Criminal Law’s Science Lag: How Criminal Justice Meets Changed Scientific Understanding

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Introduction

In 1996, Andrew Babick was convicted of arson and felony murder and sentenced to life in prison when a jury found that he had set the home of his drug dealer ablaze, killing two sleeping children. Babick claimed that he had not been involved and that the fire must have been accidental. As a federal appeals court deciding Babick’s habeas petition would later observe, the direct evidence of Babick’s culpability was thin: While Babick admitted that he had visited the home twice the night of the fire, only the shaky and self-interested testimony of the home’s owner established that Babick had visited close in time to the blaze.

But other aspects of the state’s case were powerful. The state presented two experts in fire science who testified that their investigation of the crime scene revealed that the fire had been deliberately set. Drawing on then-widespread beliefs in the fire-investigation community, the state’s expert testified that the characteristics of visible burn patterns, including their lack of a “V” shape, established that the fire had been caused by flammable liquid poured throughout the home. Also appearing as a state’s expert was a fire-department dog handler who testified that his dog, Samantha, had canvassed the crime scene and alerted to the smell of fire accelerants—a technique pioneered by the Bureau of Alcohol, Tobacco, and Firearms in 1982. Although laboratory testing had not detected accelerants inside the home or on evidence recovered from Babick, the handler testified that Samantha’s detection abilities were more sensitive than laboratory

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equipment and that the dog was “100 percent correct every time” she alerted to chemicals.7

Babick’s lawyer attempted to mount a challenge to the scientific evidence, but was unable to find experts willing to testify contrary to the state’s proffered analysis.8 This was so, notwithstanding that four years prior to Babick’s trial the National Fire Protection Association had published NFPA 921, a Guide for Fire and Explosion Investigations (NFPA 921), which set forth several concepts of fire science and procedures for fire investigation that contradicted the state’s experts’ use of burn patterns to identify accelerant.9 In particular, NFPA 921 recognized that advances in scientific understanding had displaced conventional wisdom about the observed traits of natural and accelerant-driven burn patterns with the concept of “flashover”—a stage of fire in which combustion makes naturally and accelerant-caused burn patterns frequently indistinguishable.10 NFPA 921 also rejected the use of canine alerts not confirmed by laboratory analysis.11

Widespread acknowledgement and acceptance of NFPA 921 in the fire-investigation field took time, however. Fire-investigation training and practice increasingly rejected visual burn-pattern analysis as a reliable method of identifying chemical accelerant.12 In 2000, the Department of Justice’s Technical Working Group on Fire/Arson Scene Investigation published a report identifying NFPA 921 as the “benchmark for the training and expertise of” fire experts,13 a conclusion that courts increasingly reached as well.14 In 2014, Babick, represented by lawyers from the

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9. FARMAN ET AL., supra note 5, at §§ 9:28, 9:46–49 (relating the history of NFPA 921 and discussing areas of scientific agreement and disagreement between the guide and fire investigators).
10. Id. at § 9:31 (describing the tendency of some natural fires to appear as if they were caused by ignitable liquids).
12. Lentini, supra note 6, at 15–18 (explaining the changing approaches to flashover burns and other burn-pattern analysis).
University of Michigan Law School Innocence Clinic, persuaded a Michigan state court that the eighteen years since his conviction had seen the emergence of a new consensus surrounding fire science and that this constituted newly discovered evidence warranting a new trial.¹⁵

Babick’s case is one of hundreds of arson convictions whose factual basis has been undermined by significant new developments in fire science.¹⁶ It is also one of many, many more convictions in which scientific testimony that passed muster at the time of trial is substantially called into question by changed understanding in the relevant field.¹⁷ Of course, the potential for changed scientific understanding to undermine the factual basis for criminal convictions is endemic to the justice system’s use of scientific evidence in adjudicating guilt. Law’s quest for truth must end at some point; we call that point “justice” and accept, to a degree, the socially constructed nature of its truth function.¹⁸ Science, by contrast, embraces contingent understanding, subject to testability and empirical support.¹⁹ Law cannot, of course, fully bend to science’s pace and manner of truth production. But neither can it shut its eyes to scientific change without compromising the integrity of justice. The consequences of that incomplete accommodation are magnified in criminal law, where the individual and societal costs of error are at their peak.

The central normative claim of this Article is that the criminal justice system does far too little to grapple with the implications of scientific change for its truth-finding functions. Andrew Babick’s case is unrepresentative in an important respect: relief from a conviction premised on expert evidence

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¹⁹. See Mnookin et al., supra note 18, at 744 (explaining that in science, “answers are always provisional and can be updated”); Schuck, supra note 18, at 16 (“[S]cience is committed to a conception of truth . . . reached through a conventional methodology of proof.”).
evidence that was, but is no longer, viewed as valid by the scientific community is exceedingly rare. The result is what the Article dubs a “science lag”: even as scientific understanding evolves, criminal justice outcomes whose epistemic bona fides depend on the reliability of that science remain rooted in discredited knowledge.

While there is no reason to think that this type of science lag is confined to criminal law,20 this Article identifies special features of the criminal justice system that perpetuate the lag and confound efforts to mitigate it. Academic attention to the criminal law’s grappling with changed scientific understanding specifically has to date tended to focus on legal, doctrinal barriers to the receipt of quality, current science information in the courtroom.21 These are important concerns. But criminal law’s science lag is significantly more pervasive and systemic. In fact, as the Article will argue, every institutional actor engaged in the production and use of scientific evidence in criminal cases is poorly situated or incentivized to find or correct the errors that changed science can reveal. One implication of this observation is that even if we fashioned legal doctrinal fixes, as some have suggested, the lag would remain. Thus, identifying the institutional, structural forces that conspire against remediying the science lag suggests potential solutions that attend to nonjudicial spaces.

Clarity about the limited scope of the inquiry here is in order. I attend only to the question of how the criminal justice system does, and should, take changed science on board with already adjudicated, presumptively “final,” case determinations.22 This slices off at least three related and important areas of inquiry. First, the Article is concerned only with changed science, and not scientific evidence that was demonstrably erroneous or even fraudulent at the time that it was presented. Such circumstances are troubling, but as Part II will discuss, the criminal justice system has in place a better infrastructure for addressing such cases than it has for addressing truly changed science. Second, the Article is concerned only with the narrow question of how the criminal justice system treats already-adjudicated cases in light of relevant changed science. It does not, except in passing, deal with the larger, important, and vexing question of whether the criminal justice system has optimal mechanisms for scientific


22. Moreover, my analysis largely assumes conviction at trial rather than by plea. I do not discuss the important and challenging question of the extent to which postconviction claims of changed science should upend convictions by guilty plea.
change to occur and influence adjudication in an ongoing, prospective sense. 23 Third and perhaps most significantly, the Article does not grapple with the difficult question of identifying a rule or set of standards that would signal to the legal system that scientific change has occurred. I assume for purpose of the discussion here that such change does occur, that there are some instances (fire science, for example) where there is a high degree of consensus within the scientific-expert community about the nature of that change, but that scientific understanding frequently resides in a gray area of transition. 24 Sorting through that gray area is an important project left largely to another day.

A final category of gray area is worth highlighting before proceeding. This Article uses the term “science” capaciously. I mean to encompass not only fields well-accepted as grounded in the theoretical and professional underpinnings of science, but also the entire field of “forensic science” in the criminal law. 25 Many techniques of analysis widely understood to be part and parcel of the forensic sciences have been roundly criticized as lacking a research base, validation, peer review, or any other connection to principles of scientific investigation. 26 Significantly, and largely as a result of a significant report published by the National Academy of Sciences in 2009, the field of forensic science is in the midst of a professional and cultural shift that is pushing on its constituent disciplines to respond to these criticisms and develop the kind of basic research that can validate—or invalidate—the claims made by experts in the field. 27 The central relevance

23. Cf. Mnookin et al., supra note 18, at 744–49 (discussing how forensic scientists rely on the longstanding use of a technique to infer scientific validity rather than empirical validation of that technique).


of this movement to the arguments in this Article is that as attempts to examine and validate forensic science increase, questions of how to deal with changes in understanding become only more pressing.

The Article proceeds as follows. Part I makes the case that a science lag is undesirable, situating evolving scientific understanding in the context of the criminal law’s general hostility toward undoing final judgments and revisiting factual accuracy. Part II describes the systemic nature of the science lag. Part III closes with reflections on how the science lag’s systemic properties can be countered with multi-institutional reforms.

