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## Taking a Bite Out of Forensic Science: The Misuse of Accelerant-Detecting Dogs in Arson Cases, 48 J. Marshall L. Rev. 1149 (2015)

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# TAKING A BITE OUT OF FORENSIC SCIENCE: THE MISUSE OF ACCELERANT-DETECTING DOGS IN ARSON CASES

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## I. THE PROBLEM

Carl Caples, a former sheriff's deputy, spent sixteen months in Maricopa County Jail awaiting trial after Phoenix police charged him with an arson he did not commit.<sup>1</sup> All charges against Caples were eventually dismissed when it became apparent that the Phoenix Fire Department's elite fire investigations unit botched the case.<sup>2</sup> Caples's nightmare began when an accelerant-detecting

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<sup>1</sup> See Byron Pitts, *Phoenix Arson Squad Comes Under Fire*, ABC NEWS (June 6, 2014), <http://abcnews.go.com/US/phoenix-arson-squad-fire-allegations-questionable-arrests/story?id=24014770> (noting that Caples was unable to afford bail).

<sup>2</sup> See *id.* (reporting that the squad's clearance rate was the highest in the country, when, under new leadership, they went from making arrests in just 22% of cases in 2007 to 65% in 2010).

canine, Sadie, alerted to traces of accelerants at several locations in his apartment, a telltale sign of arson.<sup>3</sup> However, when samples of the debris were eventually sent to a lab for confirmation, all tests came back negative.<sup>4</sup> Independent arson investigator, Pat Andler, conducted his own investigation and determined that the fire was actually caused by an electrical short and originated in the attic.<sup>5</sup>

While prosecutors in Arizona decided to drop the charges against Caples when Sadie's alert went unconfirmed, they may not have had to.<sup>6</sup> Of the sixteen state and federal appellate courts that have been confronted with the issue of unconfirmed canine alerts, only three have excluded the testimony of the canine handler.<sup>7</sup> The remaining courts have either admitted the testimony or indicated a willingness to admit the testimony if proper foundation were laid.<sup>8</sup>

This Comment identifies the proper uses of canine handler teams in arson investigations and trials. Part II discusses the origins of forensic science in criminal trials, the use of expert witnesses in the courtroom, the history and role of forensic science and canine handler teams in arson cases, and the problem of "junk science." Part III analyzes the pros and cons of using canine handler teams in arson investigations and the dilemma courts face when confronted with unconfirmed canine alerts. Part IV resolves the issue of using canine handler teams in arson investigations. First, it advocates for their continued use in evidence collection but suggests that unconfirmed canine alerts should be excluded from the courtroom. Then, it proposes ways that unconfirmed alerts could still have value outside of the courtroom, including during crowd searches and to establish probable cause to conduct criminal investigations.

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<sup>3</sup> See RICHARD SAFERSTEIN, *CRIMINALISTICS AN INTRODUCTION TO FORENSIC SCIENCE* 361 (10th ed. 2011) (mentioning that most arsons are committed by using gasoline or other petroleum-based accelerants).

<sup>4</sup> *Elite Phoenix Fire Investigation Comes Under Fire; Origin Doesn't Fit; Dog's Nose Doesn't Match Lab Results*, PUBLIC SAFETY REPORTER (June 7, 2014) [www.publicsafetyreporter.com/2014/06/07/elite-phoenix-fire-investigation-comes-under-fire-origin-doesnt-fit/](http://www.publicsafetyreporter.com/2014/06/07/elite-phoenix-fire-investigation-comes-under-fire-origin-doesnt-fit/).

<sup>5</sup> The Phoenix arson squad wrongly concluded that the fire started in the carport of Caples' apartment building. ANDLER & ASSOCIATES, INC., *Criminal Case History*, [www.andlerfire.com/case\\_history\\_criminal.htm](http://www.andlerfire.com/case_history_criminal.htm). (last visited Oct. 11, 2014).

<sup>6</sup> See Bruce L. Ottley, *Beyond the Crime Laboratory: The Admissibility of Unconfirmed Forensic Evidence in Arson Cases*, 36 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 263, 267 (2010) (recognizing that most of the court opinions that have considered whether to admit unconfirmed canine alerts have allowed them).

<sup>7</sup> See *id.* at 268 n.19 (observing that courts from Illinois, Georgia, and New Jersey have refused to admit).

<sup>8</sup> See *id.* at 267 n.16 (listing opinions from the 2nd Circuit, New York, Arkansas, Delaware, Iowa, Kentucky, Louisiana, Massachusetts, Michigan, Ohio, Rhode Island, Texas, and Utah).

## II. AN INTRODUCTION TO FORENSIC SCIENCE AND ARSON INVESTIGATION

### A. Forensic Science

Forensic science is the application of science to law. This Comment will focus specifically on the application of science to crime scene evidence.<sup>9</sup> The United States' commitment to forensic science began with the development of the crime lab.<sup>10</sup> In 1932 the Federal Bureau of Investigation ("FBI") built a national crime lab offering forensic science services to every law enforcement agency in the country.<sup>11</sup> Today there are more than 400 public crime labs nationwide.<sup>12</sup> The FBI's lab in Quantico, Virginia is the largest in the world.<sup>13</sup>

At the crime scene, evidence technicians are trained to find and collect samples of any foreign elements that seem out of place.<sup>14</sup> The scientists working in crime labs are responsible for processing crime scene evidence.<sup>15</sup> Forensic scientists rely on their scientific knowledge and skill in their chosen discipline to analyze the evidence.<sup>16</sup> For example, a forensic scientist in the biology unit of a crime lab may be asked to perform DNA profiling on a blood sample

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<sup>9</sup> See SAFERSTEIN, *supra* note 3, at 4 (defining forensic science in its broadest sense then describing professions within the field to include: "criminalistics, digital and multimedia services, engineering sciences, general, jurisprudence, odontology, pathology/biology, physical anthropology, psychiatry/behavioral sciences, questioned documents, and toxicology").

<sup>10</sup> See *id.* at 8 (describing the United States commitment as "ambitious" and the development as "systematic").

<sup>11</sup> See *id.* (crediting J. Edgar Hoover's directorship of the FBI as instrumental in the organization of a national crime lab).

<sup>12</sup> ANDREA M. BURCH ET AL., BUREAU OF JUSTICE STATISTICS, CENSUS OF PUBLICLY FUNDED FORENSIC CRIME LABORATORIES, 2009 (Aug. 2, 2012) available at [www.bjs.gov/content/pub/pdf/cpffcl09.pdf](http://www.bjs.gov/content/pub/pdf/cpffcl09.pdf). "Public" includes labs funded at the state, county, municipal, and federal level. *Id.* In 2009 the 411 publicly funded crime labs received a total of over 4 million requests for forensic services. *Id.*

<sup>13</sup> The FBI laboratory played a pivotal role as a model for forensic laboratories formed at the state and local level. SAFERSTEIN, *supra* note 3, at 8. The FBI still offers its services to any local police agency in need of its expertise. *Id.*

<sup>14</sup> KATHERINE RAMSLAND, FORENSIC SCIENCE OF CSI 9 (2001) available at <https://books.google.com/books?hl=en&lr=&id=szdjVWYMPDUC&oi=fnd&pg=PR9&ots=V3c3RwFJ0U&sig=H2T6NEDu60l7PF6m9a8S4tOaEEo#v=onepage&q&f=false>.

<sup>15</sup> See *id.* at 9-10 (listing examples of crime-scene evidence including: fingerprints, impressions from tools, shoes, car tires, fabric and teeth, body fluids like blood, semen, and saliva, biological evidence like hair and fingernails, trace evidence such as glass, gunshot residue, and accelerants, weapons and shell casings, and questioned documents).

<sup>16</sup> SAFERSTEIN, *supra* note 3, at 12.

recovered from a crime scene.<sup>17</sup> By matching that profile to the DNA profile of a known individual, investigators may be able to gain a better understanding of what happened at a crime scene. Though they spend a lot of their time in labs, forensic scientists also spend time in courtrooms, explaining the significance of their scientific analysis to judges and juries.<sup>18</sup> Because of the importance of their courtroom testimony, many crime labs prepare their personnel for legal interrogation by holding moot courts.<sup>19</sup>

### B. *Scientific Evidence in the Courtroom*

In 1923, against the backdrop of the twentieth century scientific revolution,<sup>20</sup> the D.C. Circuit Court of Appeals set forth the standard guideline for determining the admissibility of scientific evidence in the courtroom.<sup>21</sup> The case, *Frye v. United States*, stated the following:

Just when a scientific principle or discovery crosses the line between experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while the courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.<sup>22</sup>

For the next seventy years, courts almost universally looked to the “general acceptance” of a particular scientific field in deciding whether to admit expert testimony.<sup>23</sup> Because *Frye* required the general acceptance of the scientific community, questions emerged about how to account for new scientific theories that had not yet gained widespread general acceptance.<sup>24</sup> Largely due to this problem, a competing standard arose with the codification of the Federal Rules of Evidence.<sup>25</sup> Nevertheless, there are still several

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<sup>17</sup> *Id.* at 12.

<sup>18</sup> It is important that a forensic scientist be able to persuade the jury to accept their scientific conclusions. *Id.* at 15.

<sup>19</sup> RAMSLAND, *supra* note 14, at xii.

<sup>20</sup> See Mintz & McNeil, *Twentieth Century Revolutions*, DIGITAL HISTORY, [www.digitalhistory.uh.edu/disp\\_textbook.cfm?smtID=2&psid=3176](http://www.digitalhistory.uh.edu/disp_textbook.cfm?smtID=2&psid=3176) (last visited Nov. 4, 2014) (recounting how developments in physics, medicine, and laboratory-based science around the turn of the 20<sup>th</sup> century changed our view of the world).

<sup>21</sup> Caitlin Plummer & Imran Syed, *Shifted Science and Post-Conviction Relief*, 8 STAN. J.C.R. & C.L. 259, 264 (2012).

<sup>22</sup> *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

<sup>23</sup> Plummer & Syed, *supra* note 21, at 264.

<sup>24</sup> See L. Timothy Perrin, *Expert Witness Testimony: Back to the Future*, 29 U. RICH. L. REV. 1389, 1405-06 (1995) (noting that courts applying *Frye* tended to treat expert testimony regarding novel scientific matters with caution).

