the dozens of wrongful convictions obtained through the use of such evidence highlights the need for the Court to exercise its gatekeeping function here. Further, a judge, with the aid of briefs and expert reports, could easily determine the viability and reliability of the evidence with respect specifically to the two-day old bite mark found on JM's chest and Ms. Irving's dental impressions. Jurors, on the other hand, would be faced with the irony of a potentially Board-certified[12] doctor, the value of

[12] The ABFO provides board certification to its members.

whose testimony, it would be argued, is not supported by any scientific basis, and may in fact not exist.[13]

Finally, even if the Court determines that bite mark analysis is not "scientific," the Court should adopt the rationale in *Kumho Tire Co. Ltd. v. Carmichael*, which expands the trial court's discretion to perform a *Daubert* analysis to other areas of technical expertise. 526 U.S. 137, 152 (1999).[14] While the adoption of *Kumho Tire* by Connecticut courts has not been determined, *see, e.g.*, *State v. Sorabella*, 277 Conn. 155 (2006) (declining to apply *Kumho Tire* analysis to the "specialized knowledge" at issue because "the defendant failed to raise it in the trial court"), adoption would be the natural extension of the rationale set forth in *Porter* and *Reid*, which vested with the trial court broad discretion to determine "how and *when*" the *Porter* analysis should be employed. *See Reid*, 254 Conn. at 546 (emphasis added).

III. The Bite Mark Evidence in This Case Would Not Survive a *Porter* Hearing[15]

If the Court were to hold a *Porter* hearing—or a hearing pursuant to *Kumho Tire*—the bite mark evidence in this case would not survive. To survive a *Porter*

[13] It is also worth noting that bite mark analysis is considered a forensic *science* by the Federal Judicial Center. *See* REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 107 (FEDERAL JUDICIAL CENTER et al. eds., 3d ed. 2011).

[14] The Supreme Court in *Kumho Tire* rejected the distinction between science and technical evidence for purposes of applying the *Daubert* test because such a distinction would be difficult to draw. The Court wrote: "[I]t would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between 'scientific' knowledge and 'technical' or 'other specialized' knowledge. There is no clear line that divides the one from the others." *Kumho Tire*, 526 U.S. at 148. Indeed, philosophers of science disagree about the definition of "science," The Court quoted one definition in *Daubert*: KARL POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE 37 (5th ed. 1989) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability."). *Daubert*, 509 U.S. at 593.

[15] If given the opportunity, the defense would offer expert testimony to support the various arguments presented in this motion.

challenge, the prosecution must show that (1) the evidence is scientifically rooted in the methods and procedures of science and (2) the reasoning or methodology can be applied to the facts at issue in the case. *State v. Porter*, 241 Conn. 57, 63-64. The bite mark evidence that the prosecution intends to offer in this case fails both prongs of this test and, therefore, cannot survive scrutiny under *Porter*.

A. Bite Mark Evidence Is Scientifically Unsound

Although the test of scientific validity is a flexible one, the courts have identified a list of non-exhaustive factors for judges to consider in determining whether a particular theory or technique is based on scientific knowledge, including: (1) whether it is generally accepted in the relevant scientific community; (2) whether the methodology has been tested and subjected to peer review; (3) the known or potential rate of error; and (4) whether it relies on subjective interpretations and judgments by testifying experts rather than objective verifiable criteria. *See id.* at 64. An analysis of these and other factors clearly demonstrates that bite mark evidence is not scientifically valid.

1. Bite Mark Evidence Is Not Generally Accepted in the Scientific Community

Whether a scientific principal is generally accepted in the relevant scientific community is a "significant" factor in determining whether scientific evidence is admissible under *Porter*. *Id.* at 85. In the case of bite mark evidence, since the Connecticut Supreme Court's ruling in *Ortiz*, the NAS specifically rejected the validity of bite mark evidence. Specifically, the NAS Report concludes that, due to the "inherent weaknesses" and "basic problems inherent in bite mark analysis," there is "considerable dispute" in the scientific community "about the value and reliability" of bite mark evidence. (NAS Report at 174, 176.) That experts routinely come to opposite

conclusions when analyzing the very same data—a virtually unknown phenomenon in other pattern matching disciplines[16]—has "led to questioning of the value and scientific objectivity" of bite mark evidence. (*Id*. at 176.) Most significantly, as noted previously, the NAS found that there is "no science" establishing how to quantify the probability of a "match" between a suspect's dentition and a bite mark, and "no evidence of an existing scientific basis for identifying an individual to the exclusion of all others." (*Id.*)

Indeed, in the recent decision exonerating Douglas Prade, the Ohio Court of Common Pleas held that "new bite mark research and studies cast serious doubts to a degree that was not able to be raised by the expert testimony presented at the origination 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). Thus, the legal community as well as the scientific community is beginning to recognize the unreliability and potential danger of reliance on bite mark evidence.

2. Whether the Methodology Has Been Subjected to Testing and Peer Review

The two hypotheses on which bite mark evidence relies have never been validated through scientific testing. The first hypothesis is that a properly trained forensic dentist can determine that a bite mark and a suspect's dentition are indistinguishably similar. The second hypothesis is that, once an association is made, a forensic dentist can provide a scientifically valid estimate of the rareness or frequency of that association.