I. The Undesirability of Criminal Law’s Science Lag

Before documenting the causes of the science lag in Part II, it is well to consider first whether what this Article treats as a glitch is in fact a feature of our criminal justice system. After all, our system of criminal adjudication erects a high presumption against correction of error once a fact finder renders a determination of guilt.28 The imperative of factual accuracy embodied by the trial burden of beyond a reasonable doubt eventually recedes, and error correction is left, in the main, as a matter of grace.29 Accountability for this state of affairs is traditionally laid at the door of the deceptively complex value of “finality.”30 Continuous litigation drains scarce judicial resources; the passage of time degrades memory and other attributes of evidentiary quality; evidence favorable to the defense that arrives late in time is viewed as opportunistic and suspect; delay in transition from adjudication to punishment undermines deterrence; and victims, society, and defendants have an interest in repose: these are the interests typically cited as served by finality in the criminal justice system, and the courts are ever vigilant that they not be undermined.31


31. For an extreme example of such vigilance, see Strack v. Pelton, 637 N.E.2d 914, 916 (Ohio 1994). (“We are not unaware that our decision in effect declares as static a state of facts that reliable scientific evidence contradicts. Nonetheless, there are compelling reasons that sup-
But finality is not a trump card. Its animating concerns must be, and are, balanced against the criminal justice system’s enduring concern for accuracy and, relatedly, legitimacy. Hence, defendants can make use of limited postconviction avenues for relief from verdicts tainted with procedural or, to a lesser extent, factual error.\(^{32}\) Indeed, changed science has already worked to widen these routes, as reflected by the enactment in every jurisdiction of statutes permitting postconviction DNA testing and some pathway to a new trial based upon such results.\(^{33}\) Of course, few scientific changes approximate DNA in terms of the potential for certainty that it injects into criminal processes. Frequently, scientific consensus gives way to controversy rather than new agreement.\(^{34}\) Nevertheless, there is good reason to open criminal judgments to revision in light of changed scientific understanding without categorical distinction (as the law currently features) between DNA and all other forms of evidence.\(^{35}\)

To begin, changed scientific evidence lacks many of the characteristics that traditionally cause courts to be skeptical about the value of revisiting final criminal judgments. Unlike newly discovered witnesses or recantations, such evidence is not suspect by virtue of being late discovered.\(^{36}\) Changed understanding within a scientific community is a category of information uniquely outside the control of a defendant, and the passage

\(^{32}\) See infra subpart II(A).


\(^{34}\) See supra note 31 (listing examples of courts preferring finality over the fluidity of science). Forensic DNA analysis, of course, has seen its fair share of controversy and shifting consensus. JAY D. ARONSON, GENETIC WITNESS: SCIENCE, LAW, AND CONTROVERSY IN THE MAKING OF DNA PROFILING 146–58 (2007) (recounting the “DNA Wars” in the early 1990s over the use and regulation of DNA forensic analyses).

\(^{35}\) A small number of jurisdictions permit convicted individuals to seek other, non-DNA forms of forensic testing that were not available at the time of their original trial. E.g., 725 ILL. COMP. STAT. ANN. 5/116–3 (West 2008) (permitting convicted individuals to apply for DNA, fingerprint, or ballistics analysis not conducted or unavailable at time of trial).

\(^{36}\) For an early pronouncement on this issue, see Shields v. State, 45 Conn. 266, 270 (1877), in which the court noted:

After the trial is over and the accused stands convicted, with the heavy penalty of the law impending and just ready to fall upon him, how easy by artful or even honest suggestion to awaken a sympathy even in the heart of the victim . . . who naturally feels responsible for the conviction; and how easy for such witness by a process of speculation, colored by feeling, to feel and express a doubt about the correctness of the opinion entertained at the time of the transaction.

\textit{Id.}
of time is itself an aspect of the new information’s reliability. Moreover, it is not too idealized a view of expert testimony to acknowledge that scientific experts are commonly accountable to a broader professional community that provides greater accountability and indicia of reliability than many fact witnesses. 37

The case for minimizing criminal law’s science lag rests more squarely, though, on commonly held intuitions about the criminal justice system’s fairness and legitimacy. Confidence in our institutions of criminal justice depends upon the existence of only a tolerable gap between adjudicated outcomes and factual reality. 38 While DNA may be uniquely discriminating in its capacity for identification, it is far from unique among scientific disciplines in its capacity to unsettle epistemic belief. Deborah Tuerkheimer has made this point vividly in the context of child-abuse prosecutions that rest on discredited science surrounding shaken-baby syndrome: in at least some such cases, where experts testified that injuries suffered by a child could only be explained by shaking at the hands of the last-in-time caregiver, the scientific testimony was wholly constitutive of the crime itself. 39

To be sure, in many cases scientific testimony is only a minor or redundant link in a chain of evidence of guilt—though the same relevance concerns arise with DNA and are managed through the use of materiality standards. 40 But even in cases where scientific evidence might appear on first glance to be cumulative, there is often good reason to think that the original scientific evidence was consequential. Commentators have long posited, and social science research now supports, that jurors attach special weight to the testimony of scientific experts. 41 One particularly significant

37. See David S. Caudill & Lewis H. LaRue, Why Judges Applying the Daubert Trilogy Need to Know About the Social, Institutional, and Rhetorical—and Not Just the Methodological—Aspects of Science, 45 B.C. L. Rev. 1, 4 (2003) (noting that the legal commentary on the Daubert factors for expert testimony is dominated by the idealization of scientific accuracy).

38. See Mike Redmayne, Expert Evidence and Scientific Disagreement, 30 U.C. Davis L. Rev. 1027, 1046, 1073 (1997) (arguing that the legal system’s “emphasis on procedural truth” tends to exacerbate disagreements in the scientific community); Schuck, supra note 18, at 22 (“Law’s legitimacy, at least in the long run, rests in part upon its ability to generate outcomes that are more or less correct.”).


40. See, e.g., 18 U.S.C. § 3600(g)(2) (2012) (providing that a motion for new trial shall be granted if DNA test results “considered with all other evidence in the case . . . establish by compelling evidence that a new trial would result in an acquittal”); Tex. Code Crim. Proc. Ann., art. 64.04 (West Supp. 2014) (requiring a finding that had DNA results “been available during the trial of the offense, it is reasonably probable that the person would not have been convicted” to vacate conviction); State v. Parmar, 808 N.W.2d 623, 632–33 (Neb. 2012) (discussing when new DNA evidence would create a substantial likelihood of a different result at trial).

41. Paul C. Giannelli, The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later, 80 Colum. L. Rev. 1197, 1237 (1980). The possibility that this dynamic is undermined by the “CSI Effect”—the notion that exposure to forensic evidence through popular
finding in the context of the emergence of newly available scientific evidence is that jurors are far less apt to perceive weaknesses brought out by attorney cross-examination of expert witnesses than those highlighted by competing experts. In other words, there is reason to think that the new availability of scientific expertise is categorically likely to be material to a hypothetical juror’s deliberation, and that actual jurors may have attached special weight to the information discredited by the new evidence. To the extent that jurors and other legal actors attach special weight to scientific expertise in part because of the epistemic process to which it lays claim—in particular, the process of continuous experimentation and hypothesis testing—it is only right for law to attempt to take that process on board rather than excluding it in the name of finality.

So the legal system should take notice of these changes. At a minimum, changed science should not fare worse than other forms of new information that are permitted in most jurisdictions to reopen proceedings if it undermines the credibility of a verdict. But as Part II demonstrates, unique and systemic barriers suppress receptivity to changed science.

II. The Pathology of the Science Lag

This Part describes what generates the criminal justice system’s science lag. While others have probed individual pieces of the puzzle laid out below—for example, the unevenness of judicial receptivity toward changed

culture has made jurors judgmental toward prosecutors’ scientific evidence (or lack thereof) and, as a result, acquittal prone—has been posited but is contestable. See generally Tom R. Tyler, Viewing CSI and the Threshold of Guilt: Managing Truth and Justice in Reality and Fiction, 115 YALE L.J. 1050 (2006) (positing a range of psychologically plausible juror reactions to scientific evidence in light of exposure to the television show CSI).

42. Shari Seidman Diamond et al., Juror Reactions to Attorneys at Trial, 87 J. CRIM. L. & CRIMINOLOGY 17, 41 (1996) (stating that strong cross-examinations have little to no effect on the weight jurors give to expert testimony). See also Margaret Bull Kovera et al., Reasoning About Scientific Evidence: Effects of Juror Gender and Evidence Quality on Juror Decisions in a Hostile Work Environment Case, 84 J. APPLIED PSYCHOL. 362, 363 (1999) (indicating that jurors are heavily influenced by expert testimony, regardless of validity); Margaret Bull Kovera et al., Expert Testimony in Child Sexual Abuse Cases: Effects of Expert Evidence Type and Cross-Examination, 18 LAW & HUM. BEHAV. 653, 655–56 (1994) (noting that jurors assign more weight to evidence that is viewed as more scientific).


44. See Sheila Jasanoff, Science at the Bar: Law, Science, and Technology in America 42–44, 52–54 (1995) (discussing differences between legal and scientific cultures of truth production); Christopher Slobogin, The Structure of Expertise in Criminal Cases, 34 SETON HALL L. REV. 105, 105 (2003) (predicting in criminal law, as a result of the Daubert trilogy’s emphasis on testability and reliability, a “push . . . away from the notion that knowledge is socially constructed and toward a positivist epistemology that assumes we can know things objectively”).
science as a basis for revisiting criminal verdicts—the aim here is to illustrate how pervasive and systemic the forces are that prevent the criminal justice system from taking changed science on board. Addressing any one force is unlikely to correct the lag.