<sup>25</sup> The need for a codified rule governing the testimony of expert witnesses

jurisdictions that apply the *Frye* test today.<sup>26</sup>

Rule 702 says scientific testimony is admissible when it will help the trier of fact and if (1) “the testimony is based on sufficient facts and data”; (2) “the testimony is the product of reliable principles and methods”; and (3) “the expert has reliably applied the principles and methods to the facts of the case.”<sup>27</sup> In 1993 the United States Supreme Court weighed in on the two standards, rejecting *Frye*’s general acceptance test in favor of Rule 702.<sup>28</sup> In *Daubert v. Merrell Dow Pharmaceuticals, Inc.* the Court examined Rule 702 and made clear that when considering the admissibility of scientific testimony courts should assess the reliability of the principles and methods employed by the expert.<sup>29</sup> The Court set out four factors for determining the reliability of a theory or method: (1) “whether it can be (and has been) tested,” (2) whether it “has been subjected to peer review and publication,” (3) whether “the known or potential rate of error” is acceptable, and (4) whether it is “generally accepted” in the scientific community.<sup>30</sup>

While *Frye* puts courts in a passive position in determining whether a scientific discipline is generally accepted, *Daubert* requires courts to become active gatekeepers in determining whether a scientific expert is testifying based on reliable methods.<sup>31</sup>

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arose because “most of the literature [at the time] assume[d] that experts testify only in the form of opinions.” FED. R. EVID. 702 advisory committee’s notes. Rule 702 “encourage[d] the use of expert testimony in nonopinion form when counsel believe[d] the trier can itself draw the requisite inference.” *Id.* The question courts should consider is whether the expert testimony will assist the trier of fact. *Id.*

<sup>26</sup> The United States Supreme Court’s decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), was based on the language of Fed. R. Evid. 702 and not a constitutional right. Alice B. Lustre, Annotation, *Post Daubert Standards for Admissibility of Scientific and Other Expert Evidence in State Courts*, 90 A.L.R.5th 453, §2 (2001). Thus, states were free to decide for themselves which standard to apply. *Id.* The seventeen jurisdictions that continue to apply *Frye* are: Arizona, California, District of Columbia, Florida, Illinois, Kansas, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New York, North Dakota, Pennsylvania, and Washington. *Id.* at III.

<sup>27</sup> FED. R. EVID. 702.

<sup>28</sup> In *Daubert* the Court held that 702 “preempted” *Frye*. Plummer & Syed, *supra* note 21, at 265.

<sup>29</sup> See Kenneth Chesebro, *Taking Daubert’s “Focus” Seriously: The Methodology/Conclusion Distinction*, 15 CARDOZO L. REV. 1745, 1746 (1994) (pointing out that the Court held Rule 702 to proscribe authority to scrutinize the reliability of expert’s principles and methods alone and not the persuasiveness of their conclusions).

<sup>30</sup> *Daubert*, 509 U.S. at 593-94.

<sup>31</sup> See Plummer & Syed, *supra* note 21, at 265 (arguing that the shift courts went through from “passive overseer of scientific discussions” to “active gatekeeper” reflected lessons learned from *Frye*’s shortcomings and allowed courts to be more responsive to the evolving nature of science; see also Paul C. Giannelli, *Ake v. Oklahoma: The Right to Expert Assistance In A Post-Daubert, Post-DNA World*, 89 CORNELL L. REV. 1305, 1316 (2004) (contending that the

Both approaches, however, remain “backward-looking” in that the court’s evaluation is not concerned with where a particular scientific field is headed but, rather, where it presently stands.<sup>32</sup> Because science is dynamic, by its nature, scientists themselves are often caught off guard when new discoveries emerge and change what had been well-settled science.<sup>33</sup>

### C. *Arson Investigation and the Use of Accelerant-Detecting Canines*

Once thought to be well-settled, the science behind arson has seen frequent attacks from scholars and defense attorneys alike.<sup>34</sup> A fire scene, as one might imagine, is difficult to interpret because of the extensive destruction that many fires cause.<sup>35</sup> A fire can start any number of ways so the task of determining its cause requires thorough investigation and many considerations.<sup>36</sup>

An arson investigator’s work begins as soon as a fire has been extinguished.<sup>37</sup> Most arsons are committed by using some form of

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shift from *Frye* to *Daubert* required courts to impose a more “exacting” standard to scientific evidence).

<sup>32</sup> *Daubert* fails to account for “what new knowledge may soon emerge that would undermine the testimony being presented today.” Plummer & Syed, *supra* note 21, at 266.

<sup>33</sup> The “backward-looking” problem with *Daubert* and *Frye* is unavoidable given the way unexpected scientific discoveries are made. *Id.*

<sup>34</sup> See, e.g., Plummer & Syed, *supra* note 21, at 262 (suggesting that “falsehoods . . . perpetrated by pseudo-scientists testifying as experts in countless arson cases . . . likely led to the conviction of hundreds of innocent people.”); Paul C. Giannelli, *Junk Science and the Execution of an Innocent Man*, 7 N.Y.U. J.L. & LIBERTY 221, 221-22 (2013) (claiming that the expert testimony relied on to convict Cameron Todd Willingham of arson was “junk science”); PAUL BIEBER, ANATOMY OF A WRONGFUL ARSON CONVICTION: SENTINEL EVENT ANALYSIS IN FIRE INVESTIGATION, THE ARSON RESEARCH PROJECT, *available at* [http://thearsonproject.org/charm/wp-content/uploads/2014/08/wrongful\\_convictions.pdf](http://thearsonproject.org/charm/wp-content/uploads/2014/08/wrongful_convictions.pdf) (revealing that in two-thirds of the thirty arson exonerations studied, the original convictions were based on untested and unreliable forensic methods); JOHN LENTINI, THE MYTHOLOGY OF ARSON INVESTIGATION, FIRESIDENT.COM (2006), *available at* [www.firescientist.com/Documents/The%20Mythology%20of%20Arson%20Investigation.pdf](http://www.firescientist.com/Documents/The%20Mythology%20of%20Arson%20Investigation.pdf) (noting several common myths that were promulgated by fire investigators and to some extent are still being relied upon notwithstanding the progress made by the NFPA and other fire investigation publications). At common law arson is defined as the “willful and malicious burning of the dwelling place of another.” *United States v. Doe*, 136 F.3d 631, 638 (9th Cir. 1998).

<sup>35</sup> SAFERSTEIN, *supra* note 3, at 354.

<sup>36</sup> See *id.* (listing faulty wiring, overheated electrical motors, improperly cleaned and regulated heating systems, and cigarette smoking as examples of accidental causes). See JOHN D. DEHAAN, KIRK’S FIRE INVESTIGATION §7 (6th ed. 2007) for a detailed account of structure fire investigation.

<sup>37</sup> SAFERSTEIN, *supra* note 3, at 361.

accelerant.<sup>38</sup> Because accelerants may evaporate soon after a fire is put out, it is critical that an investigator work quickly.<sup>39</sup> For the same reason, an investigator should attempt to determine when a fire started as accurately as possible.<sup>40</sup>

Generally, upon arrival at a fire scene, an investigator will first seek an owner's consent to begin his investigation.<sup>41</sup> If unable to obtain consent, an investigator may have to apply for an administrative warrant before undertaking his investigation.<sup>42</sup> He will begin by attempting to determine a point of origin.<sup>43</sup> Finding where a fire started is particularly important if an accelerant was used, because traces of the accelerant will likely be left behind at its point of origin.<sup>44</sup> There are certain considerations that an arson investigator will take into account in determining a fire's origin.<sup>45</sup> For example, there are the physical marks left by a fire.<sup>46</sup> Burn patterns can be an indicator of a fire's origin.<sup>47</sup> Because a fire tends to move upward, a fire's origin will often be the lowest point that shows the most intense burning.<sup>48</sup> Other factors a fire investigator will consider are the accounts of witnesses, the analysis of the

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<sup>38</sup> An accelerant is "[a]ny material used to start or sustain a fire." *Id.* However, "[m]ost arsons are started with petroleum-based accelerants such as gasoline or kerosene." *Id.*

<sup>39</sup> Unfortunately for investigators, "accelerant residues that remain after a fire is extinguished may evaporate within a few days or even hours." *Id.* at 362.

<sup>40</sup> NATIONAL FIRE PROTECTION ASSOCIATION, NFPA 921: GUIDE FOR FIRE & EXPLOSION INVESTIGATIONS §14.2.2, at 107 (2004) [hereinafter NFPA] (declaring that "the age of the scene may have an effect on the planning of the investigation.").

<sup>41</sup> If the fire department is still on the scene or if investigators arrive and enter a "reasonable time" after they have left then consent is not necessary under the Fourth Amendment. Guy Burnette, *Documentation of the Fire Scene: A Legal Perspective*, INTERFIRE.ORG, [http://www.interfire.org/res\\_file/srchseiz.asp](http://www.interfire.org/res_file/srchseiz.asp) (last visited Nov. 10, 2014). The cases that have reached the Supreme Court have involved situations where investigators never obtained consent so obtaining consent can prevent potential Fourth Amendment problems down the road. *Id.*

<sup>42</sup> First, the fire investigator must show that a fire of undetermined cause has occurred. *Michigan v. Tyler*, 436 U.S. 499, 507 (1978). Then it is the duty of the magistrate to weigh the disruption to the occupant with the need for the intrusion in deciding whether to grant the warrant. *Id.*

<sup>43</sup> See *infra* text accompanying notes 48-54 for a discussion of how investigators determine origin.

<sup>44</sup> While searching for a fire's origin the investigator may uncover evidence of separate unconnected fires or "streamers" – like a trail of gasoline used to spread the fire from room to room. SAFERSTEIN, *supra* note 3, at 362.

<sup>45</sup> NFPA, *supra* note 40, §17.1.1 at 131.

<sup>46</sup> *Id.*

<sup>47</sup> *Id.*; see also SAFERSTEIN, *supra* note 3, at 362 (mentioning "V-shaped pattern forms").

<sup>48</sup> Although it is not a hard and fast rule, fire tends to move upward. SAFERSTEIN, *supra* note 3, at 362; but see Bieber, *supra* note 37 (revealing that flashover conditions tend to limit the investigator's ability to draw reliable conclusions based on burn patterns).



physics and chemistry of fire initiation,<sup>49</sup> and the location of electrical arcing.<sup>50</sup>

Investigators are encouraged to diagram heat and flame vectors to identify the direction of heat or flame spread based on observed fire patterns.<sup>51</sup> If possible, nothing should be moved or touched until an investigator is able to diagram, sketch, and photograph the fire scene.<sup>52</sup> While fire patterns may be traced back to a heat source, that source is not necessarily conclusive proof of the fire's origin.<sup>53</sup> For instance, a fire may start in a bedroom and then spread to a garage where it ignites with gasoline and consequently produces fire patterns in the garage.<sup>54</sup> Factors such as high winds, collapsing floors and roofs, and the presence of elevator shafts in a structure can cause a fire to deviate from its normal behavior and throw off an investigation.<sup>55</sup>

Misleading fire patterns can also develop when there are unnatural openings in a structure.<sup>56</sup> When investigators survey the damage at a scene, they will look to the damage associated with natural and unnatural openings.<sup>57</sup> Unnatural openings, like holes created by fire, indicate an area of intense burning.<sup>58</sup> Because ventilation affects fire movement, holes can create fire patterns that appear abnormal.<sup>59</sup> To complicate matters, sometimes firefighters have to create holes while trying to extinguish fires, so investigators will have to take that into account.<sup>60</sup>

When investigators locate the point of origin, an examination will follow to determine whether the cause of the fire was accidental or whether there is evidence of arson.<sup>61</sup> At the same time, fire investigators are urged not to make any determinations about a single point of origin unless they have conclusive evidence.<sup>62</sup> Rather, they should identify multiple potential points of origin and list

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<sup>49</sup> See NFPA, *supra* note 40, §17.1.1 at 131 (mentioning it as a factor in origin determination and going on to describe in greater detail in Chapter 19).