With respect to the first hypothesis, no studies have been conducted to determine how precise or reliable the instruments that dentists use to assess bite marks are, whether

[16] Pattern matching disciplines include ballistics, tool marks, shoe and tire tread analysis, and latent fingerprint analysis.

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.

The second hypothesis is similarly untested. First, there have been no population studies that establish how rare or common the variables in human dentition are, and thus no way of knowing how many other persons would also be associated with or excluded by the bite mark. For this reason, forensic dentists who assess the likelihood of a match between a suspect and a bite mark do so based only on a gut feeling or instinct.

This lack of testing or known error rates means that the bite mark examiner cannot testify to the statistical significance of the purported association between dentition and bite mark or demonstrate any objective criteria supporting such an association, rendering any claimed relationship entirely speculative.

Significantly, bite mark evidence involves the same two hypotheses as microscopic hair comparison, which the FBI has now conceded can no longer be considered scientifically valid.[17]

3. The Field of Bite Mark Evidence Lacks a Known Error Rate

Error rates measure the ability of an expert to declare a "match" between a bite mark and a known sample under controlled conditions. Because there is no proficiency testing, there is also no evidence that Dr. Freeman or any other forensic dentists can reliably associate a known dentition with a bite mark. Indeed, the extraordinary number

[17] *See U.S. Reviewing 27 Death Penalty Convictions for FBI Forensic Testimony Errors*, Wash. Post (Jul. 17, 2013), http://www.washingtonpost.com/local/crime/us-reviewing-27-death-penalty-convictions-for-fbi-forensic-testimony-errors/2013/07/17/6c75a0a4-bd9b-11e2-89c9-3be8095fe767_story.html.

of wrongful convictions and the few reported proficiency tests suggest unacceptably high false positives—even in the context of controlled studies—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 ABFO 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 percent "false positive identifications . . . for various groups of forensic odontologists."[18]

Without meaningful proficiency testing, the "years of experience" forensic dentists rely upon in forming their opinions mean very little because there is no way of knowing how often he or she has been right or wrong. Forensic dentists perform analyses and reach conclusions as to probable "matches" without any proven track record of accurately associating a known dentition with a bite mark.

4. Whether the Evidence Relies on Subjective Interpretations and Judgments by Testifying Experts Rather than Objective Criteria

[18] C. Michael Bowers, *Problem-Based Analysis of Bitemark Misidentifications: The Role of DNA*, 159S Forensic Sci. Int'l S104, S106-177 (2006). 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).

As discussed above, there is no objective process, based on standard metrics, to measure a bite mark against teeth that is not subject to an individual's interpretation. Forensic dentists who purport to be able to assess bite marks have no objective standard by which to measure bite marks. Here, the arrest warrant indicates that Dr. Freeman excluded Mr. Foster and concluded that Ms. Irving's dental impressions are "more consistent" with the bite mark injury inflicted on the victim. This conclusion is demonstrative of the types of ambiguous and imprecise terms that forensic dentists use to describe a positive association between an alleged bite mark and a particular dentition.

5. Other Indicia of Unreliability

a. 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 and arrests that resulted from the flawed reliance on bite mark evidence testimony. For example:

- Douglas Prade—who 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 purporting to show that the bite mark on the victim was an exact match to Mr. Prade.
- Robert Lee Stinson, who spent over twenty-three years in jail for rape and murder. The only physical evidence against Mr. Stinson was the testimony of two forensic dentists who testified 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 inaccurate, are summarized in Appendix A to this motion. In each case, subsequent forensic evidence established that the convicted or arrested individual could not have been the source of the bite mark that had been deemed a match by the flawed conclusions of a forensic dentist. Moreover, in the overwhelming majority of these cases, the bite mark analysis was performed by an ABFO board-certified dentist.

b. Skin Does Not Accurately Record Bite Marks

Unlike all other pattern-matching disciplines, such as fingerprints, tool marks and ballistics, bite mark analysis attempts to interpret data from an ever-changing, pliable and unpredictable substrate. 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." (NAS Report 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.

Today, there is new research into the ability of skin to accurately record a bite mark—the first foundational research conducted since the publication of the NAS

Report—which further erodes any confidence this Court should have in Dr. Freeman's testimony. A research team from SUNY Buffalo conducted a series of research experiments using cadavers to test whether skin, even under ideal laboratory conditions without any distortion of the mark caused by the healing process, or decomposition, can capture enough information to make an association with the dentition that created the mark. Their research, and the dozen peer-reviewed articles the research team has published in scientific journals, strongly suggest that skin is incapable of accurately recording a bite mark.[19]

c. Bite Mark Examiners Do Not Make Blind Determinations

Bite mark examiners do not operate in conditions that reduce the effects of cognitive bias, biasing information, or other contextual distortions that would improperly