A. Courts

For reasons explored in Part I, avenues for revisiting criminal convictions in light of new evidence of any sort are highly limited. But changed-science claims face distinctive barriers. This subpart demonstrates why, though it paints with an admittedly broad brush in summarizing appellate and postconviction procedures that, in their details, vary among the fifty states and the federal system.

Following conviction, new evidence might be considered in a criminal case through two primary pathways: a new trial motion or a petition for habeas corpus or coram nobis—the latter of which I will refer to as “postconviction relief.” As to the first, new trial motions typically require a demonstration that evidence was not previously available through an exercise of due diligence and a showing that the new evidence would change the outcome at trial. Most problematically from the standpoint of changed science, however, such motions must be brought within a fixed, short time window from the verdict—sometimes a matter of days or months. Such time limits frequently preclude relief in the context of changed science, evidence of which can emerge only at the pace at which a given scientific consensus evolves. The barrier created by time limitations is only exacerbated by dynamics, described below, that systematically suppress public awareness of scientific shifts.

Postconviction relief, then, is the most likely outlet for changed-science claims. Labyrinthine procedural hurdles—often including restrictive time limits for filing and bars on multiple petitions for relief—will


46. *Id.* at 666–69, 675 (discussing the forms of relief that can be sought to overturn a conviction or seek postconviction relief). *See also* Brandon L. Garrett, *Claiming Innocence*, 92 MICH. L. REV. 1629, 1670–73 (2008) (reviewing procedural difficulties for new trial motions based on “newly discovered evidence of innocence”).

47. *See, e.g.,* Medwed, *supra* note 45, at 666–67 (explaining that equitable concerns historically encouraged courts to grant new trial motions upon discovery of new evidence); Gabel & Wilkinson, *supra* note 21, at 1013–14 (reviewing statutory schemes that provide for new trials in the event of newly discovered evidence).

48. Gabel & Wilkinson, *supra* note 21, at 1014. Three years is the longest time window, applicable in the federal system and a small number of states. *Id.;* FED. R. CRIM. P. 33(b)(1) (“Any motion for a new trial grounded on newly discovered evidence must be filed within 3 years after the verdict or finding of guilty.”).

49. *See supra* Part II.
often prove dispositive barriers to relief.\textsuperscript{50} But even when those barriers can be surmounted, changed-science claims frequently lack a foothold in the available substantive law governing postconviction claims.

First, a changed-science claim is uniquely difficult to shoehorn into a constitutional claim, which is a prerequisite for postconviction relief in federal court\textsuperscript{51} and many state courts.\textsuperscript{52} Neither newly discovered evidence of innocence nor the admission at trial of unreliable evidence proves, by its own force, a constitutional infirmity in a conviction.\textsuperscript{53} To be sure, the Supreme Court has held open the possibility that, at least in a capital case, an “extraordinarily high” showing of actual innocence might demonstrate that a prisoner was held in violation of the Constitution.\textsuperscript{54} But changed science by its own force is unlikely to meet such a threshold. Courts entertaining actual-innocence claims frequently require that claimants offer affirmatively exonerative evidence such as a third party confessing guilt rather than evidence that undermines the cumulative proof at trial, and changed science frequently falls into the latter category.\textsuperscript{55} Moreover, the “extraordinarily high” burden of proof of innocence, designed to leave a


\textsuperscript{51} 28 U.S.C. §§ 2254(a), 2255(a) (2012) (indicating that habeas relief requires a showing of a constitutional violation).

\textsuperscript{52} E.g. LA. CODE CRIM. PROC. ANN. art. 930.3(1) (2008) (stating that habeas relief is granted when constitutional error is shown); OHIO REV. CODE ANN. § 2953.21(A)(1)(a) (West 2014) (same). See also Wyatt v. State, 71 So.3d 86, 97 (Fla. 2011) (describing a defendant’s claim that conviction was unconstitutional under the Supreme Court’s holdings in \textit{Brady v. Maryland}, 373 U.S. 83 (1963), and \textit{Strickland v. Washington}, 466 U.S. 668 (1984)).

\textsuperscript{53} Perry v. New Hampshire, 132 S. Ct. 716, 728 (2012) (“[T]he potential unreliability of a type of evidence does not alone render its introduction at the defendant’s trial fundamentally unfair.”); Herrera v. Collins, 506 U.S. 390, 400 (1993) (“Claims of actual innocence based on newly discovered evidence have never been held to state a ground for federal habeas relief absent an independent constitutional violation occurring in the underlying state criminal proceeding.”). See also Cavazos v. Smith, 132 S.Ct. 2, 4, 7 (2011) (per curiam) (holding that due process was not violated under \textit{Jackson v. Virginia}, 443 U.S. 307 (1979), because new developments regarding shaken-baby syndrome were irrelevant to whether “no rational trier of fact” could have convicted defendant based on trial evidence).

\textsuperscript{54} Herrera, 506 U.S. at 417 (acknowledging that only “a truly persuasive demonstration of ‘actual innocence’ . . . would render the execution of a defendant unconstitutional”).

\textsuperscript{55} E.g., Carriger v. Stewart, 132 F.3d 463, 476–77 (9th Cir. 1997) (explaining that “[r]equiring affirmative proof of innocence is appropriate” in habeas proceedings). See also \textit{Ex parte} Robbins, 360 S.W.3d 446, 458 (Tex. Crim. App. 2011) (holding that relief not warranted where expert reevaluated previously incriminating findings and stated that she “can no longer stand by her trial testimony”).
tiny window open for only the clearest proof of error, is too limiting to appropriately address the science lag.\textsuperscript{56}

Of course, newly discovered evidence can at times expose other errors of constitutional significance.\textsuperscript{57} A new witness discovered by the defense but known to police or prosecutors may establish a violation of due process under the doctrine of \textit{Brady v. Maryland},\textsuperscript{58} or perhaps even a claim of fabrication under \textit{Napue v. Illinois}.\textsuperscript{59} Information that should have been discovered or put to use by trial or appellate attorneys may provide relief through a claim of ineffective assistance of counsel.\textsuperscript{60} Indeed, the Supreme Court has specifically blessed ineffective assistance of counsel claims stemming from counsels’ inadequate deployment of scientific experts: Anthony Hinton recently obtained habeas relief based on his trial attorney’s failure to seek available funds to obtain a ballistics expert other than the inexperienced and thoroughly discredited witness he hired on the cheap.\textsuperscript{61} But changed science can rarely be squeezed into these molds since the essence of the changed science problem is that the prevailing view of experts was accurate at the time of trial, and that the revised understanding was essentially unavailable.\textsuperscript{62} Exemplary is \textit{Wyatt v. State},\textsuperscript{63} in which a Florida man convicted partly on the basis of comparative bullet-lead analysis (CBLA) sought relief from his conviction following the FBI’s concession that the bullet-lead-analysis testimony had since been shown to have “exceeded the limits of the science . . . .”\textsuperscript{64} The new evidence was

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  \item \textsuperscript{56} \textit{Herrera}, 506 U.S. at 417.
  \item \textsuperscript{58} 373 U.S. 83 (1963).
  \item \textsuperscript{59} 360 U.S. 264 (1959).
  \item \textsuperscript{60} Strickland v. Washington, 466 U.S. 668, 686 (1984) (establishing guidance on constitutional claims of ineffective counsel).
  \item \textsuperscript{63} 71 So. 3d 86 (Fla. 2011).
  \item \textsuperscript{64} Id. at 95–96.
\end{itemize}
held favorable but not Brady material since the FBI’s changed view of the science after conviction did not establish that flaws in CBLA were known at the time of trial.\(^{65}\) Nor, for the same reasons, could the trial prosecutors be found to have knowingly presented false evidence in violation of Napue.\(^{66}\) And since CBLA was not discredited until after Wyatt’s trial, his trial lawyer’s failure to reveal the evidence’s flaws did not fall below the objective reasonableness standard for ineffective assistance of counsel.\(^{67}\)

In states that have legislated postconviction pathways not solely dependent on establishing constitutional trial violations, other difficulties arise. Prisoners typically must establish the existence of new evidence that could not have been discovered by reasonable diligence prior to the time of trial, that was brought to the court without unreasonable delay, and that if available at the time of trial would have changed the verdict.\(^{68}\) But frequently, and oddly, changed science evades classification as “new evidence” due to rules excluding impeachment or cumulative information from the ambit of actionable new evidence. Frequently courts’ analysis of what makes scientific evidence merely cumulative seems facile in light of the known potential for scientific testimony to carry an “aura of infallibility,”\(^{69}\) and the known error risk endemic to other types of evidence—as when an expert is held to have simply corroborated eyewitness testimony.\(^{70}\) Courts have also held that evidence that only a portion of the scientific community has rejected earlier-presented views is merely cumulative of actual or potential cross-examination of expert witnesses at trial.\(^{71}\) And some courts have excluded from the ambit of new evidence any information that fails to

\(^{65}\) Id. at 102–03.