<sup>50</sup> *Id.* §8.10.1 at 71.

<sup>51</sup> *Id.* §17.2.3 at 132.

<sup>52</sup> See SAFERSTEIN *supra* note 3, at 362 (suggesting that the fire scene should be treated like any crime scene until a proper investigation takes place).

<sup>53</sup> NFPA, *supra* note 40, 17.2.3.2 at 132.

<sup>54</sup> *Id.*

<sup>55</sup> SAFERSTEIN *supra* note 3, at 362.

<sup>56</sup> NFPA, *supra* note 40, §17.5.5.1 at 134.

<sup>57</sup> See *id.* (listing window, door, and vent openings as natural openings).

<sup>58</sup> *Id.*

<sup>59</sup> *Id.*

<sup>60</sup> See DEHAAN, *supra* note 36, at 201 (discouraging unnecessary structural damage where possible and cautioning investigators to be cognizant of structural damage when determining cause and origin).

<sup>61</sup> Unlike arsons, accidental causes, like faulty wiring, do not usually leave a chemical trace. SAFERSTEIN, *supra* note 3, at 354.

<sup>62</sup> Sometimes "an irrefutable article of physical evidence or a dependable eyewitness to the initiation, can be the basis for a conclusive determination." NFPA, *supra* note 40, §17.1.2 at 131.

possible explanations for each one.<sup>63</sup>

Most arsonists use some type of accelerant to start a fire, and if investigators find evidence of an accelerant at the fire's origin, this finding is often crucial in any subsequent prosecution.<sup>64</sup> Nevertheless, an accelerant by itself does not create a fire.<sup>65</sup> A fire only results from the combination of fuel and an ignition source.<sup>66</sup> So, in establishing the cause of a fire, an investigator must be cognizant of the sequence of events that brings an accelerant and an ignition source together.<sup>67</sup>

In searching for traces of accelerants, fire investigators have multiple tools.<sup>68</sup> Portable vapor detectors are devices that can be used on-scene to screen for volatile residues.<sup>69</sup> Investigators can also use canines specially trained to detect the odor of accelerants.<sup>70</sup> Canine handler teams are particularly useful because they can be deployed to confirm whether the appropriate debris has been recovered for lab analysis.<sup>71</sup> Interestingly, a canine nose is thought to be capable of detecting the presence of traces of gasoline so small that they fall below those concentrations detected by crime labs.<sup>72</sup> Yet, the ability to distinguish between an accelerant and background materials is more important than sensitivity to any amount of accelerant.<sup>73</sup> It is not clear which individual chemical compounds "trigger" a canine.<sup>74</sup>

Many common synthetic materials, when burned, produce chemical compounds that are contained in ignitable liquids.<sup>75</sup> The

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<sup>63</sup> *Id.*

<sup>64</sup> See SAFERSTEIN, *supra* note 3, at 361 (mentioning that the presence of containers capable of holding an accelerant arouses suspicion of arson).

<sup>65</sup> NFPA, *supra* note 40, §18.5.1 at 139.

<sup>66</sup> *Id.*

<sup>67</sup> See *id.* (warning fire investigators against making conclusive cause determinations without sufficient evidence).

<sup>68</sup> SAFERSTEIN, *supra* note 3, at 363.

<sup>69</sup> It works by sucking in the air around the sample and passing it over a heated filament. *Id.* If there is an accelerant present it oxidizes and the temperature of the filament will increase. *Id.*

<sup>70</sup> See Emma Wagner, *The Use of Canines in Accelerant Detection*, at 4 (Apr. 1997), available at [www.tcforensic.com.au/docs/uts/essay2.pdf](http://www.tcforensic.com.au/docs/uts/essay2.pdf) (informing that dogs can either be trained to respond aggressively by scratching or barking or passively by sitting when the handler says "show me").

<sup>71</sup> See NFPA, *supra* note 40, §16.5.4.7.5 at 125 (suggesting that this is the proper use of such teams).

<sup>72</sup> *Id.* §16.5.4.7.3.

<sup>73</sup> See *id.* (distinguishing between "specificity" and "sensitivity" and pointing out that the former is most important in an arson investigation because we do not want the dogs alerting to everyday background materials found at the scene).

<sup>74</sup> *Id.* §16.5.4.7.4.

<sup>75</sup> See, e.g., *Land v. State*, 802 N.E. 2d 45, 46, 48 (Ind. Ct. App. 2004) (describing how a canine that alerted on a pair of shoes belonging to the defendant when lab tests did not because the soles were manufactured using a type of flammable solvent).

variety of these materials found at a fire scene may explain most unconfirmed alerts by canines.<sup>76</sup> Canines are very effective at detecting accelerants but may lack the ability to differentiate between ignitable liquids and common synthetic materials.<sup>77</sup> As a result, the National Fire Protection Association suggests that their proper use is to assist in the selection of samples to be tested in a lab and recognizes that unconfirmed canine alerts are improper evidence.<sup>78</sup>

When an investigator suspects the use of accelerants in a particular area of a fire scene, either based on a canine alert or some other indicator, he will collect samples of the debris.<sup>79</sup> He should also collect similar but uncontaminated specimens from other areas of the scene to use as substrate controls.<sup>80</sup> Back in a lab, forensic analysts will then perform testing on the debris.<sup>81</sup>

Today, crime labs use both gas chromatography and mass spectrometry to identify possible accelerants.<sup>82</sup> Gas chromatography allows an analyst to separate mixtures of materials based on differences in their physical and chemical properties.<sup>83</sup> Under certain conditions, however, gas chromatography will be unhelpful in providing an analyst with enough discernible patterns to identify the materials.<sup>84</sup> In such cases, mass spectrometry has proven to be a valuable technique, because it allows an analyst to break materials into smaller sub-molecular pieces.<sup>85</sup>

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<sup>76</sup> See NFPA, *supra* note 40, §16.5.4.7.4 at 125 (suggesting that the canine olfactory system while remarkable is not infallible).

<sup>77</sup> *Id.* §16.5.4.7.3.

<sup>78</sup> See *id.* §16.5.4.7.6 (advising that canines should be used in conjunction with and not in place of laboratory analysis).

<sup>79</sup> The best way to store samples containing suspected ignitable liquids is in clean, metal paint cans or sealable glass jars. SAFERSTEIN, *supra* note 3, at 364.

<sup>80</sup> See *id.* (explaining that if an investigator collects carpet from the point of origin they must also sample the same carpet from another part of the room for comparison purposes); see *infra* Section III.C for a discussion of an investigation where investigators failed to take substrate controls.

<sup>81</sup> See DEHAAN, *supra* note 36, at 516 (mentioning that most states have at least one state lab that can provide the services a fire investigator would need).

<sup>82</sup> See *id.* at 530 (revealing that GC/MS has been feasible for over 30 years but has only recently become “small, inexpensive and, user-friendly enough” to be convenient).

<sup>83</sup> See *id.* at 528 (stating that “[g]as chromatography uses a stream of gas (nitrous or helium) as a carrier to move a mixture of gaseous materials along a long column or tube filled or coated with a separating compound”).

<sup>84</sup> See SAFERSTEIN, *supra* note 3, at 376-68 (explaining that a combination of multiple accelerants present in the sample may render gas chromatography ineffective).

<sup>85</sup> Complex chromatographic patterns can sometimes be more easily analyzed using mass spectrometry. DEHAAN, *supra* note 36, at 530. “Mass spectrometry allows the analyst to break apart each compound into small sub-molecular pieces and, by counting those pieces, establish the chemical structure of the original molecule.” *Id.*

#### D. *The Emergence of Junk Science*

The term “junk science” arose sometime in the late 1980s or early 1990s, coinciding with the explosion of toxic tort litigation.<sup>86</sup> Scholars have quibbled about what “junk science” means.<sup>87</sup> For the purposes of this Comment, the phrase refers to the use of novel scientific principles that are held out to the trier of fact as “scientific” testimony while resting on unreliable principles and methods.<sup>88</sup> Junk science is a problem in today’s courtrooms because, for a number of reasons, jurors tend to believe what scientific experts say.<sup>89</sup> In the hands of a skilled attorney, “scientific sounding” testimony can be extremely effective.<sup>90</sup>

The wrongful conviction and execution of Cameron Todd Willingham reveals just how dangerous junk science can be.<sup>91</sup> On December 23, 1991, a fire at Willingham’s house killed his three children.<sup>92</sup> He was arrested and charged with intentionally starting the fire.<sup>93</sup> At his trial, the judge allowed two experts to testify about

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<sup>86</sup> At the time, there were numerous lawsuits involving chemical manufacturers and pharmaceutical companies that resulted in massive payouts based on scientific expertise about which many were skeptical. Gary Edmund & David Mercer, *Trashing “Junk Science,”* 1998 STAN. TECH. L. REV. 3, 6-7 (1998). The term “junk science” arose at least partly as a way for commentators to explain the crisis many perceived with the American tort system. *Id.* at 5-6.

<sup>87</sup> *Id.* at 11.

<sup>88</sup> See Alan W. Tamarelli, Jr., *Daubert v. Merrell Dow Pharmaceuticals: Pushing The Limits of Scientific Reliability – The Questionable Wisdom of Abandoning the Peer Review Standard for Admitting Expert Testimony*, 47 VAND. L. REV. 1175, 1178 (1994) (noting that the purpose of *Frye*’s “general acceptance” test was to ensure that the courtroom not become “a testing ground for novel scientific breakthroughs”).

<sup>89</sup> Laurie R. Kuslansky, *Experts: What Makes Jurors Believe Yours Is Right?*, KROLL ONTRACK (2004), [http://www.krollontrack.com/publications/expertswhatmakesjurors\\_kuslansky\\_0004.pdf](http://www.krollontrack.com/publications/expertswhatmakesjurors_kuslansky_0004.pdf) (citing a TrialGraphix survey of jurors in the Northeast that revealed that 80% believe experts are “moderately to very important” in their decision making).

