

IN THE SUPREME COURT OF OHIO

STATE OF OHIO,

PLAINTIFF-APPELLEE,

v.

KENNETH ALEX GRAD,

DEFENDANT-APPELLANT.

Case No. 2023-0213

**AMICUS BRIEF OF THE INNOCENCE NETWORK
IN SUPPORT OF DEFENDANT-APPELLANT**

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STATEMENT OF INTEREST OF AMICUS CURIAE

The Innocence Network (the “Network”) is an association of independent organizations dedicated to providing pro bono legal and/or investigative services to prisoners for whom evidence discovered post-conviction can provide conclusive proof of innocence. The 69 current members of the Network represent hundreds of prisoners with innocence claims in all 50 states, the District of Columbia, and Puerto Rico, as well as Argentina, Australia, Brazil, Canada, Ireland, Israel, Italy, the Netherlands, New Zealand, the United Kingdom, and Taiwan. The Innocence Network and its members are also dedicated to improving the accuracy and reliability of the criminal justice system in future cases. Drawing on the lessons from cases in which the system convicted innocent persons, the Network advocates study and reform designed to enhance the truth-seeking functions of the criminal justice system to ensure that future wrongful convictions are prevented.

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INTRODUCTION

The United States Supreme Court has declared that the “ultimate objective” of our system of criminal law is that “the guilty be convicted and the innocent go free.” *Herring v. New York*, 422 U.S. 853, 862, 95 S. Ct. 2550, 45 L. Ed. 2d 593 (1975). When that objective is not achieved, Rule 33 of the Ohio Rules of Criminal Procedure is an important tool to ensure that the innocent are exonerated. It permits defendants to seek a new trial when they discover new evidence, including newly discovered scientific evidence, that supports their innocence. But science and law are often at odds: science is constantly developing, often as a theory that is proved or disproved over time, whereas law provides predictability and seeks finality based on facts ascertainable at any given time. Because of this tension, Crim.R 33 serves as an important buffer. It provides, or at least should provide, a mechanism by which the law accommodates new scientific discoveries that might undermine the validity of a prior criminal conviction.

Ohio’s procedural rules and statutes require defendants who do not file a new trial motion within a certain time to show that they were “unavoidably prevented from the discovery of the evidence upon which [they] must rely” before a court will consider their substantive claim.¹ Ohio courts maintain that defendants are entitled to a hearing on newly discovered evidence when they submit documents that, on their face, support a claim that they were unavoidably prevented from timely discovering the evidence at issue. *State v. McConnell*, 170 Ohio App. 3d 800, 2007-Ohio-

¹ “Motions for new trial on account of newly discovered evidence shall be filed within one hundred twenty days after the day upon which the verdict was rendered, or the decision of the court where trial by jury has been waived. If it is made to appear by clear and convincing proof that the defendant was unavoidably prevented from the discovery of the evidence upon which he must rely, such motion shall be filed within seven days from an order of the court finding that he was unavoidably prevented from discovering the evidence within the one hundred twenty day period.” Crim.R. 33(B).

1181, 869 N.E.2d 77, ¶ 19 (2d Dist.); *State v. Hill*, 10th Dist. Franklin No. 22AP-576, 2023-Ohio-1954, ¶ 15. But, some Ohio courts—including the Ninth District in the decision below—have held that scientific evidence is “new” only if it is not premised on a preexisting theory articulated at the time of trial. In other words, so long as a scientific theory existed and was known by the defendant at the time of his conviction, regardless of the infancy of that theory, subsequent discoveries that prove or disprove that theory are not new evidence and can never support a motion for leave to file a new trial motion.

This rule is flawed for several reasons. First, it ignores the inherent tension between law and science, which presents issues related to finality and a defendant’s effort to timely proffer a defense based on scientific evidence. Second, it ignores the reality that new scientific developments have overturned and must overturn prior convictions, including discoveries related to fire science, lead bullet composition analysis, the shaken baby hypothesis, and microscopic hair analysis. And third, it ignores the scientific developments that call into question Mr. Grad’s guilt.

In light of these flaws, this Court should hold that (1) a scientific discovery postdating trial is newly discovered evidence even if the basis for that discovery was known at the time of trial, and (2) a defendant need only present prima facie evidence of that new discovery to obtain a hearing on his motion for leave to file a new trial motion.

STATEMENT OF FACTS

The Network adopts the Statement of Facts presented by the Defendant-Appellant.

ARGUMENT

I. THE NINTH DISTRICT’S HOLDING IGNORES THE TENSION BETWEEN LAW AND SCIENCE.

There is an inherent tension between law and science because the law “must resolve disputes finally and quickly,” whereas “[s]cientific conclusions are subject to perpetual revision.”

Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 597, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993).² When played out in court, this tension can put lawyers between a rock and a hard place.

One author explained the reality of this tension as follows:

Science is a moving target; answers are always provisional and can be updated as research produces new information or challenges accepted findings. But in a trial, the judge or jury must make pragmatic use of the best available answers to scientific questions at that given moment in time. As a result, the legal system may quite legitimately accept evidence, even scientific evidence, that is good enough rather than perfect. Waiting for the next study, or postponing a decision, is typically not an option.

Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 U.C.L.A. L.Rev. 725, 744 (2011).

The trouble with this structure is that, with constant scientific advancements, it seems inevitable that some science that was once “good enough” will eventually become “not good enough.” When that happens, the finality of a previous decision may (and should) be questioned. *See, e.g., United States v. Hebshie*, 754 F.Supp.2d 89, 128 (D. Mass. 2010) (holding that, while the court “recognizes the importance of finality in criminal cases, particularly after time and resources have gone into the trial, and after a jury has pronounced guilt[,] . . . finality cannot trump fairness or justice”).

While avenues to challenge the finality of a conviction exist, there are several barriers that make the quest an uphill battle. *See Laurin, Criminal Law’s Science Lag: How Criminal Justice Meets Changed Scientific Understanding*, 93 Tex. L. Rev. 1751, 1763–64 (2015) (outlining several limitations to re-litigation based on shifts in science). One major contributor to the tension between

² This uneasy relationship has been a long-standing issue for lawyers. *See Berger & Solan, The Uneasy Relationship Between Science and Law: An Essay and Introduction*, 73 Brook. L. Rev. 847, 848 (2008) (tracing the history of the tension between science and law back to the eighteenth century).

law and science is the significant amount of time that it takes for new science to percolate through the scientific community and legal community. The lower court in this case ignored this tension—a decision that could have irreparable consequences for Grad and countless others. This Court should instead follow the Tenth District’s lead, which both recognizes the tension and helps prevent wrongful convictions.

A. “Science Lag” and the “Percolation Problem”

In theory, Ohio’s rules provide an avenue to challenge a conviction based on outdated forensic science. Crim.R. 33 permits a new trial “[w]hen new evidence material to the defense is discovered which the defendant could not with reasonable diligence have discovered and produced at the trial.” Ohio Crim. R. 33(a)(6). But, if a motion is brought more than 120 days after the verdict, defendants must show by clear and convincing evidence that they were “unavoidably prevented from the discovery of the evidence upon which [they] must rely.” Ohio Crim. R. 33(B).

However, shifts in science can take years—in some cases, decades—to become widely recognized and accepted in the legal community.³ This is because there first has to be consensus within the relevant scientific communities themselves, which is both complicated and takes time. *See Berger & Solan, The Uneasy Relationship Between Science and Law: An Essay and Introduction*, 73 *Brook.L.Rev.* 847, 852 (2008) (“[R]ather than being in relative consensus, albeit without clear proof, the scientific community can often be in vigorous disagreement.”). Another layer of complexity is that these initial phases of development generally happen “largely out of the public eye—published, if at all, in professional and trade journals.” Laurin, *Criminal Law’s Science Lag: How Criminal Justice Meets Changed Scientific Understanding*, 93 *Tex.L.Rev.*

³ *See infra* Part II for examples of this in four different forensic disciplines—Fire Science, Comparative Lead Bullet Analysis, the Shaken Baby Hypothesis, and Microscopic Hair Comparison Analysis.

1751, 1765 (2015) (citing Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L.Rev. 725, 754–56, 773–74 (2011)). In other words, while the underpinnings of a scientific shift may be available at the time of the original trial, it takes time for the understanding to become mainstream in the legal community.

Consequently, there are cases where a defendant is convicted based on flawed science and, while the flaws technically could have been known at the time of the original trial, the shift in science has not yet been recognized by the law. This phenomenon has been referred to as “Science Lag” or the “Percolation Problem.” See Plummer & Syed, “*Shifted Science*” Revisited: *Percolation Delays and the Persistence of Wrongful Convictions Based on Outdated Science*, 64 Clev.St.L.Rev. 483 (2016) (describing the “Percolation Problem” as a situation “where shifts in science take years to percolate down into the average courtroom—and the delay causes unjust convictions to continue for years after the science is recognized as flawed”); Laurin, 93 Tex.L.Rev. 1751 (2015) (describing the “Science Lag” as a set of circumstances where “even as scientific understanding evolves, criminal justice outcomes whose epistemic bona fides depend on the reliability of that science remain rooted in discredited knowledge”).