\(^{66}\) Id.

\(^{67}\) Id. at 103.

\(^{68}\) Gabel & Wilkinson, supra note 21, at 1014–15.


\(^{70}\) E.g., Dickens v. State, 997 N.E.2d 56, 61 (Ind. Ct. App. 2013) (concluding that the defendant failed to show that exclusion of expert CBLA evidence would make a different result at retrial probable because the CBLA evidence was not what placed the defendant at the scene of the crime, eyewitness testimony did).

\(^{71}\) See, e.g., Commonwealth v. Fisher, 870 A.2d 864, 872 (Pa. 2005) (deciding that discrediting the CBLA expert witness with new criticism of the scientific technique would not exculpate the defendant); Robertson v. State, No. M2013-02023-CCA-R3-CO, 2014 WL 5491315, at *11–12 (Tenn. Crim. App. Oct. 30, 2014) (determining that the FBI’s change of policy on CBLA use was not “newly discovered evidence” because shortcomings were previously known); Peck v. State, No. E2013-01760-CCA-R3-ECN, 2014 WL 3735224, at *3 (Tenn. Crim. App. July 28, 2014) (concluding that defense counsel successfully questioned the witness and accordingly the expert witness testimony did not change the outcome of the trial). For examples of federal courts reaching similar conclusions when considering Rule 33 motions for a new trial, see United States v. Higgs, 663 F.3d 726, 743 (4th Cir. 2011), and United States v. Berry, 624 F.3d 1031, 1040 (9th Cir. 2010).
point affirmatively to innocence.\footnote{E.g., Newby v. State, No. A-10464, 2010 WL 3273502, at *2 (Alaska Ct. App. Aug. 18, 2010) (holding that “the weakness in the CBL analysis does not indicate that there was another perpetrator, establish an alibi, or otherwise tend to establish Newby’s innocence”).} These limitations create inappropriate categorical barriers to relitigation of changed science. The typically incremental evolution of scientific understanding will rarely generate new and uncontroversial consensus as opposed to a new competing view.\footnote{See Berger & Solan, supra note 24, at 852 (noting the frequency of disagreement within the scientific community); infra subpart II(B).} Moreover, the rejection of changed-science claims as mere impeachment of expert testimony already subject to cross-examination ignores the outsized impact that scientific evidence might be thought to have had in a criminal case, as well as the unique hurdles to effectively undermining scientific expert testimony through attorney cross-examination.\footnote{See supra notes 39–42 and accompanying text.}

Of course, not all claims that changed science warrants a new trial should be granted; there are unquestionably instances where scientific evidence at trial played a truly marginal role in proving guilt or where the purported change is of insufficient magnitude or relevance to warrant relief. But current doctrine keeps out too much. More critically, limited litigation options are only one piece of the criminal justice system’s systemic inhospitability to changed science. As subsequent sections will discuss, integrating updated scientific understanding into the criminal justice system founders at the threshold of a range of gatekeepers.

B. Science Itself

Let us consider the role of the scientific community itself. In particular, I focus here on the forensic-science community—researchers, analysts, and testifying experts pursuing their craft with specific application to criminal investigations. This does not exhaust the universe of scientific expertise that might be tapped for criminal proceedings, but it constitutes a significant volume and presents troubling features.

Several relevant characteristics of the forensic-science community have long generated significant academic criticism and were launched into the spotlight by the National Academy of Science’s 2009 report on the field.\footnote{NAS REPORT, supra note 25, at 39–52 (detailing pressures on the forensic-science system).} Forensic-science disciplines have traditionally been, and remain, technically and professionally rooted not in the scientific field but rather within law enforcement.\footnote{See Rachel E. Barkow, Prosecutorial Administration: Prosecutor Bias and the Department of Justice, 99 VA. L. REV. 271, 291–92 (2013) (describing the close relationship between the forensic-science community and law enforcement); Jennifer E. Laurin, Remapping the Path Forward: Toward a Systemic View of Forensic Science Reform and Oversight, 91 TEXAS} With a small number of exceptions—DNA
technology among them—these disciplines are not rooted in any body of research that has application outside of crime fighting and are not practiced by experts who work outside law enforcement. At the same time, most forensic-science disciplines—again with the possible exception of forensic DNA—have an impoverished body of research supporting them and a weak culture of pursuing such validation, for reasons including a lack of grant money for non-DNA forensic-science research and the near absence of academic programs in the field. Those studies that have been performed regarding either practitioner proficiency or the underlying analytical basis for forensic-science methodologies are often either unpublished—indeed, frequently guarded by government entities asserting privilege—or appear in trade journals with minimal circulation outside the given field. And finally, the field has long been, and still remains, highly fragmented and unregulated: forensic scientists operate in thousands of laboratories and law-enforcement organizations with relatively little in the way of standardized practical or ethical guidance.

These attributes generate an array of disincentives and barriers to updating scientific understanding or disseminating changed understanding within the forensic-science field. The lack of an institutional structure for basic research as opposed to application of techniques in the field means that the source of change would by and large be practitioners in (typically law-enforcement-controlled) laboratories rather than comparatively

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L. Rev. 1051, 1060–63 (2013) (showing how the emergence of DNA revealed a lack of oversight in other forensic-science areas).

77. See NAS Report, supra note 25, at 4, 7 (emphasizing forensic-science disciplines’ contribution to the criminal law and defining forensic practitioners to include scientists trained in “chemistry, biochemistry, biology and medicine; laboratory technicians; crime scene investigators; and law enforcement officers”).

78. See Mnookin et al., supra note 18, at 742–44 (describing a research culture as one with empiricism, transparency, and open to critical perspectives).

79. Id. at 754–56, 773–74 (noting the low circulation and access to forensic trade journals and data); Giannelli, supra note 17, at 80–81 (discussing law enforcement suppression of independent studies).

80. See NAS Report, supra note 25, at 15–16, 26 (noting the “extreme disaggregation” of the forensic-science enterprise and the lack of “consistent mechanisms” for enforcing ethical codes); Laurin, supra note 76, at 1063–64 (describing the fragmentation of forensic science). The leading forensic laboratory accrediting authority, the American Society of Crime Laboratory Directors / Laboratory Accreditation Board (ASCLD/LAB), states as one of the “guiding principles” of forensic practice that “[l]aboratory management will take appropriate action if there is potential for, or there has been, a miscarriage of justice due to circumstances that have come to light, incompetent practice or malpractice.” Guiding Principles, AM. SOC’Y CRIME LABORATORY DIRECTORS, http://www.ascldlab.org/guiding-principles, archived at http://perma.cc/QG28-ZZAE. But in the wake of the discovery that FBI hair microscopy analysis had rendered unsupported conclusions, ASCLD/LAB notified accredited crime laboratories of the finding and encouraged, but did not require that the laboratories review their own hair-comparison reports and past testimony. Tex. Forensic Sci. Comm’n, Statement Regarding Texas Hair Microscopy Review 1, available at http://www.fsc.texas.gov/sites/default/files/Statement-Regarding-Texas-Hair-Microscopy-Review.pdf, archived at http://perma.cc/QQ53-THNA.
disinterested researchers. Crime laboratories have every incentive to continue in the methodologies they utilize, both from the standpoint of avoiding costly retraining of employees and to avoid professional friction with the police and prosecutors they disproportionately serve.\footnote{Calls for independent laboratories, seen in a small number of jurisdictions, are inspired largely by these concerns. See, e.g., Paul C. Giannelli, Independent Crime Laboratories: The Problem of Motivational and Cognitive Bias, 2010 Utah L. Rev. 247, 250–58 (describing the variety of biases that plague forensic-science laboratories by virtue of their association with law enforcement offices).} Putting aside institutional or motivational bias, forensic analysts are subject to natural cognitive resistance to updating prior belief and experience that cognitive resistance in an atmosphere where their primary mission is resolving cases rather than pursuing open-ended research. We should therefore expect that discoveries undermining the validity of prior methodologies will in the short or even medium term generate controversy rather than consensus.\footnote{See Laurin, supra note 76, at 1054–55 (discussing the controversy the NAS Report created after questioning the validity of every major forensic methodology).} Consider on this score the field of hair microscopy, in which analysts microscopically examine and compare fibers and testify as to the degree of similarity between them—permitting a jury to conclude that a person shed their hair in a given location.\footnote{NAS REPORT, supra note 25, at 156–57.} As early as 1974, research demonstrated that the technique was so subjective that different analysts reached different results with the same fibers, and ten years later the FBI acknowledged that hair microscopy could not positively identify a hair as belonging to an individual.\footnote{NAS REPORT, supra note 25, at 157–58 (summarizing a 1974 study finding that “it was not possible to get complete reproducibility between two or more examiners coding the same hair” (quoting B.D. Gaudette & E.S. Keeping, An Attempt at Determining Probabilities in Human Scalp Hair Comparison, 19 J. Forensic Sci. 599, 605 (1974))); Brandon L. Garrett & Peter J. Neufeld, Invalid Forensic Science Testimony and Wrongful Convictions, 95 Va. L. Rev. 1, 49 (2009).} And yet FBI analysts testified to precisely such conclusions through much of the 1990s.\footnote{See, e.g., Garrett & Neufeld, supra note 84, at 28 (acknowledging that it is not “difficult to find a host of reported appellate decisions describing invalid forensic science testimony”); Spencer S. Hsu, Convicted Defendants Left Uninformed of Forensic Flaws Found by Justice Dept., WASH. POST, Apr. 16, 2012, http://www.washingtonpost.com/local/crime/convicted-defendants-left-uninformed-of-forensic-flaws-found-by-justice-dept/2012/04/16/gIQAWTwgMT_story.html, archived at http://perma.cc/3FNS-279Z (describing various cases reviewed in the 1990s following “reports that sloppy work by examiners at the FBI lab was producing unreliable forensic evidence in court trials”).} Indeed, history is replete with examples of forensic-science practitioners and the governing bodies within the profession aligning with law enforcement against calls for validation or voices (some scientific) of skepticism.\footnote{See Barkow, supra note 76, at 296–306 (blaming the close ties between law enforcement and forensics labs for much of the scandal, carelessness, and collusion in forensic cases); Simon A. Cole, More Than Zero: Accounting for Error in Latent Fingerprint Identification, 95 J. Crim. L. & Criminology 985, 987–90, 988 n.20 (2005) (discussing the concept of “error rate”}
Moreover, the radical decentralization and absence (at least until recently) of overarching oversight of arson science means that even rumblings of change within a field are not promptly communicated to practitioners. The relative absence of legal or ethical guidance within the field as to what, if any, notification obligations are raised by new discovery vis-à-vis past cases means that received information may not be acted upon. These attributes do much to explain how, as in the Andrew Babick case, it took years before NFPA 921 was even known to experts in the field.