<sup>90</sup> John T. Floyd Law Firm, *Dog Handler Discredited: False Results, Exaggerated Claims Exposed*, HG.ORG LEGAL RESOURCES, <http://www.hg.org/article.asp?id=7370> (last visited Sept. 29, 2014) (commenting on the problem of junk science in courtrooms due to the importance jurors attach to expert testimony).

<sup>91</sup> See generally Giannelli, *supra* note 31, at 221 (outlining the failure of the Texas criminal justice system in executing Willingham based on arson evidence that had later been brought into serious question).

<sup>92</sup> See *id.* at 228 (conceding that Willingham exaggerated his attempts to save his children in speaking to police later but that such exaggerations are common when a parent survives their children’s death in a fire).

<sup>93</sup> *Id.*; Brandi Grissom, *Forensic Panel Calls for Review of Past Arson Cases*, THE TEXAS TRIBUNE, Sept. 9, 2011, available at [www.texastribune.org/2011/09/09/science-panel-agrees-review-past-arson-evidence/](http://www.texastribune.org/2011/09/09/science-panel-agrees-review-past-arson-evidence/).

their opinions on the cause of the fire.<sup>94</sup> One of the experts, Deputy Fire Marshal Manuel Vasquez testified that he found twenty indicators of arson during his investigation.<sup>95</sup> Willingham was convicted and sentenced to death.<sup>96</sup> In the following years, numerous arson experts reviewed the reports and testimony of the State's experts and universally concluded that each of Vasquez's twenty indicators of arson could be explained innocently.<sup>97</sup>

When Willingham was convicted in 1992, Texas allowed scientific experts to testify if they would assist the trier of fact.<sup>98</sup> At that time, Texas judges did not make preliminary determinations about the reliability of scientific evidence.<sup>99</sup> Then, in 1995, Texas adopted *Daubert* and judges assumed a gatekeeping role requiring expert witnesses to explain their scientific methodology before testifying in front of the jury.<sup>100</sup> Whether this would have made a difference in the Willingham case is debatable;<sup>101</sup> but, it would have given Willingham's counsel a mechanism for challenging what we now know was unreliable expert testimony.<sup>102</sup>

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<sup>94</sup> See David Grann, *Trial by Fire*, THE NEW YORKER, Sept. 7, 2009, available at [www.newyorker.com/magazine/2009/09/07/trial-by-fire](http://www.newyorker.com/magazine/2009/09/07/trial-by-fire) (recounting that Deputy Fire Marshal Manuel Vasquez was allowed to testify at trial that the fire was "intentionally set by human hands").

<sup>95</sup> See Giannelli, *supra* note 31, at 226-29 (describing how Vasquez testified to it being a "low burning fire" and that he observed "puddle configurations," "pour patterns," "alligatoring," and "crazed glass" at the scene).

<sup>96</sup> Willingham was eventually executed by Texas. *Id.* at 221. See Grissom, *supra* note 93, for a discussion of the execution in the context of The Texas Forensic Science Commission's review of past arson cases.

<sup>97</sup> Independent investigators have consistently concluded that the indicators relied on by the original investigation were in fact caused by full-room involvement conditions. Bieber, *supra* note 34. See *infra* text and accompanying note 108 for a further discussion of this phenomenon.

<sup>98</sup> See THE TEX. FORENSIC SCI. COMM'N, WILLINGHAM/WILLIS INVESTIGATION 31-32 (2011), available at [www.fsc.state.tx.us/documents/FINAL.pdf](http://www.fsc.state.tx.us/documents/FINAL.pdf) (pointing out that the court followed Texas Rule of Evidence 702 at the time of the trial).

<sup>99</sup> "Most expert testimony, including that of fire experts and investigators, was readily admitted into evidence, and the jury was then allowed to [assess their] credibility." *Id.* at 32.

<sup>100</sup> *Daubert* had a significant impact on expert testimony in Texas. *Id.* Before *Daubert*, expert testimony from fire investigators was readily admitted into evidence and it was then up to the jury to decide if it was credible. *Id.* *Daubert* required fire investigators "to understand and describe the science behind their conclusions before they [were] allowed to testify to a jury regarding those conclusions." *Id.* at 33.

<sup>101</sup> See Plummer & Syed, *supra* note 21, at 266 (arguing that because *Daubert* is a "backward-looking approach", i.e., it does not look to where a particular discipline is headed but instead looks backward in determining admissibility, it cannot address problems of "shifted science" like arson science has undergone).

<sup>102</sup> Before *Daubert* was adopted in Texas, scientific evidence like Vasquez's testimony was not challenged outside the presence of the jury. THE TEX. FORENSIC SCI. COMM'N, *supra* note 98, at 34.

### III. THE SCIENCE BEHIND ARSON INVESTIGATION AND THE ROLE OF CANINE HANDLER TEAMS

One of the reasons the integrity of fire science has been called into question is because of the dual nature of arson investigation. On the one hand, some facets of arson investigation lend themselves to the scientific field.<sup>103</sup> On the other, there is clearly a human component that is more like art than science.<sup>104</sup> This Section first explores the subjectivity involved in fire pattern analysis. It then examines some of the same subjectivity problems with respect to canine handler teams. Next, it analyzes a case where the improper use of a canine handler team resulted in a wrongful conviction. Finally, it considers the special problem of unconfirmed canine alerts.

#### A. *Subjectivity of Fire-Pattern Analysis and other Arson Indicators*

Among the tools available to forensic scientists, DNA is considered the most reliable.<sup>105</sup> In fact, when a wrongful conviction is challenged by DNA evidence, that evidence often calls into question some other forensic science discipline that may have been used to convict the person in the first place.<sup>106</sup> Unlike the truly scientific analysis of DNA, the ways in which investigators draw conclusions from fire patterns and other indicators in an arson investigation are based almost entirely on human interpretation.<sup>107</sup>

There are several myths about fire science that have plagued the field and cast doubt on the testimony of expert witnesses.<sup>108</sup>

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<sup>103</sup> See, e.g., DEHAAN, *supra* note 36, at 530 (discussing the use of gas chromatography and mass spectrometry to test for the presence of accelerants).

<sup>104</sup> See, e.g., NFPA, *supra* note 40, §17.1.1 at 131 (mentioning the physical marks and burn patterns as being important clues in determining a fire's origin).

<sup>105</sup> See Jonathan Jones, *Forensic Tools: What's Reliable and What's Not-So-Scientific*, FRONTLINE, (Apr. 17, 2012), [www.pbs.org/wgbh/pages/frontline/criminal-justice/real-csi/forensic-tools-whats-reliable-and-whats-not-so-scientific/](http://www.pbs.org/wgbh/pages/frontline/criminal-justice/real-csi/forensic-tools-whats-reliable-and-whats-not-so-scientific/) (noting that unlike some forensic tools used by investigators DNA testing faced rigorous scientific experimentation and validation prior to its use in forensic science).

<sup>106</sup> See *id.* (reporting findings made by Peter Neufeld of the Innocence Project who said, "when we looked at all the cases of people who have been exonerated by DNA evidence, we found that in 60 percent of those cases, experts who testified for the prosecution produced either invalid evidence or the misapplication of science in their testimony").

<sup>107</sup> See Bieber, *supra* note 34 (claiming that the determination of how a fire developed based on fire-patterns is subjective and can lend itself to "bias, misinterpretation and misidentification of an accidental fire as arson").

<sup>108</sup> Some common myths include "alligatoring effect, crazing of glass, depth of char, line of demarcation, sagged furniture springs, spalling, fire load, low

First, for many years fire investigators thought that if they found melted metals at the scene it was evidence of abnormally high temperatures, which could only be achieved by the use of flammable liquids.<sup>109</sup> Another myth that has been debunked is the phenomenon of crazed glass, which is the irregular formation of cracks in glass.<sup>110</sup> Until scientific testing proved otherwise, it was once thought that crazing occurred due to rapid intense heat, which could only be explained by the presence of an accelerant.<sup>111</sup> Some arson indicators, once thought of as reliable, are now in doubt because of scientists' recent understanding of flashover and its effects on fire damage.<sup>112</sup> Based on the premise that fire burns upward, investigators used to look for irregular damage to floors because they thought burn damage to floors could only be explained by the presence of an accelerant in that area.<sup>113</sup> But when flashover conditions occur, the intense radiant heat created by full room involvement can cause the same type of floor damage without the presence of accelerants.<sup>114</sup>

That is not to say the use of arson indicators by fire investigators is without merit.<sup>115</sup> One example of investigators

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burning and holes in the floor, V-pattern angle, and time and temperature." Lentini, *supra* note 37.

<sup>109</sup> See DEHAAN, *supra* note 36, at 292 (indicating that the flame temperatures of fires started with flammable liquids are about the same as wood-fueled fires and that high temperatures can be produced by many synthetic materials found in furnished rooms).

<sup>110</sup> The National Bureau of Standards Fire Investigation Handbook from 1980, a book relied upon by fire investigators and textbook authors, listed crazed glass as an indicator of arson. Lentini, *supra* note 34, at 4.

<sup>111</sup> See *id.* (describing observations and experiments conducted in 1991 that proved that crazing can only be caused by rapid cooling, e.g., during fire suppression efforts).

<sup>112</sup> One example is the damage to floors. *Id.* §6.16.2.4, at 42. Flashover conditions may modify or obliterate pre-existing burn patterns on floors due to the radiant heat flux in the room. *Id.* Flashover is "a transition phase in the development of a compartment fire in which surfaces exposed to thermal radiation reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space, resulting in full room involvement or total involvement of the compartment or enclosed space." NFPA, *supra* note 40, §3.3.72 at 11.

<sup>113</sup> The presence of large shiny blisters at a fire scene used to be interpreted as proof an accelerant was used. Lentini, *supra* note 34, at 7. In fact, these blisters can be present in many types of fires, including post-flashover. *Id.*

<sup>114</sup> See DEHAAN, *supra* note 36, at 292-93 (disclosing that heat fluxes on floors after flashover conditions are extremely high and the reaction of synthetic carpets and pads to such heat causes irregular melting). See also JOHN LENTINI, THE LIME STREET FIRE: ANOTHER PERSPECTIVE, (1992), available at <http://www.firescientist.com/Documents/TheLimeStreetFire-AnotherPerspective.pdf> (describing an experiment conducted where fire investigators set a couch on fire in a test room without accelerants and the room went to flashover in four and one-half minutes and they observed charring and burn patterns on the floor).