[19] Tenured research professor Mary A. Bush and her team have conducted this foundational research, all of which was published in peer-reviewed scientific journals and represents the most current and rigorous research on the foundational issues of whether the biting surface of the human dentition is unique, and, if so, whether the uniqueness can be accurately recorded by skin. *See* Bush M.A., Bush P.J., Sheets H.D., "A Study of Multiple Bitemarks Inflicted in Human Skin by a Single Dentition Using Geometric Morphometric Analysis," *For. Sci. Int'l* 211:1-8 (2011)); Bush M.A., Miller R.G., Bush P.J., Dorion R.B., "Biomechanical Factors in Human Dermal Bitemarks in a Cadaver Model," *J. Forensic Sci.* 54(1):167-176 (2009); Sheets H.D., Bush P.J., Brzozowski C., Nawrocki L.A., Ho P., and Bush M.A., "Dental Shape Match Rates in Selected and Orthodontically Treated Populations in New York State: A Two Dimensional Study," *J. Forensic Sci.* 56(3):621-626 (2011); Bush M.A., Bush P.J., Sheets H.D., "Similarity and Match Rates of the Human Dentition In 3 Dimensions: Relevance to Bitemark Analysis," *Int'l J. Leg. Med*. 125(6):779-784 (2011); Bush M.A., Bush P.J., Sheets, H.D., "Statistical Evidence for the Similarity of the Human Dentition," *J. Forensic Sci.* 56(1):118-123 (2011); Bush M.A., Thorsrud K., Miller R.G., Dorion R.B.J., Bush P.J., "The Response of Skin to Applied Stress: Investigation of Bitemark Distortion in a Cadaver Model," *J. Forensic Sci*. 55(1):71-76 (2010); Miller R.G., Bush P.J., Dorion R.B., Bush M.A., "Uniqueness of the Dentition as Impressed in Human Skin: A Cadaver Model," *J. Forensic Sci.* 54(4):909-914 (2009); Bush M.A., Cooper H.I., Dorion R.B., "Inquiry into the Scientific Basis For Bitemark Profiling and Arbitrary Distortion Compensation," *J. Forensic Sci.* 55(4):976-983 (2010); Sheets H.D., Bush M.A., "Mathematical Matching of a Dentition to Bitemarks: Use and Evaluation of Affine Methods," *Forensic Sci. Int'l* 207(1-3):111-118 (2011); Sheets H.D., Bush P.J., Bush M.A., "Patterns of Variation and Match Rates of the Anterior Biting Dentition: Characteristics of a Database of 3D Scanned Dentitions," *J. Forensic Sci.* (in Press); Sheets H.D., Bush P.J., Bush M.A., "Bitemarks: Distortion and Covariation of the Maxillary and Mandibular Dentition as Impressed in Human Skin," *Forensic Sci. Int'l* (2012).

influence their conclusions. All forensic examiners should blind themselves to the underlying context of their examination, i.e., the prosecutor's theory of a suspect's guilt, lest biases influence their final determinations. This is especially true with bite mark analysis due to the lack of any objective standards for declaring a "match," making the dentist's subjective opinion all the more vulnerable to improper influence from biasing information.

Despite this common-sense approach, bite mark examiners do not operate under blind conditions. 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 the biasing information.

B. Bite Mark Evidence is Not Relevant to the Facts Here

In addition to being scientifically reliable, in order to survive a challenge under *Porter*, the prosecution must also show that the bite mark evidence "can be applied to the facts in issue." *Porter*, 241 Conn. at 63-64. However, the age of the bite mark at the time it was discovered and the fact that only Mr. Foster and Ms. Irving's dental impressions were taken, despite various others with access to JM, undermines whether Dr. Freeman's findings are relevant to the facts at issue.

IV. The Bite Mark Evidence in This Case Has No Probative Value and Is Highly Prejudicial

The bite mark evidence should also be deemed inadmissible because its unknown probative value is substantially outweighed by its overwhelming prejudicial effect. Under Code of Evidence Section 4-3, "relevant evidence may be excluded if its probative value is outweighed by the danger of unfair prejudice or surprise, confusion of the issues,

or misleading the jury, or by considerations of undue delay, waste of time or needless presentation of cumulative evidence."

Here, the unknown probative value of bite mark comparison, as discussed above, must be weighed against the substantial prejudicial effect on a jury from testimony by a forensic dentist that a defendant has been positively identified with a bite mark on the victim. This effect is compounded by the fact that a bite mark demonstrates extreme violence in the commission of a crime, which on its own may prejudice the jury.

Indeed, media reports issued after the exoneration of Mr. Prade 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." She further commented that "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). In fact, because Mr. Prade was exonerated by DNA evidence, his teeth plainly did not "fit right in." Nevertheless, the violent image of the bite mark coupled with a proffered expert testifying that the bite was inflicted by the defendant was enough to convince the jurors of Mr. Prade's guilt. This fact alone supports the conclusion that such evidence is simply too prejudicial to be allowed into evidence, particularly in light of its inherent unreliability. The Court should therefore exclude the proffered bite mark evidence as unfairly prejudicial.

CONCLUSION

In conclusion, the defendant respectfully requests that the Court exclude expert testimony regarding bite mark evidence as inadmissible or, as an alternative, hold a *Porter* hearing at the Court's earliest convenience.