To be sure, the forensic-science community has been in a state of cultural, institutional, and scientific flux since the 2009 NAS Report. Some changes, discussed in Part III, may provide promising levers for ameliorating the science lag. But the inertia and fragmentation that characterizes forensic practice is likely to remain a significant feature of the field for the foreseeable future and to remain a significant structural hurdle to new scientific understanding being generated or ever seeing the light of day.

C. Prosecutors

In the event that new scientific evidence that has the potential to call into question prior criminal verdicts does emerge, prosecutors play an important gatekeeping role for this information. Prosecutors are the primary consumers of scientific evidence in criminal cases. In discussing with forensic experts the potential for examination and testing of physical evidence to yield probative conclusions in case after case, and through periodic professional training, prosecutors are theoretically well-positioned to receive incremental notice that scientific change is afoot. Moreover, in light of their constitutional disclosure duties as well as their relative institutional centralization vis-à-vis a given jurisdiction’s criminal docket, prosecutors are typically the first point of notification when scientific evidence comes under significant public scrutiny. Thus, for example, the

and the myth of fingerprint identification infallibility in forensic fingerprint technology); Giannelli, supra note 17, at 88 (discussing general resistance from the Department of Justice to the NAS Report project on forensic science).

87. See Mnookin et al., supra note 18, at 776 (noting that courts have not required forensic scientists to disclose exculpatory evidence to defense counsel). It is worth noting that fire science is not, unlike most forensic methodologies, a field whose relevance is limited to criminal justice.

88. See supra notes 9–14 and accompanying text.

89. This assumes, contra the discussion in subpart II(A), that experts are themselves updating prior knowledge.

90. See Barkow, supra note 76, at 272–74 (describing the role of prosecutors in superintending criminal processes); Bruce A. Green & Ellen Yaroshefsky, Prosecutorial Discretion and Post-Conviction Evidence of Innocence, 6 OHIO ST. J. CRIM. L. 467, 506 (2009) (“The principal power and responsibility for correcting error—even if not the ultimate legal authority—reside in prosecutors. . . . As a legal matter, and in theory, the power resides elsewhere. . . . But, as a practical matter, the prosecutor has the largest say.”); Erik Luna & Marianne Wade, Prosecutors
Department of Justice and local prosecutor agencies were the first line of
contact when the FBI Laboratory discontinued CBLA testing just as they
had been in prior and subsequent instances of FBI Laboratory error or
malfeasance.\textsuperscript{91} And when defendants seek reexamination of old evidence in
light of new techniques or theories, they must typically obtain that evidence
either with the consent of a prosecutor or through court order in an
adversary proceeding.\textsuperscript{92}

For a variety of reasons, however, after a conviction becomes final
prosecutors are not in fact apt to perceive scientific change or to be
effective conduits of changed science that is squarely before them. To a
large extent, this insight rests on characteristics that have been widely noted
as short-circuiting prosecutors’ ability and inclination to credit or disclose
favorable evidence of all types. The American prosecutor’s function
encompasses a duality: to advocate for the state’s interests in an adversary
contest with the defendant and also to ensure “that justice shall be done.”\textsuperscript{93}

It is the latter function that is vindicated when prosecutors disclose new
evidence undermining the reliability of a prior conviction at obvious
disadvantage to their advocacy position. But personal and institutional
incentives are frequently not aligned for the tension in the prosecutor’s dual
role to be resolved in favor of justice rather than adversarialism. Justice is
an ill-defined goal with an ill-defined constituency; the comparatively
clearer parameters of the adversary role make hewing to pursuit of
conviction a far more tractable goal.\textsuperscript{94} Moreover, the legal, professional,

\begin{footnotesize}

\footnote{92. See Nat’l Comm’n on the Future of DNA Evidence, U.S. Dep’t of Justice, Postconviction DNA Testing: Recommendations for Handling Requests, at xv–xvi (1999) (treating prosecutors as loci for postconviction evidentiary release determination); Kreimer & Rudovsky, supra note 30, at 557–60 (describing the importance of the prosecutorial role in determining postconviction access to evidence). The origin and legal basis for the widespread assumption that prosecutors are the legal custodians of evidence post-trial is, to my knowledge, unclear.}

\footnote{93. Berger v. United States, 295 U.S. 78, 88 (1935).}

\footnote{94. See, e.g., Fred C. Zacharias, Structuring the Ethics of Prosecutorial Trial Practice: Can Prosecutors Do Justice?, 44 VAND. L. REV. 45, 46–49 (1991) (discussing the dual and often vague role of professional duty and responsibility in criminal cases and stating that “[i]ts vagueness leaves prosecutors with only their individual sense of morality to determine just conduct”).}
\end{footnotesize}
and psychological environment in which prosecutors act incentivizes conviction and renders prosecutorial embrace of the possibility of a defendant’s innocence, certainly after the time of charging, a far riskier move. At bottom, prosecutors’ supposed mandate to subordinate advocacy to justice is poorly defined and incentivized.

The tension between adversary zeal and justice might be thought to recede in the postconviction context where prosecutors are not acting in the heat of battle. In fact, the disincentives to act as a brake on potential error are exacerbated. A conviction not only shifts the legal presumption of innocence but also solidifies a prosecutor’s cognitive commitment to belief in a defendant’s guilt. Acknowledging the potential for error entails significant personal costs—especially if the case is the prosecutor’s own, but even if it was handled by a colleague—and political risks, as public reaction to an erroneous confession of error will assuredly be negative. Individual prosecutors have substantial caseloads and little (if any) time or incentive to add to their burden by reinvestigating old cases. And legal and ethical constraints that might recalibrate prosecutorial incentives are at their weakest in the postconviction context. In contrast to the trial setting, there is no constitutional obligation to disclose exculpatory


97. See Alafair S. Burke, Improving Prosecutorial Decision Making: Some Lessons of Cognitive Science, 47 WM. & MARY L. REV. 1587, 1613 (2006) (suggesting that prosecutors may “cling to the theory of guilt” in postconviction proceedings in order to avoid cognitive dissonance); Fred C. Zacharias, The Role of Prosecutors in Serving Justice After Convictions, 58 VAND. L. REV. 171, 174–75 (2005) (proposing that “prosecutors’ incentives at the postconviction stage militate against taking action that benefits convicted defendants” because “prosecutors properly presume that convicted defendants have received a fair trial and have been punished appropriately”).

98. See Zacharias, supra note 97, at 174 (asserting that postconviction action in favor of defendants “may involve confronting a prosecutor’s own error or undermining the reputation of a colleague who erred” and “invites public distrust of the accuracy of the criminal justice system”).

99. See id. (contending that prosecutorial “action that benefits convicted defendants . . . means undertaking additional work that ordinarily is not required by legal requirements or the demands of supervisors” and claiming that “the overwhelming workloads of prosecutors and the presumption of guilt that attaches to convicted defendants can justify inaction”).