<sup>115</sup> See NFPA, *supra* note 40, §22.1 at 165 (noting that the existence of

using reliable indicators to solve an arson happened in the case against Debora Green.<sup>116</sup> On October 24, 1995, the Green house was destroyed by fire and two of Mrs. Green's children were killed.<sup>117</sup> One of the first things arson investigators noticed was that some of the carpeting in Green's living room had burned and melted in an irregular pattern even though the rest of the room was basically intact.<sup>118</sup> There was no damage to the ceiling overhead and all the walls were unblemished, so it was obviously unconnected to the extensive fire damage found in other rooms of the house.<sup>119</sup> Investigators found the same type of clearly unconnected fire in the guest bedroom.<sup>120</sup> They also observed what they interpreted as pour patterns and charring in areas on the main floor.<sup>121</sup> Finally, investigators had multiple alerts from an accelerant-detecting canine and did confirmatory lab testing of the debris.<sup>122</sup>

### B. *False Alerts and Handler Bias among Canine Handler Teams*

As in Green's case, there are often benefits to using accelerant-detecting canines in arson investigations.<sup>123</sup> As discussed in Section II.C, the National Fire Protection Association<sup>124</sup> advocates using them in conjunction with lab testing.<sup>125</sup> Having a canine handler team survey the scene allows fire investigators to quickly inspect a potentially large area and pinpoint specific areas from which to take

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indicators is not conclusive proof of arson but may suggest the fire deserves further investigation).

<sup>116</sup> SAFERSTEIN, *supra* note 3, at 352.

<sup>117</sup> *See id.* (revealing that the marriage of Green and her husband Michael Farrar had been deteriorating leading up to the fatal fire).

<sup>118</sup> The fire to the carpet had gone out because it was flame retardant. ANN RULE, BITTER HARVEST: A WOMAN'S FURY, A MOTHER'S SACRIFICE 174 (1997).

<sup>119</sup> *Id.*

<sup>120</sup> The room looked almost damage free. *Id.* at 174-75. The bed was still neatly made up and the bathroom was intact but the vertical blinds had burn marks on them. *Id.*

<sup>121</sup> Investigators observed pooling outlines in the center of the dining room and deep charring of wood in irregular patterns. *Id.* at 176-77.

<sup>122</sup> The dog, Avon, alerted her handler Nancy Thomas multiple times to the presence of accelerants. *Id.* at 176. Because Green eventually pled no contest to avoid a possible death sentence, the laboratory results were not revealed. The Associated Press, *No Contest Plea at Issue*, THE TOPEKA CAPITAL-JOURNAL (Feb. 6, 2000), [http://cjonline.com/stories/020600/kan\\_nocontestplea.shtml](http://cjonline.com/stories/020600/kan_nocontestplea.shtml).

<sup>123</sup> *See* Wagner, *supra* note 70, at 3 (noting that since the first dog was trained in the early 1980's the use of canines in fire investigations has steadily grown to approximately 200 canine teams today due to the benefits they provide investigators).

<sup>124</sup> *See* Babick v. Berghuis, 620 F.3d 571, 580 (6th Cir. 2010) (Merritt, J., dissenting) (describing the National Fire Protection Association 921 as "the bible of arson forensic science").

<sup>125</sup> NFPA, *supra* note 40, §16.5.4.7 at 125.



samples for lab testing.<sup>126</sup> Jim Butterworth, a fire investigator from the Connecticut Office of the State Fire Marshal, cites several reasons an accelerant-detecting canine is superior to mechanical sniffers.<sup>127</sup> He says that, unlike dogs, the portable sniffers do not differentiate between certain synthetic products that contain petroleum, like chair cushions, and items that contain flammable liquids.<sup>128</sup> Butterworth also points out that canines help investigators reduce the number of samples that need to be tested at the lab.<sup>129</sup> Moreover, the canine may be able to alert its handler to an area with no visible pour patterns.<sup>130</sup>

The Missouri Division of Fire Safety currently uses three accelerant-detecting canines, including Gus, a Labrador retriever.<sup>131</sup> In 1996, Gus inspected fifty-four fire scenes, of which forty-three were ruled to be arson.<sup>132</sup> Overall, since the Missouri Division of Fire Safety began using canines the rate of positive samples taken from fire scenes has increased from 10% to 80%.<sup>133</sup>

However, there are also problems with using canines.<sup>134</sup> First, there may be false negative alerts.<sup>135</sup> A dog may fail to alert to the presence of an accelerant if it follows some other odor away from the source.<sup>136</sup> It is also possible that an arson fire may have been started using some type of accelerant that a dog is not trained to detect.<sup>137</sup>

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<sup>126</sup> Once the dog arrives at the scene it will be given a command such as “seek” and begin randomly sniffing until it does or does not find an odor of accelerant. Wagner, *supra* note 70, at 6. Once the source of the odor is located it will alert the handler, usually by sitting by the site. *Id.*

<sup>127</sup> See Ottley, *supra* note 6, at 271 (mentioning that Butterworth was one of the original handlers and trainers of the first accelerant-detecting canine in Connecticut).

<sup>128</sup> See *id.* at 272 (explaining that Butterworth thinks “a properly trained . . . canine will ignore the normal products and focus on finding combustible liquids”; but see *supra* notes 75-77 and accompanying text).

<sup>129</sup> See Ottley, *supra* note 6, at 272 (pointing out that fire investigators are limited in the number of samples they can send to the laboratory for analysis).

<sup>130</sup> *Id.*

<sup>131</sup> See Wagner, *supra* note 70, at 10 (noting that Gus and his handler Greg Carrell were trained by the Maine State Police and that Gus was found to be capable of detecting 2/100 ths of a microliter of evaporated gasoline, which is lower than the detection limits of most machines).

<sup>132</sup> See *id.* (revealing that out of the 43 fires ruled to be arson 18 arrests were made).

<sup>133</sup> *Id.*

<sup>134</sup> See Bieber, *supra* note 34 (observing that one reason for these problems is “the subtle and vague cues given off by a dog can be distinctly influenced by the beliefs of the handler himself”).

<sup>135</sup> A false negative is any alert that should have happened but did not. Daniel Owen, *What is a False Negative?*, SANS, [www.sans.org/security-resources/idfaq/false\\_negative.php](http://www.sans.org/security-resources/idfaq/false_negative.php) (last visited Oct. 21, 2014).

<sup>136</sup> See Wagner, *supra* note 70, at 11 (suggesting that for this reason arson investigators should collect samples from areas he considers may contain accelerant even if the dog does not alert).

<sup>137</sup> See *id.* (pointing out that items such as paper and Styrofoam may have been used as accelerants but would not be detected by the dog).

Next, there may be false positives.<sup>138</sup> Some scholars suggest that the detection capabilities of canines are so strong that they can alert to the presence of an accelerant that is below the detection limits of instruments used for confirmation.<sup>139</sup> Since these alerts cannot be confirmed, they may be false positives.<sup>140</sup> Canines may also alert to the vapors of ordinary household items, like carpet adhesives and cleaning solvents, which can be ruled out in the laboratory.<sup>141</sup>

Aside from potential problems with dogs themselves, there is the issue of how a handler's beliefs influence his dog.<sup>142</sup> Dog handlers may give off subtle, or sometimes not so subtle,<sup>143</sup> cues that affect a dog's alert locations.<sup>144</sup> A 2001 study tested this hypothesis.<sup>145</sup> To test the influence of handlers on dogs, the researchers set up a course inside a building and told the dog handlers that the scent locations were marked by a piece of red construction paper.<sup>146</sup> They also tested the dogs by hiding unwrapped "Slim Jim" meat sticks along the course.<sup>147</sup> In actuality there were no legitimate scent targets for the dogs to detect so every alert would be a false positive.<sup>148</sup> After observing eighteen handler teams go through the course multiple times, 85% of the searches

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<sup>138</sup> A false positive is any normal or expected behavior that is identified as anomalous. Daniel Owen, *What is a False Positive and Why are False Positives a Problem?*, SANS, [www.sans.org/security-resources/idfaq/false\\_positive.php](http://www.sans.org/security-resources/idfaq/false_positive.php) (last visited Oct. 21, 2014).

<sup>139</sup> See Wagner, *supra* note 70, at 11 (conceding that the exact detection limit of dogs is not known but that it is thought to be capable of detecting 0.01 microliters of accelerant, which falls below the detection limits of laboratory instruments); *but see supra* notes 75-77 and accompanying text.

<sup>140</sup> *Id.* at 11.

<sup>141</sup> *Id.*; *see also supra* text accompanying notes 75-77.

<sup>142</sup> See Earth Erowid, *False Alerts: Growing Evidence that Drug-Sniffing Dogs Reflect Police Bias*, 20 EROWID EXTRACTS 6, 6-7 (2011), available at [www.erowid.org/freedom/police/police\\_article1.shtml](http://www.erowid.org/freedom/police/police_article1.shtml) (arguing that canine handler teams are too often unable to neutrally detect evidence because of problematic biases and that double-blind type field techniques must be developed that are proven to remove handler bias).

<sup>143</sup> For example, in the botched arson investigation of Barbara Sloan, the canine handler was caught on videotape telling his dog Sadie, who had not yet alerted, to "just fake it for me, OK." Pitts, *supra* note 1.

<sup>144</sup> Cf. Bieber, *supra* note 34 (observing that dogs too can give off vague and subtle cues and that a handler with preconceived beliefs about the fire may be influenced by those beliefs in his interpretation of the dog's cues).

<sup>145</sup> See Lisa Lit et al., *Handler Beliefs Affect Scent Detection Dog Outcomes*, ANIMAL COGNITION (2011), available at [www.ncbi.nlm.nih.gov/pmc/articles/PMC3078300/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078300/) (asking whether the beliefs of dog handlers affect the dog's performance and evaluating the relative importance of human versus dog influences on handlers' beliefs).

<sup>146</sup> *Id.* (explaining that the scent locations either contained no scent at all or decoy scents like that of food or a toy).

<sup>147</sup> *Id.*

<sup>148</sup> The study was testing both drug detection dogs and explosive detecting dogs so if a dog alerted that meant it falsely identified either drugs or explosives. *Id.*

resulted in at least one alert.<sup>149</sup> The paper targets designed to trick the handlers resulted in twice as many false alerts as the Slim Jims designed to fool the dogs.<sup>150</sup>

### C. *Improper Use of the Canine Handler Team and the Wrongful Conviction of James Hebshie*

Just as handler bias can compromise an arson investigation so too can the lazy inspection of a fire scene. James Hebshie was convicted of arson and mail fraud for starting a fire that destroyed his convenience store.<sup>151</sup> Several problems with the investigation and expert testimony were later revealed at his habeas corpus hearing.<sup>152</sup> After he was granted a new trial, prosecutors decided to drop all charges.<sup>153</sup>

During the investigation, Sergeant Douglas Lynch led his accelerant-detecting canine, Billy, directly to the area of Hebshie's store where he believed the fire started.<sup>154</sup> Billy alerted to the presence of an accelerant and investigators gathered a sample but they failed to check other areas of the store and took no control samples from anywhere else in the store.<sup>155</sup> The single sample was tested at the crime lab and came back positive for "light petroleum distillate."<sup>156</sup> However, many light petroleum distillates, like those present in lighter fluid and glue, could be found in goods sold in

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<sup>149</sup> There were two possible explanations for the false alerts. *Id.* Either the dog handlers were erroneously calling alerts because they believed that was where the scent target was located or the handler belief affected the dogs' alerting behavior. *Id.*

<sup>150</sup> Some possible cues given by the handlers include: the handler's "proximity to the dog according to scent location, gaze and gesture cues, and postural cues," all of which may have been learned during the dog's initial training. *Id.*

<sup>151</sup> He was eventually sentenced to a mandatory fifteen years in prison. *United States v. Hebshie*, 754 F. Supp. 2d 89, 91 (D. Mass. 2010).

<sup>152</sup> Problems with the canine evidence and laboratory analysis were significant and should have been clear at trial. *Id.* at 93. For example, the dog was only taken to one area of Hebshie's store, investigators took no comparison samples, and the single sample that did test positive for "light petroleum distillate" was not necessarily inculpatory because Hebshie's store contained numerous items that contained light petroleum distillates. *Id.*

<sup>153</sup> See Bieber, *supra* note 34 (reporting that he was released from prison on bond on November 23, 2010 and seven months later prosecutors dropped all charges).

<sup>154</sup> *Hebshie*, 754 F. Supp. 2d at 93.

<sup>155</sup> *Id.*; cf. *supra* text accompanying notes 79-81.

<sup>156</sup> *Hebshie*, 754 F. Supp. 2d at 93; see Dean Whitehead, *Facts and Myths about Petroleum Distillates*, PROTECTALL.COM, [www.protectall.com/artpetdist.aspx](http://www.protectall.com/artpetdist.aspx) (last visited Dec. 13, 2014) (defining "petroleum distillates" as "products made from crude oil that have been distilled in a refinery and then usually processed further and purified in some manner.").

Hebshie's store.<sup>157</sup> As the District Court said, "the laboratory test was only probative of arson if one area tested positive while others did not or if the test disclosed a chemical that would not normally be present at the scene."<sup>158</sup>

Aside from the investigation errors, the court also found errors in the length to which the handler, Lynch, was able to testify.<sup>159</sup> He made the unsubstantiated claim that Billy was 97% accurate and the only mistakes she made were the handler's fault.<sup>160</sup> Lynch also testified, without objection, that Billy only alerted to one specific area of Hebshie's store, even though he admitted that Billy was not allowed to range anywhere else.<sup>161</sup>

In the end, Hebshie was granted a new trial because of ineffective assistance of counsel.<sup>162</sup> The District Court said, "a *Daubert/Kumho Tire* hearing would have allowed the trial court to screen whether minimum scientific standards were met – not in the abstract, but in the particular context of the case."<sup>163</sup> The hearing would also "allow the court to monitor how far the testimony [of the dog handler] could lawfully range, and what were its appropriate limits."<sup>164</sup>

#### D. *The Dilemma of Unconfirmed Accelerant Alerts*

A good defense attorney can theoretically expose shoddy investigative work on cross-examination. Hebshie's trial counsel should have challenged Lynch's methods, particularly his failure to collect substrate samples. He also should have objected to the breadth of Lynch's testimony and questioned his unsubstantiated claims about Billy's accuracy. However, not all canine handlers make such careless mistakes.<sup>165</sup> Even when an arson investigation is conducted properly a defendant may have an objection to a canine

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<sup>157</sup> *Hebshie*, 754 F. Supp. 2d at 93.

<sup>158</sup> *Id.*

<sup>159</sup> The court described Lynch's testimony on this as "an almost mystical account of Billy's powers and her unique olfactory abilities." *Id.* at 93-94.

<sup>160</sup> Defense counsel did not challenge the handler's claims. *Id.* at 102-03. The handler was also allowed to testify to "his entirely subjective ability to interpret her face, what she thought, intended, and the *strength* of the alert she gave in this case." *Id.* at 94.

<sup>161</sup> *Id.* at 102. Lynch only brought Billy to the area that had been cleared and was safe for her, which also happened to be the area where fire investigators believed the fire started. *Id.* at 96-97.

<sup>162</sup> The court granted Hebshie's habeas petition and declared that despite "the importance of finality in criminal cases . . . finality cannot trump fairness or justice." *Id.* at 128.

<sup>163</sup> *Id.* at 93.

<sup>164</sup> *Id.*

<sup>165</sup> *E.g.*, *Yell v. Commonwealth*, 242 S.W. 3d 331, 334-35 (Ky. 2007) (describing how the investigator and dog were properly trained, the dog alerted to multiple locations at the scene, and control samples were taken). See *infra* notes 172-183 and accompanying text for a detailed discussion of this case.

alert. This often happens with unconfirmed canine alerts.

In most arson cases, the handler who observed the alert and collected the evidence for testing will testify as an expert witness.<sup>166</sup> In some of these cases, for a variety of reasons, the investigation will include a canine alert to the presence of accelerants at the scene, but no subsequent confirmation by forensic scientists in the lab.<sup>167</sup> Most courts that have considered the issue have allowed the unconfirmed alerts into evidence.<sup>168</sup>

Kentucky, a *Daubert* state, has allowed unconfirmed canine alerts into evidence.<sup>169</sup> In *Yell v. Commonwealth* the Supreme Court of Kentucky affirmed Robert Yell's arson conviction.<sup>170</sup> Before his trial, Yell made a pre-trial suppression motion to the unconfirmed dog alerts.<sup>171</sup> The court held a *Daubert*-style hearing and made findings as to several facts about the dog handler, Buster Cannon, and the dog, PJ.<sup>172</sup> Cannon had been a policeman and firefighter for twenty-three years.<sup>173</sup> He and PJ had spent five weeks attending a course in accelerant detection with the Bureau of Alcohol, Tobacco, Firearms, and Explosives in 2002 and they were re-certified each

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<sup>166</sup> See Ottley, *supra* note 6, at 277-78 (meaning that in jurisdictions that have adopted Fed. R. Evid. 702 it is the job of the trial judge to determine whether the handler's testimony will help the trier of fact understand the evidence).

<sup>167</sup> *E.g.*, Yell, 242 S.W. 3d at 336; Reisch v. State, No. 426, 1993 Del. LEXIS 229, at \*6 (Del. June 4, 1993); State v. Buller, 517 N.W. 2d 711, 713-14 (Iowa 1994); People v. Jackson, No. 272776, 2008 Mich. App. LEXIS 958, at 6-7 (Mich. Ct. App. May 13, 2008); Carr v. State, 267 Ga. 701, 702 (Ga. 1997); People v. Acri, 277 Ill. App. 3d 1030, 1033 (Ill. App. Ct. 1996); State v. Sharp, 395 N.J. Super. 175, 186 (Sup. Ct. 2006); see also Fitts v. State, 982 S.W. 2d 175, 179 (Tex. App. Ct. 1998) (indicating that multiple alerts were made by the dogs but only one was confirmed as an accelerant in the lab).

<sup>168</sup> See Yell, 242 S.W. 3d at 336-37 (holding that there was a sufficient showing of reliability to admit the dog's alerts despite the negative lab test results); Reisch, 1993 Del. LEXIS 229, at \*4-5 (holding that the experience and qualifications of the dog handler were not at issue). The dog's experience and training was not at issue. *Id.* The only issue raised was regarding the dog's skill level and the court found that there was no support for the defendant's contention that the dog was unreliable. *Id.* at \*5; Buller, 517 N.W.2d at 714 (stating that despite laboratory tests being inconclusive, the State offered evidence indicating lab tests were less reliable than dogs and that there was no evidence to indicate the dog would falsely alert); Jackson, 2008 Mich. App. LEXIS 958 at \*7 (rejecting as a misrepresentation of the law in Michigan the defendant's contention "that scientific evidence is necessary to substantiate canine-detection evidence."

<sup>169</sup> *E.g.* Yell, 242 S.W. 3d 331 at 336 (holding that "the Commonwealth satisfied the foundational requirements").

<sup>170</sup> *Id.* at 343.

<sup>171</sup> *Id.* at 334.

<sup>172</sup> The defendant did not cite *Daubert* in his motion or request a *Daubert* hearing but the court held a self-described *Daubert* hearing. *Id.* Cannon was a National Certified Fire Investigator and PJ was assigned to him by the Bureau of Alcohol, Tobacco, Firearms and Explosives. *Id.*

<sup>173</sup> *Id.*

year.<sup>174</sup> They had worked approximately 200 fire scenes.<sup>175</sup> The court was given a detailed account of PJ's training.<sup>176</sup> During training PJ was able to detect as little as one microliter of accelerant.<sup>177</sup> Cannon testified that some of the samples she alerted to in training were too small for a laboratory instrumentation to detect.<sup>178</sup>

Satisfied with their qualifications, the trial court allowed the evidence regarding PJ's alerts.<sup>179</sup> At Yell's trial, Cannon testified that PJ alerted to accelerants at six separate locations.<sup>180</sup> However, the lab analyst who tested the samples PJ had alerted to found that all six samples were negative for accelerant.<sup>181</sup>

Not only did the Court affirm the decision to allow the evidence,<sup>182</sup> it went on to say that *Daubert* does not even apply to such evidence.<sup>183</sup> Evidence gathered from canine accelerant detection "is based on the dog handler's personal observations of the dog's actions relative to his experience with and training of the dog."<sup>184</sup> The Court said a dog alert is not "amenable to peer review or scientific standards and testing. Rather, it concerns the behaviors of the dog and the meanings of those behaviors [as gleaned through] experience and training."<sup>185</sup> Instead of applying *Daubert*, Kentucky said the more appropriate question is foundational: whether the state has established that the dog has a reliable alert record and the handler is qualified to interpret its behavior.<sup>186</sup>

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<sup>174</sup> *Id.* at 334-35.

<sup>175</sup> *Id.* at 335.

<sup>176</sup> The food reward system involved Cannon feeding PJ kibble for correctly alerting ignitable liquids at varying levels. *Id.* During training "PJ [was] exposed to as little as one micro liter (roughly one-half of an eye-dropper) to as much as 15 micro liters of . . . accelerant." *Id.*

<sup>177</sup> *Id.*

<sup>178</sup> A sample may not be sufficient for laboratory testing if too much of the accelerant was consumed in the fire or evaporated. *Id.*

<sup>179</sup> *Id.*

<sup>180</sup> Before alerting, Cannon "calibrated" PJ by having her detect a drop of accelerant away from the scene. *Id.*

<sup>181</sup> Rider testified that in order "for a lab to detect the presence of an accelerant, there needs to be 15-20 parts per million of accelerant in the sample" and that a negative lab test does not necessarily mean that an accelerant was not used. *Id.* at 337.