100. See Daniel S. Medwed, The Prosecutor as Minister of Justice: Preaching to the Unconverted from the Post-Conviction Pulpit, 84 WASH. L. REV. 35, 49 (2009) (remarking that “[w]ith respect to ethics, prosecutors encounter few concrete obligations to implement the minister-of-justice ideal in the post-conviction setting”).
evidence following conviction. Ethical rules in this context—even in the wake of new guidance from the American Bar Association—remain contested and, where adopted, probably ineffectual in most cases. The ABA’s proposed standard, for example, would require disclosure of “new, credible and material evidence creating a reasonable likelihood” of innocence, but in appearing to leave to individual prosecutors the determination of materiality or likelihood of innocence, the standard is vague and vulnerable to the cognitive pressures discussed above.

These circumstances suppress prosecutorial receptivity to postconviction favorable evidence of all types. But prosecutorial consideration of changed science faces special hurdles. First, as to the notion that individual prosecutors might be counted on to perceive scientific evolution because of their repeat-player status, that potential is undermined by the slow and incremental nature of that change combined with a typically high degree of turnover among prosecutors. Prosecutors with significant, ongoing caseloads are highly unlikely to recognize the exculpatory potential of evolved scientific understanding in any particular closed case—which is the sort of particularized knowledge that is required to trigger ethical rules of disclosure—even if they could overcome the above-discussed barriers to embracing the credibility and materiality of such information.

101. See Dist. Attorney’s Office for the Third Judicial Dist. v. Osborne, 557 U.S. 52, 68–69 (2009) (holding that the constitutional obligation to disclose material exculpatory evidence does continue after the defendant is convicted); Arizona v. Youngblood, 488 U.S. 51, 57–58 (1988) (holding that “unless a criminal defendant can show bad faith on the part of the police, failure to preserve potentially useful evidence does not constitute a denial of due process of law” even though the evidence might be beneficial to the defendant).

102. MODEL RULES OF PROF’L CONDUCT R. 3.8(g), (h) (2014); see Bruce A. Green, Prosecutors and Professional Regulation, 25 GEO. J. LEGAL ETHICS 873, 889–93 (2012) (recounting opposition “to new state rules of professional conduct based on ABA Model Rules 3.8(g) and 3.8(h)").

103. MODEL RULES OF PROF’L CONDUCT R. 3.8(g) (2014). See Stephen A. Saltzburg, Changes to Model Rules Impact Prosecutors, CRIM. JUST., Spring 2008, at 1, 13 (discussing the ABA’s new standards in Model Rules 3.8(g) and 3.8(h), but noting that “not everyone was persuaded that [these sections] provided clear enough guidance to prosecutors”).


105. See Green & Yaroshefsky, supra note 90, at 511–12 (quoting MODEL RULES OF PROF’L CONDUCT R. 3.8(g)) (arguing that the administrative function of investigating and evaluating new evidence should be separate from the adversarial function, which is often burdened with bias and close mindedness and noting that ABA Model Rule 3.8(g) only requires a postconviction reinvestigation when “the prosecutor in the office where the conviction was obtained learns of ‘new, credible and material evidence creating a reasonable likelihood that’ the convicted defendant [was] innocent”); Medwed, supra note 100, at 53–57 (noting that “the post-conviction
Additionally, the prosecution function is, as with the American criminal justice system as a whole, highly fragmented; there are more than 2,300 prosecutors’ offices in the United States, which are generally (with the exception of the federal system and a few states) operating entirely autonomously. This means that scientific change, even if perceived by one pocket of the system, will be slow to circulate.

Perhaps most problematic from the standpoint of prosecutors as gatekeepers of scientific change is the fact that, in contrast to evidence undermining the validity of a single case, shifted science threatens to upset an array of convictions, past and future. Consider on this score the example of scientific controversies surrounding shaken-baby-syndrome diagnoses. While courts have begun to view the prior consensus about a unique etiology of shaken-baby injuries as undermined by developments in the medical field, the prosecutorial community has been far more skeptical.

Indeed, prosecutors today still are routinely trained that child-abuse and death cases can reliably rest on the findings of medical experts who purported to observe injuries whose nature and timing can only be explained by abuse at the hands of caregivers. The prosecutorial community’s stance is unsurprising given the substantial reliance interest bound up in shaken-baby syndrome and the enormous institutional cost that would attend acknowledging error. Thus, even as prosecutors increasingly scope of the duty to disclose exculpatory evidence is far from clear and granting that although the recently amended Model Rule 3.8 offers some guidance, it has yet to be adopted as binding authority).

106. See STEVEN W. PERRY & DUREN BANKS, BUREAU OF JUSTICE STATISTICS, PROSECUTORS IN STATE COURTS, 2007-STATISTICAL TABLES 1 (2012) (finding more than 2,300 state court prosecutors’ offices operating in 2007 and noting that “[b]y law, these prosecutors are afforded broad discretion in determining who is charged with an offense and whether a case goes to trial”).

107. See, e.g., Del Prete v. Thompson, 10 F. Supp. 3d 907, 957–58 (N.D. Ill. 2014) (questioning whether the expert medical testimony offered by the defendant regarding shaken-baby injuries would be sufficient to prove causation); Ex parte Henderson, 384 S.W.3d 833, 833–34 (Tex. Crim. App. 2012) (per curiam) (accepting the lower court’s grant of a new trial based on new developments in the field of biomechanics); State v. Edmunds, 746 N.W.2d 590, 598–99 (Wis. Ct. App. 2008) (recognizing a “shift in mainstream medical opinion . . . as to the causes of the types of trauma [the victim] exhibited,” and holding that “the emergence of a legitimate and significant dispute within the medical community . . . constitutes newly discovered evidence”).

108. See Keith A. Findley et al., Shaken Baby Syndrome, Abusive Head Trauma, and Actual Innocence: Getting It Right, 12 HOUSES. J. HEALTH L. & POL’Y 209, 242 (2012) (“In general, prosecutors and child abuse pediatricians continue to strongly endorse the SBS/AHT hypothesis . . . ”). See generally Joëlle Anne Moreno & Brian Holmgren, The Supreme Court Screws Up the Science: There is No Abusive Head Trauma/Shaken Baby Syndrome “Scientific” Controversy, 2013 UTAH L. REV. 1357 (presenting two prosecutors’ views that new medical evidence involving Abusive Head Trauma (AHT) and Shaken-Baby Syndrome (SBS) claims are litigation driven and not credible).

cooperate with rather than oppose DNA-testing motions, the comparatively greater disruption that changed science represents means that prosecutors continue to be unreliable conduits for its dissemination.

D. Defense Counsel

Like prosecutors, defense attorneys are repeat system players and might themselves be expected to perceive evolution in science. More critically, in contrast to prosecutors, defense counsel have legal and ethical obligations to advocate zealously for their defendant clients and indeed to remain loyal to their clients’ interests even after representation has ended. In fact, however, defense counsel is frequently structurally disabled or disinclined to bring changed science to the attention of defendants or the criminal justice system more broadly.

To begin, a critical factor suppressing the significance of defense counsel in postconviction changed evidence is the highly limited prevalence of representation in this context. The constitution guarantees the provision of counsel only at trial and appeals as of right. Putting aside capital defendants, who in most jurisdictions are guaranteed representation even in postconviction proceedings pursuant to legislative enactment, most convicted individuals lose their statutory right to counsel at the termination of direct appeals—at least until they can demonstrate the factual basis for a colorable postconviction claim. Thus, as a practical matter, most defendants are going it alone. This severely hampers the ability to reinvestigate or relitigate any form of new evidence. But following the trail of

110. See THE NAT’L REGISTRY OF EXONERATIONS, UPDATE 2012, at 2–3 (2013) (describing “a dramatic increase in the number and the proportion of exonerations that prosecutors or police participated in obtaining”).

111. See, e.g., Brief of Amici Curiae in Support of Appellant at 10 n.7, Wyatt v. State, 71 So.3d 86 (Fla. 2011) (No. 08-655), 2010 WL 2476188, at *10 n.7 (asserting that the FBI only notifies prosecutors, not defense attorneys, when there may be unreliable evidence and that prosecutors in many instances have failed to notify the defense attorney of such findings); Hsu, supra note 85 (explaining that prosecutors in many cases do not notify defendants and their attorneys about flawed forensic evidence).


113. Gideon v. Wainwright, 372 U.S. 335, 342 (1963) (holding that the right to counsel guaranteed by the Sixth Amendment is a fundamental right); Griffin v. Illinois, 351 U.S. 12, 24 (1956) (Frankfurter, J., concurring) (guaranteeing indigent clients assistance of counsel on nonfrivolous appeals).