<sup>182</sup> They were satisfied that it was possible for a dog to detect accelerants at levels lower than laboratory testing could detect. *Id.*

<sup>183</sup> After the submission of briefs for this case, the Court decided another case, *Debruler v. Commonwealth*, 231 S.W. 3d 752 (Ky. 2007), wherein they held that *Daubert* does not apply to evidence derived from canine scent tracking because it "is not grounded in scientific technique, theory or methodology." *Id.* at 336. The Court went on to extend this holding to evidence gathered from accelerant-detecting canines. *Id.*

<sup>184</sup> This is true of scent tracking and accelerant detection. *Id.*

<sup>185</sup> *Id.* (citing *Debruler*, 231 S.W. 3d 752).

<sup>186</sup> The trial court satisfied these requirements at their *Daubert*-style

Interestingly, none of the three states that have refused to allow unconfirmed dog alerts follow *Daubert* either.<sup>187</sup> In *Carr v. State*, the Georgia Supreme Court reversed the defendant's arson conviction when the prosecution relied on an unconfirmed dog alert.<sup>188</sup> In doing so, the Court reasoned that dog alerts had not reached a state of "verifiable certainty."<sup>189</sup> In *People v. Acri*, an Illinois Appellate Court<sup>190</sup> pointed out that the differing viewpoints of arson professionals on the reliability of unconfirmed dog alerts was proof that there is no "general acceptance" in the field.<sup>191</sup> Similarly, in *State v. Sharp*, a New Jersey Superior Court refused to allow the handler's testimony about a dog alert when laboratory testing came back negative because it failed the "general acceptance" test.<sup>192</sup>

#### IV. THE BENEFITS OF ACCELERANT-DETECTING CANINES AND THE LIMITATIONS OF UNCONFIRMED ALERTS

While the use of accelerant-detecting canines is clearly effective in arson investigations, allowing dog handlers to testify to unconfirmed alerts at a trial is a mistake.<sup>193</sup> This Section proposes limiting the use of canine alerts in the courtroom. As a starting point, fire investigators should continue to use accelerant-detecting canines to search fire scenes and collect evidence. However, positive alerts by canines that are unable to be confirmed by laboratory tests should be excluded from trials entirely. Even then, accelerant-detecting canines would serve an important role because they have other potential uses. For example, police and arson investigators could utilize canines to perform on-scene crowd searches.

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hearing before the trial. *Id.*

<sup>187</sup> See Lustre, *supra* note 26 for a breakdown of which states apply *Daubert*, *Frye*, or their own tests.

<sup>188</sup> Fire debris sent to the State Crime Lab was negative for the presence of accelerants but the accelerant-detecting canine, Blaze alerted in a spot investigators had already believed would show the presence of an accelerant. *Carr*, 267 Ga. at 702.

<sup>189</sup> "Verifiable certainty" is the standard required by the Supreme Court of Georgia in *Harper v. State*, 292 S.E. 2d 389 (Ga. 1982). *Id.*

<sup>190</sup> Illinois courts apply the *Frye* standard to scientific testimony. Lustre, *supra* note 26, at III.

<sup>191</sup> See *Acri*, 277 Ill. App. 3d at 1033 (explaining that one faction, led by the Illinois State Police Forensic Science Laboratory believes that evidence of a dog's alert should not be used without laboratory confirmation while the other faction, led by the Canine Accelerant Detection Association believes that dog alerts should be allowed without confirmation).

<sup>192</sup> See *Sharp*, 395 N.J. Super. at 186 (stating that "the scientific theory at issue—that a dog's nose is more accurate than laboratory equipment—is simply *not* supported by experts on fire causation, by scientific literature on the subject, or by judicial opinions."). See Lustre, *supra* note 26, at IV (noting that New Jersey continues to apply *Frye* but also applies some *Daubert* factors).

<sup>193</sup> See *infra* notes 196-212 and accompanying text.

Additionally, even though unconfirmed alerts should be excluded from the courtroom, they could be allowed to establish probable cause for investigators to conduct more extensive criminal investigations into suspicious fires.

To begin with, the canine olfactory system is unquestionably remarkable.<sup>194</sup> Since investigators trained the first accelerant-detecting canine in Connecticut, their use has become commonplace in the United States.<sup>195</sup> They offer numerous benefits to fire scene investigators. The assistance of canines reduces the number of man-hours spent on the scene by fire investigators because of their ability to survey large areas in minimal time.<sup>196</sup> They reduce the number of samples a technician needs to collect and eliminate a lot of the guess work that investigators were forced to perform without them.<sup>197</sup> A 1995 study by Tindall and Lothridge confirmed that positive alerts signal a high probability that an accelerant is present.<sup>198</sup> For all of these reasons, accelerant-detecting canines should continue to be utilized in evidence collection.

While canine handler teams can clearly assist arson investigations, positive accelerant alerts should be excluded from trials when they are not confirmed by laboratory tests.<sup>199</sup> To

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<sup>194</sup> See Reta Tindall & Kevin Lothridge, *An Evaluation of 42 Accelerant Detection Canine Teams*, 40 J. FORENSIC SCI. 561, 563-64 (1995) (finding that of the five canines tested on detectability limits, four of the canines were able to detect gasoline at the level of 0.005 microliters). This was the minimum amount their syringes could dispense. *Id.* at 564. The laboratory equipment, on the other hand, could only detect 0.1 microliters of gasoline. *Id.* at 563.

<sup>195</sup> See TIMOTHY JONAS & ERNEST BUEKER, ACCELERANT DETECTION CANINES USES AND MISUSES (1999), available at [www.nciaai.com/training/doc\\_download/1-accelerant-detection-canines](http://www.nciaai.com/training/doc_download/1-accelerant-detection-canines) (explaining that there are 45 accelerant detection canine teams trained by The Bureau of Alcohol, Tobacco, and Firearms and approximately 200 when state, municipal, and privately trained canines are added to that figure).

<sup>196</sup> See *id.* (noting the mobility of canines enables canine teams to cover large areas in half the time it would take an investigator to search the same area).

<sup>197</sup> See *id.* (mentioning that using canine teams means investigators do not have to take “pot shot” or random samples based on their observations of fire patterns).

<sup>198</sup> Forty-two canine teams were tested on their ability to discriminate between fires started with and without gasoline. Tindall & Lothridge, *supra* note 202, at 562. The statistics revealed that the canines were accurate 96.7% of the time. *Id.*

<sup>199</sup> See Carl Chasteen et al., *IAAI Forensic Science Commission Position on the Use of Accelerant Detection Canine*, 40 J. FORENSIC SCI. 532, 533 (1995) (arguing that the chemical processes that enable canines to alert to accelerants are not fully understood and that allowing the trier of fact to hear testimony regarding unconfirmed alerts “does not present the trier of fact with accurate data within the scope of scientific certainty.”); John Lentini, *The Evolution of Fire Investigation*, 1977-2011, FIRESCIENTIST.COM (2012) [hereinafter *Evolution of Fire Investigation*], [www.firescientist.com/Documents/The%20Evolution%20of%20Fire%20Investigation,%201977-2011.pdf](http://www.firescientist.com/Documents/The%20Evolution%20of%20Fire%20Investigation,%201977-2011.pdf) (describing the cases of *U.S. v. Hebshie* and *Ga. v. Carr* as cases where accelerant-detecting canines were misused to gain



illustrate why, it is helpful to examine other ways investigators use canines.<sup>200</sup> Drug-sniffing canines are trained to alert to a variety of illicit substances.<sup>201</sup> When a drug-sniffing canine alerts on a suspect's bag, it gives the police probable cause to search the bag.<sup>202</sup> However, if the police search turns up no drugs, the suspect is obviously not charged. The same applies with bomb-sniffing canines. No bomb uncovered after an alert, no criminal charges. Yet, for some reason, some courts treat unconfirmed alerts from accelerant-detecting canines differently.<sup>203</sup>

As discussed in Section III.B, the National Fire Protection Association cautions against using unconfirmed alerts in prosecutions.<sup>204</sup> While canines can be very effective tools for fire investigators, they are not infallible.<sup>205</sup> False positives can happen if a dog is triggered by petroleum distillates leftover from common synthetic materials.<sup>206</sup> Moreover, the aforementioned study testing the effect of handler beliefs on canine alerts confirms that handler

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convictions); NFPA, *supra* note 40, §16.5.4.7 at 125 (suggesting that the proper use of accelerant detecting canines is to “assist with the location and selection of samples.”).

<sup>200</sup> See Wagner, *supra* note 70, at 3 (noting that prior to being used for accelerant detection, canines had been used successfully for some time in drug and bomb detection).

<sup>201</sup> Because of their sensitive noses, drug-sniffing dogs can detect even minute amounts of a particular odorous substance. Anna Lesniak et al., *Canine Olfactory Receptor Gene Polymorphism and Its Relation to Odor Detection Performance by Sniffer Dogs*, 99 J. OF HEREDITY 518, 518 (2008), available at <http://jhered.oxfordjournals.org/content/early/2008/07/29/jhered.esn057.full.pdf>. They are also easily trained and willing to cooperate with humans. *Id.*

<sup>202</sup> See *Florida v. Harris*, 133 S. Ct. 1050, 1054 (2013) (affirming a police officer's determination that he had probable cause to search a vehicle after his drug-detection canine alerted). The United States Supreme Court reversed the ruling of the Florida Superior Court, which required the State to establish the dog was reliable enough to establish probable cause based on field performance records. *Id.* at 1056; *United States v. Dixon*, 51 F.3d 1376, 1379-80 (8th Cir. 1995) (finding probable cause to search when canine sniff alerted officer to presence of drugs in suspect's bag); *United States v. Garcia*, 42 F.3d 604, 605-06 (10th Cir. 1994) (finding probable cause to search luggage based on alert of canine after sniff of checked bags in Amtrak luggage compartment), cert. denied, 115 S. Ct. 1713 (1995).

<sup>203</sup> *E.g.*, *Yell*, 242 S.W. 3d at 336; *Reisch*, 1993 Del. LEXIS 229, at \*6; *Buller*, 517 N.W.2d at 713-14; *Jackson*, 2008 Mich. App. LEXIS 958, at \*6-7; see also *Fitts*, 982 S.W. 2d at 179 (indicating that multiple alerts were made by the dogs but only one was confirmed as an accelerant in the lab).

<sup>204</sup> See *supra* note 125 and accompanying text.

<sup>205</sup> See JONAS & BUEKER, *supra* note 195 (explaining that while a positive alert may indicate the likely presence of an accelerant, it may also be explained by the presence of some pyrolysis products); Chasteen, *supra* note 199, at 533 (listing some common products like carpet, plywood adhesives, and cleaning products as producers of vapors that the canine is unable to distinguish from deliberately poured ignitable liquids).

<sup>206</sup> Chasteen, *supra* note 199, at 533; see *supra* text accompanying notes 75-76.

bias does have an impact on false positive alerts.<sup>207</sup> Often times a handler has already formed a belief about how the fire started when he arrives at the scene.<sup>208</sup> The study suggests that relying on alerts in those cases would be a mistake.<sup>209</sup> Lab confirmation would solve the problem, yet many courts do not require it.<sup>210</sup>

Even if a court were to find that the unconfirmed alert is “generally accepted” under *Frye*, sufficiently reliable under *Daubert*, or meets the foundational requirement Kentucky found appropriate in *Yell*, the evidence is often too prejudicial to the defendant.<sup>211</sup> Dogs are the most commonly owned pets in the United States.<sup>212</sup> The question of whether jurors are unduly influenced by canine evidence because of their love for a pet is certainly worth asking.<sup>213</sup> In fact, Illinois refuses to admit canine tracking evidence because of its potential prejudicial impact.<sup>214</sup> The same reasoning could apply to canine accelerant alert evidence as well.

Even with this restriction, unconfirmed alerts would continue to have potential value *outside* of the courtroom. Accelerant-detecting canines should be used, if available, for crowd searches during fire suppression efforts. Many arsonists set fires to draw attention to their behavior.<sup>215</sup> They often desire control and

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<sup>207</sup> See *supra* text accompanying notes 145-50.

<sup>208</sup> See, e.g., Pitts, *supra* note 1 (discussing the misguided investigations into Carl Caples and Barbara Sloan where the fire investigators had preconceived ideas about the use of accelerants before the dog was brought in); *Hebshie*, 754 F. Supp. 2d at 103 (stating that Lynch took Billy to the area of the store where investigators had concluded the fire started). Moreover, once Billy alerted and a sample was taken they stopped the canine sweep and collected no more samples. *Id.*

<sup>209</sup> See Lit et al., *supra* note 145 (concluding that handler beliefs affect working dog outcomes).

<sup>210</sup> See *supra* note 168 and accompanying text.

<sup>211</sup> See, e.g., Fed. R. Evid. 403 or similar state rules as methods by which courts may exclude otherwise relevant evidence.

<sup>212</sup> See American Veterinary Medical Association, *U.S. Pet Ownership Statistics*, AVMA.ORG (2012), [www.avma.org/KB/Resources/Statistics/Pages/Market-research-statistics-US-pet-ownership.aspx](http://www.avma.org/KB/Resources/Statistics/Pages/Market-research-statistics-US-pet-ownership.aspx) (last visited April 1, 2015) (listing the number of households that own at least one dog at 36.5% in 2012).

<sup>213</sup> The dissent in *Yell* said he “believe[d] there is a high probability that the specter of good ol’ PJ, mans’ best friend, who even the judge said would not lie, overshadowed all the other evidence in this case and played a highly prejudicial role in convincing the jury to convict Appellant of *intentional* arson.” *Yell*, 242 S.W. 3d at 344 (Scott, J., concurring in part and dissenting in part).

<sup>214</sup> In *People v. Cruz*, the State used the testimony of a handler regarding his dog’s scent-tracking of the defendant to argue that a confessed killer had not acted alone. 162 Ill. 2d 314, 368 (Ill. 1994). While doubting that the evidence presented was reliable at all, the court reversed on the ground that its potential prejudice was too great. *Id.* at 370. The court pointed out that “[t]he very name by which the animal is called [i.e., bloodhound] has a tendency to enhance the impressiveness of the performance.” *Id.*

<sup>215</sup> See Matthew Rosenbaum, *Inside the Mind of an Arsonist*, ABC NEWS (Jan. 2, 2012), <http://abcnews.go.com/US/mind-arsonist-head-los-angeles-fire->

power.<sup>216</sup> For these reasons, about one-third of arsonists return to the scene of their crime to watch firemen attempt to put out the fire.<sup>217</sup> Using accelerant-detecting canines to search crowds during fire suppression efforts may allow police and investigators to identify a suspect who unknowingly left traces of an accelerant behind on his hands or clothing.<sup>218</sup> While a positive alert at the scene does not necessarily mean that person started the fire, it may give police probable cause to investigate them further.<sup>219</sup>

Beyond crowd searches, investigators may find unconfirmed alerts useful in securing a criminal search warrant.<sup>220</sup> Fire fighters do not need a warrant to enter a building in response to a fire.<sup>221</sup> The United States Supreme Court has held that an active fire scene is an emergency and that investigators do not need a warrant to enter and determine origin and cause while the fire department is still at the scene.<sup>222</sup> Even if fire fighters have left the scene, a warrant is not required for a “reasonable time” after extinguishment.<sup>223</sup>

But if a reasonable time has passed after the fire, a warrant is required unless the owner gives investigators consent.<sup>224</sup> In *Michigan v. Tyler*, the United States Supreme Court created the administrative search warrant for fire investigation.<sup>225</sup> Given the

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starters/story?id=15274504 (reporting the opinions of former FBI Agent Brad Garrett who described anger, revenge, and attention as common motives of arsonists).

<sup>216</sup> *Id.*

<sup>217</sup> Agent Garrett speculated that an arsonist returning to the scene may be thinking, “I created this scene, I’m actually controlling what they’re doing because I started the fire.” *Id.*

<sup>218</sup> See JONAS & BUEKER, *supra* note 195 (claiming that because canines are social animals using them to search crowds around a fire scene causes no threat to the public). See also Wagner *supra* note 70, at 9 (mentioning that fires often attract “curious onlookers” and that canine teams can be deployed to investigate them).

<sup>219</sup> A positive alert “may . . . give the investigator/handler probable cause to obtain a search warrant to conduct a clothing line-up search with the canine.” JONAS & BUEKER, *supra* note 195.

<sup>220</sup> See Evolution of Fire Investigation, *supra* note 199, at 10 (stating that no jury should ever hear about an unconfirmed alert but that it might be acceptable in the context of establishing probable cause to search further).

<sup>221</sup> See Burnette, *supra* note 41 (explaining that an active fire is an emergency for purposes of the Fourth Amendment of the Constitution).

<sup>222</sup> “Fire officials are charged not only with extinguishing fires, but with finding their causes.” *Tyler*, 436 U.S. at 510. “Immediate investigation may . . . be necessary to preserve evidence from intentional or accidental destruction.” *Id.* The sooner the investigation happens, the sooner the interference with the privacy interests of the victims is over. *Id.*

<sup>223</sup> *Id.*; see also Burnette, *supra* note 41 (pointing out that the Court did not define “reasonable time” in *Tyler*).

<sup>224</sup> See *Tyler*, 436 U.S. at 511 (holding that “additional [non-consensual] entries to investigate the cause of the fire must be made pursuant to the warrant procedures governing administrative searches.”).

<sup>225</sup> *Id.*

importance of determining how a fire started, judges are quick to approve these warrants.<sup>226</sup> Unlike the more demanding standard of probable cause necessary to obtain a traditional search warrant,<sup>227</sup> arson investigators seeking an administrative warrant need only show that a fire occurred and that the cause and origin are undetermined.<sup>228</sup>

The administrative search limits the investigator, though. For example, they cannot search areas unaffected by the fire.<sup>229</sup> To conduct a more extensive search of a fire scene for evidence of arson, investigators need a traditional criminal search warrant with probable cause.<sup>230</sup> Knowing that, one can imagine situations where an unconfirmed alert could be useful to investigators. For instance, a canine handler team may search a suspicious fire scene pursuant to an administrative warrant and get an unconfirmed alert. Rather than charge the defendant based on potentially unreliable evidence, investigators could instead use the alert in their application for a traditional criminal search warrant. This is what happens with drug and explosive alerts.<sup>231</sup> An alert to drugs or explosives gives investigators probable cause to investigate further. The same should apply in arson cases.

During their subsequent criminal investigation, investigators would be given more latitude to search for evidence of arson in areas unaffected by the fire. For example, while searching an unaffected bedroom investigators may discover evidence that valuable electronics are missing or pictures have been removed from the walls, indicating that the fire was set deliberately and the occupants

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<sup>226</sup> “[A] fire victim’s privacy must normally yield to the vital social objective of ascertaining the cause of the fire, [but] the magistrate can perform the important function of preventing harassment by keeping that invasion to a minimum.” *Id.* at 507-08.

<sup>227</sup> In traditional probable cause determinations judges and magistrates make decisions based on the “totality-of-the circumstances.” *Illinois v. Gates*, 462 U.S. 213, 238 (1983). The task of the issuing magistrate is to decide whether, given the “totality-of the circumstance” presented to him, “there is a fair probability that contraband or evidence of a crime will be found in a particular place.” *Id.*

<sup>228</sup> *Burnette*, *supra* note 41; *Cf. Tyler*, 436 U.S. at 507 (noting that the magistrate still must balance privacy interests of occupants). Factors the magistrate might consider include: “the number of prior entries, the scope of the search, the time of day when it is proposed to be made, the lapse of time since the fire, the continued use of the building and the owner’s efforts to secure it against intruders.” *Id.*

<sup>229</sup> *Burnette*, *supra* note 41.

<sup>230</sup> *See Tyler*, 436 U.S. at 512 (holding that “[e]vidence of arson discovered [pursuant to the restrictions of the administrative warrant] is admissible at trial, but if the investigating officials find probable cause to believe that arson has occurred and require further access to gather evidence for a possible prosecution, they may obtain a warrant only upon a traditional showing of probable cause applicable to searches for evidence of crime.”).

<sup>231</sup> *See supra* note 202 and accompanying text.

removed them. With additional evidence, investigators may be able to charge the occupant despite not having an alert to rely on at trial.

## V. CONCLUSION

The wrongful arrest of Carl Caples and the wrongful convictions of Cameron Todd Willingham and James Hebshie illustrate the importance of conducting proper arson investigations. Given the high stakes and the potential for false positive alerts, no jury should hear evidence of unconfirmed canine alerts. Instead, canine handler teams should be limited as proposed in Section IV. These teams should continue to assist in gathering evidence at the scene and conduct crowd searches. Unconfirmed alerts, while improper if offered as evidence at trial, should be used in the limited circumstance of establishing probable cause for criminal search warrants.