115. See, e.g., John H. Blume et al., In Defense of Noncapital Habeas: A Response to Hoffman and King, 96 CORNELL L. REV. 435, 445 (observing that many states do not provide indigents any right of counsel when challenging noncapital offenses and remarking that other states provide counsel only in very limited circumstances).
scientific development is especially challenging. Such development happens largely out of the public eye—published, if at all, in professional and trade journals. The relevant witnesses are entirely outside the control or reasonable ambit of the prisoner or the prisoner’s agents. When changed science is more prominently exposed, establishing that a new scientific view would alter conclusions rendered in a prisoner’s own case is a demanding task, typically requiring retention of new experts which is beyond the means of the typical unrepresented prisoner. Significantly, as with Andrew Babick, many of the successfully litigated claims have been brought by prisoners represented by innocence projects or other private organizations with a dedicated mission and funding to conduct post-conviction science investigations.

Perhaps most significantly, however, while defense counsel is the one institutional actor tasked with vindicating defendants’ interests, the defense bar is poorly suited to recognize and respond to the sort of systemic challenge that changed-scientific understanding represents. As with other criminal-justice functions, defense services are highly fragmented across and within states, and they frequently are provided entirely or at least in part by private counsel appointed by courts—in other words, solo practitioners acting with little or no institutional support. Defense services remain notoriously underresourced, with the inadequate provision of expert and investigative services of special concern. This means that with the exception of a small number of standout public-defender offices in the country, there is too little focus in defense practice on countering scientific evidence offered by the state. Combined with the above-described constraint of science developing largely in the hands of government-controlled actors, defense attorneys are unlikely to perceive scientific evolution by their own efforts. And because of the far-flung and little-

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116. See supra notes 73–75 and accompanying text.
117. E.g., State v. Urbano-Uriostegui, No. M2012-00235-CCA-R3-CD, 2013 WL 1896931, at *18 (Tenn. Crim. App. May 6, 2013) (listing the requirements that must be established in order for a defendant to “obtain a new trial on the basis of newly discovered evidence”’ (quoting State v. Nichols, 877 S.W.2d 722, 737 (Tenn. 1994)); Babick v. Berghuis, No. 1:03-CV-20, 2008 WL 282166, at *10 (W.D. Mich. Jan 29, 2008) (asserting that a defendant cannot prevail on an ineffective assistance of counsel claim for failing to introduce expert testimony if the defendant does not show “what evidence counsel should have pursued and how such evidence would have been material”’ (quoting Hutchison v. Bell, 303 F.3d 720, 748 (6th Cir. 2002)).
118. NAT’L RIGHT TO COUNSEL COMM., JUSTICE DENIED: AMERICA’S CONTINUING NEGLECT OF OUR CONSTITUTIONAL RIGHT TO COUNSEL 53 (2009); THE SPANGENBERG GRP., AM. BAR ASS’N STANDING COMM. ON LEGAL AID & INDIGENT DEFENDANTS, STATE INDIGENT DEFENSE COMMISSIONS 1 (2006).
119. NAT’L RIGHT TO COUNSEL COMM., supra note 118, at 52, 93.
120. Garrett & Neufeld, supra note 84, at 10–11, 89–90 (2009). See also Harrington v. Richter, 131 S. Ct. 770, 791–92 (2011) (reversing a lower-court holding that counsel was ineffective for failing to call an expert to counter state’s serology and blood-pattern analysis).
coordinated nature of defense practice, new scientific knowledge percolates slowly through the defense community.

There are efforts to counteract these limitations, to be sure, as Part III will discuss. Professional organizations such as the National Legal Aid and Defender Association (NLADA) and state defense bar organizations can, and sometimes do, work to overcome the fragmentation that suppresses dissemination of new science in the defense community. The emergence of defense-services oversight entities, which now exist in some form in forty-three states plus the District of Columbia, has provided greater infrastructure in this regard. But to a still significant extent, defense counsel is little able in the individual case to bring new scientific evidence into the light, and even less able to spur systemic recognition of changed science.

III. Countering the Science Lag

Part II aimed to persuade that the criminal justice system’s receptivity to new scientific information in old cases falters at numerous checkpoints. Judicial doctrine is an important barrier to be sure, but a postconviction right of action is of little value if upstream actors are unable to generate or make use of new scientific evidence to assemble plausible claims for relief from criminal verdicts undermined by changed science. If the nature of the criminal law’s science lag is systemic, then the response must be multipronged and multi-institutional. This final Part shines a light on isolated efforts to address the science lag that system actors have undertaken, focusing on actors and institutions upstream of courtrooms which might grease the wheels for dissemination of changed science.

A. Postconviction Relief

A necessary, though insufficient, reform to augment the ability of the criminal justice system to update outcomes in light of changed science is to ensure that pathways exist for defendants to return to court when new scientific evidence emerges in their cases. The postconviction route most


commonly available, namely a new-trial claim based on newly discovered evidence, frequently features doctrinal constraints that uniquely and inappropriately suppress receptivity to changed science. Recognizing the value of fixing the science lag requires fashioning law that will better accommodate science’s incrementalism and that is more clear-eyed about the potential importance of scientific evidence in juries’ evaluations of guilt.

A range of doctrinal fixes could be proposed. At a minimum, in jurisdictions where there is no postconviction pathway to introduce newly discovered evidence outside of constitutional or actual-innocence claims, such a pathway should be created—at least as to scientific evidence. Moreover, changed science should be permitted to form the basis for a postconviction claim without time limitation so long as a prisoner demonstrates reasonable diligence in uncovering the new evidence.

Some jurisdictions have been more ambitious in facilitating judicial receptivity to changed science in the form of legislatively crafted, science-specific postconviction claims. Texas took this approach in 2013 after Texas’s highest criminal court had issued a series of conflicting decisions that struggled to shoehorn changed-science claims into Texas’s existing habeas corpus jurisprudence. Senate Bill 344 authorized the grant of a new criminal trial where new scientific evidence emerges and a prisoner can show by a preponderance of the evidence that if the new information had been admitted a jury would not have convicted. The bill’s critical significance was to remove the requirement in Texas that constitutional violations or actual innocence be proved to obtain postconviction relief; it thus created a science-specific claim. Additionally, it allowed scientific evidence that was either entirely unavailable or “contradict[ed]” scientific evidence relied on by the state at trial but was not ascertainable through reasonable diligence, thus providing an important path for relitigation where contradictory scientific opinion emerged in a spotty or nontransparent manner.

123. See Senate Research Center, Bill Analysis, Tex. S.B. 344, 83rd Leg., R.S. (2013), available at http://www.legis.state.tx.us/tlodocs/83R/analysis/pdf/SB00344S.pdf#navpanes=0, archived at http://perma.cc/8R9C-ZTEW (recognizing that Senate Bill 344 “specifies that evidence to contradict scientific evidence presented at trial is among the types of claims or issues that can affect . . . an application for a writ of habeas corpus” and noting that the bill might modify claims considered by the Court of Criminal Appeals).


125. TEX. CODE CRIM. PROC. ANN. art. 11.073 (West 2014).

126. Id. California also recently amended its habeas corpus statute to permit relief from a verdict based on “false evidence,” defined (as amended) as “opinions of experts that have either
Crafting a science-specific path to postconviction relief does not, of course, assure optimal receptivity to prisoners’ efforts to revisit the science underlying their convictions. Any such enactment leaves interpretative work to the courts. But changed-science writs like Texas’s present an opportunity to override aspects of generally applicable postconviction doctrines that uniquely impinge on new science claims.

B. Solving Notice Lags

A necessary step in addressing criminal law’s science lag is to recalibrate the systemic incentives and structures that currently disable the scientific community, prosecutors, defense attorneys, and prisoners from appreciating and making use of scientific evidence. It is important to note that, to the extent that this recalibration depends upon changes within the forensic-science community to bring about enhanced and more open research and a shift away from law enforcement alignment to a more science-rooted professional culture, there are significant efforts afoot. Many of the central and most well-received recommendations of the 2009 NAS Report on forensic science concerned the importance of developing resources and infrastructure for enhanced research and professional development, and there are indications that those recommendations are beginning to take hold. I will concentrate here, then, on what changes might pave a smoother path for changed science to be effectively disseminated by and to prosecutors and defense counsel. Recent examples of ad hoc efforts on this score provide a helpful framework for imagining how system actors can effectively handle changed science. The examples below are not the first or only instances where the imperative to address flawed or changed science in the criminal justice system has spurred investigation or action; in the United States and elsewhere, ad hoc investigative bodies or commissions have tackled allegations of individual misconduct as well as systemic lags in the use of scientific evidence. But

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129. See, e.g., STEPHEN T. GOWDGE, INQUIRY INTO PEDIATRIC FORENSIC PATHOLOGY IN ONTARIO 437–57 (2008) (addressing the roles that coroners, police, prosecutors, and defense counsel can play in restoring and enhancing the public’s confidence in pediatric forensic
the efforts discussed below stand out for their multi-institutional response, and, relatedly, their insight into potential sites for institutional transformation within the criminal justice system.

Consider the multi-institutional notification effort that developed following the FBI’s discontinuance of CBLA. In 2005, the FBI discontinued use of CBLA following a National Research Council report criticizing the lack of empirical basis for analytic conclusions rendered by its analysts. The FBI publicly announced the discontinuance and sent notification letters to the approximately three-hundred law-enforcement agencies and prosecutors’ offices that had used the FBI’s CBLA analysts. But the letters neither clearly disclosed that new science undermined previously rendered conclusions nor identified the cases in which testimony had been provided. Two years later, a team of reporters and lawyers combed court records and pieced together an incomplete set of 250 criminal cases in which CBLA testimony had been provided in criminal cases. The media coverage spurred the FBI into collaboration with what became the Joint CBLA Task Force, comprised of The Innocence Network, the Innocence Project, the National Association of Criminal Defense Lawyers, and private attorneys and journalists. The work of the Task Force has consisted of identification by the FBI of all cases in which CBLA testimony was given against a criminal defendant, review of the testimony in each case by both the FBI and non-FBI Task Force members, consultation between the FBI and other Task Force members about disagreement concerning the testimony’s validity, and letter notification of the Task Force’s findings to the court of conviction and prosecutor in each case.

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131. Id. See also Hsu, supra note 85 (elaborating that although prosecutors received notice of the FBI’s flawed forensic work, defense attorneys did not receive such notice).

132. See Fed. Bureau of Investigation, supra note 91 (noting that the purpose of the letters is to allow each agency to take the steps they deem appropriate for each particular case, while asserting that “the FBI laboratory has not determined that previously issued bullet lead reports were in error”).


135. Id.
Additionally, the non-FBI Task Force members worked to attempt to locate and notify defendants or defense counsel directly.\footnote{136}{Id.}

This process has become a blueprint for subsequent, similar instances where widely used scientific evidence became discredited. Thus, after the FBI revealed that its own hair-microscopy experts had rendered scientifically unsupported conclusions about hair matches, a review process was launched that tracked the CBLA model of joint review by the FBI and a task force from national defense organizations and notification to courts, prosecutors, and defendants.\footnote{137}{See Norman L. Reimer, The Hair Microscopy Review Project: An Historic Breakthrough for Law Enforcement and a Daunting Challenge for the Defense Bar, CHAMPION, July 2013, at 16, available at http://www.nacdl.org/champion.aspx?id=29488, archived at https://perma.cc/JZ6G-Q85Z (outlining the contours of the National Association of Criminal Defense Lawyers’ partnership with the Innocence Project and the Federal Bureau of Investigation “to review thousands of criminal cases in which the FBI conducted microscopic hair analysis of the crime scene evidence”).}

In Texas, a similar collaborative model is in process to identify arson convictions involving discredited science and notify the affected defendants.\footnote{138}{Statewide Arson Review, supra note 16.}

But these efforts are ad hoc and limited.\footnote{139}{See Linda Geddes, FBI Errors Throw Forensic Convictions into Question, NEWS SCIENTIST LIFE, Aug. 1, 2014, http://www.newscientist.com/article/dn25994-fbi-errors-throw-forensic-convictions-into-question.html, archived at http://perma.cc/SHJK-YR6W (noting that only three states have launched reviews of convictions involving hair analysis).}

Widespread adoption faces barriers of resources and infrastructure as well as will. A critical question to ask is what would it take to better institutionalize these responses or at least to ensure that there is a ready infrastructure to support more widespread and regular deployment of ad hoc approaches.

Key to these taskforce-review efforts has been the existence of organizations or agencies with the capacity and interest to undertake case review and notification. Forensic-science oversight entities, which exist in widely varying forms in most states, are a promising option—but only if they possess the resources, mandate, and independence to perform this function.\footnote{140}{See Ryan M. Goldstein, Note, Improving Forensic Science Through State Oversight, 90 TEXAS L. REV. 225, 235–49 (2011) (describing a range of approaches for state forensic-science oversight).}

Texas, which now is in the throes of two changed-science review processes, offers an example via its Forensic Science Commission (TFSC)—a nine-member commission with statutory authority to investigate allegations of scientific misconduct or negligence, as well as to promote the development of professional standards and training in the forensic-science field.\footnote{141}{TEX. FORENSIC SCI. COMM’N, WILLINGHAM/WILLIS INVESTIGATION 2–3 (2011) (stating that the TFSC investigates allegations of scientific misconduct of negligence, develops}
by recommending such a process in the course of reviewing a misconduct complaint in the Cameron Todd Willingham case.\textsuperscript{142} It has since served a significant coordination role in that review process as well as hair-microscopy reviews.\textsuperscript{143}

Efforts like the task force reviews described above could also be better institutionalized if criminal justice actors simply developed notification procedures for when scientific change comes to light. Though neither law nor ethics provides clear guidance in the postconviction context, criminal justice stakeholders can and should develop best practices. Again, Texas serves as an example. Following a revelation that a state crime laboratory analyst had falsified data in numerous cases, the state’s criminal justice system was faced with a problem of how to ensure that defendants in all the cases worked on by the analyst were notified.\textsuperscript{144} The TFSC coordinated a process, including an in-person meeting of stakeholders, for developing a notification protocol, now published as a white paper.\textsuperscript{145} An important function that could be served by the newly constituted National Commission on Forensic Science would be developing similar guidance for criminal justice actors.

Attention to the defense function, and in particular the fragmentation and lack of resources that suppress discovery and use of changed science by convicted individuals, is also critical. The lack of continuity of representation for defendants in the various stages of criminal proceedings, and the lack of organized oversight or coordination of defense services in many jurisdictions, means that actors most closely aligned with defense interests tend not to perceive the existence or relevance of changed science in any individual case or system wide. Public defender offices are frequently better positioned to see and respond to systemic shift, but they are notoriously and in some instances grossly underresourced.\textsuperscript{146} Erin Murphy

\begin{itemize}
  \item \textsuperscript{142} Id. at 8–10.
  \item \textsuperscript{143} Texas Hair Microscopy Case Review, TEXAS FORENSIC SCI. COMMISSION, http://www.fsc.texas.gov/texas-hair-microscopy-case-review, archived at http://perma.cc/E88Z-XN6R.
  \item \textsuperscript{144} TEX. FORENSIC SCI. COMM’N & TEX. CRIMINAL JUSTICE INTEGRITY UNIT, DEFENDANT NOTIFICATION AFTER MAJOR FORENSIC NONCONFORMANCE, at ii (2013).
  \item \textsuperscript{145} Id.
has advocated for “dedicated, roving... evidence... advisors” with an institutional mission to research and develop scientific evidence from a defense perspective and to provide that information to the many dissociated defense providers in a jurisdiction. A working model for this concept exists in North Carolina, where that state’s defense oversight office employs a dedicated “Forensic Resource Counsel” who maintains a repository of publicly available scientific research, noteworthy developments in the forensic science, and expert resources. Even in the absence of resources to actively assemble scientific research, formally lodging responsibility for receiving notification of law enforcement disclosures of changed science with point people in state indigent defense oversight bodies, defense bar organizations, or elsewhere, would ameliorate the barrier that defense-services fragmentation poses to the best intentions of notification.

In offering a laundry list of ideas to create new entities and augment the duties of existing agencies and institutions, I am not blind to the financial and political barriers to doing more in the criminal justice system. Some of these proposals contemplate relatively modest additional expenditures. For example, even a single, dedicated, science-resource staff person could do wonders in a public defender organization or prosecutor’s office. Others, such as the creation of forensic-science oversight entities along the model of Texas’s, are likely to face more budgetary and political opposition. At bottom, addressing the science lag will undoubtedly require investments and paradigm shifts that will be hard fought. But as the steep cuts to their budgets, federal public defenders around the country have furloughed or laid off hundreds of lawyers and other staff members, spent less on expert witnesses and cut back on case-related travel.

147. Murphy, supra note 50, at 655–56.


149. See Norman Lefstein, The Movement Towards Indigent Defense Reform: Louisiana and Other States, 9 LOY. J. PUB. INT. L. 125, 126 (2008) (noting recent indigent defense commissions created in North Carolina, Oregon, Texas, Georgia, Virginia, Montana, North Dakota, South Carolina, and Louisiana). Several state public defender commissions already perform monitoring functions into which changed-science notifications could be incorporated. E.g., MICH. COMP. LAWS ANN. § 780.989(f) (West Supp. 2014) (establishing the state’s indigent defense commission’s authority to create procedures for mandatory collection of data); MONT. CODE ANN. § 47-1-105(9)(f) (2013) (requiring the state public defender commission to include in its reports to state bodies information about new cases); N.D. CENT. CODE § 54-61-02(1)(d) (2014) (requiring the state commission on legal counsel for indigents to establish a means of monitoring caseloads).

150. See TEX. FORENSIC SCI. COMM’N, supra note 141, at 5 (calling on the Texas Criminal Defense Lawyer’s Association to appoint a forensic contact to be notified when the Texas Forensic Science Commission receives notice of forensic nonconformance).
criminal law continues to consume scientific evidence with its historic voracity, and indeed as we happily devote greater attention to verifying the reliability of that evidence, we must also assume the burden of calibrating our criminal justice system in a manner that vindicates rather than obscures the epistemic value it offers.