B. New Scientific Discoveries Are New Evidence

The Ninth District held that scientific evidence is “new” only if it is not premised on a preexisting theory articulated at the time of trial. *State v. Grad*, 2022-Ohio-4221, ¶ 12 (9th Dist.). But this rationale ignores Science lag and the Percolation Problem. Instead, this Court should follow the Tenth District’s lead by embracing this reality and appropriately granting defendants the opportunity to present new scientific discoveries at a hearing on their motion for a new trial. See *State v. Butts*, 2023-Ohio-2670, ¶ 102 (10th Dist.).

In *Butts*, the State argued that the defendant’s “new evidence” was not “new” because it was predicated upon science that existed at the time of the original trial, but the Tenth District held

that “it is the emergence of a legitimate and significant dispute within the medical community in the years following [the defendant’s] trial . . . that constitutes newly discovered evidence.” *Id.* at ¶ 66. The court went on to explain that, “although the basic premises underlying [the defendant’s] arguments are generally parallel to those raised at his 2003 trial . . . the form and nature of the evidence supporting the arguments are drastically different today than they were in 2003.” “The ‘new advancements’ presented by [the defendant] are a quantum leap in the medical community’s understanding of [the relevant field of science].” *Id.* at ¶ 70.

Science Lag and the Percolation Problem impact countless defendants in the form of wrongful convictions. Forensic science that is now known to be outdated and unreliable contributed to over half of the Innocence Project’s wrongful conviction cases and to nearly a quarter of all wrongful conviction cases since 1989. Innocence Project, *Misapplication of Forensic Science*, <https://innocenceproject.org/misapplication-of-forensic-science/> (accessed August 8, 2023). This makes it the “second most common contributing factor to wrongful convictions.” *Id.* Unless this Court deems scientific discoveries postdating trial as “new evidence,” regardless of whether the basis was known at the time of trial, defendants may never receive an opportunity to prove their innocence when science makes a quantum leap.⁴

II. ACCOMMODATING SCIENTIFIC DEVELOPMENT IS A PROTRACTED YET CRUCIAL MECHANISM FOR OVERTURNING WRONGFUL CONVICTIONS.

Over the past several years, shifts in science have repeatedly rendered old forensic disciplines unreliable. The United States Supreme Court, recognizing the grave impact this had on the integrity of our criminal justice system, acknowledged that “[s]erious deficiencies have

⁴ At a minimum, a hearing should be held to give the defendant a chance to show why they were unavoidably prevented from discovering the evidence and how the science has shifted. This is discussed further in Part IV.

been found in the forensic evidence used in criminal trials.” *Melendez-Diaz v. Massachusetts*, 557 U.S. 305, 319, 129 S. Ct. 2527, 2537, 174 L. Ed. 2d 314 (2009). In fact, “[t]he legal community now concedes, with varying degrees of urgency, that our system produces erroneous convictions based on discredited forensics.” *Id.* (citing Metzger, *Cheating the Constitution*, 59 Vand. L.Rev. 475, 491 (2006)).

This Court need not look far for examples of this all-too-common story; the scientific community and courts have been grappling with the scientific development and criminal forensic investigations for decades. A brief look at four forensic disciplines—fire science, Comparative Lead Bullet Analysis, the Shaken Baby Hypothesis, and Microscopic Hair Comparison Analysis—paints a lucid picture of the need for liberal evaluation of new scientific discoveries in postconviction proceedings.

A. Fire Science

Consider the development of fire science since the 1980s. At one time, fire investigators claimed to be able to ascertain whether a fire was caused by arson by identifying physical markers at the fire scene, including, for example, burn or pour patterns, spalled concrete, wood checkering, and the location and depth of char. These types of investigations were typically conducted by “old school” investigators—those who used intuition and a number of rules of thumb to determine whether a fire was incendiary.” Gianelli, *Junk Science and The Execution of the Innocent Man*, 7 N.Y.U. J.L.&Lib. 225 (2013). But as early as 1977, the old school ways were criticized as lacking scientific foundation. One government report noted that the indicators “received little or no scientific testing” and “there appears to be no published material in the scientific literature to substantiate their validity.” J.F. Boudreau et al., *Arson and Arson Investigation: A Survey and Assessment*, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Dep’t of Justice 88 (1977).

Throughout the 1980s, old-school investigators persisted but, behind the scenes, the science-based approach to arson investigations made strides. For example, “computers were able to come to grips with the complexities of simultaneously modeling fluid dynamics, heat transfer, mass loss, and chemistry.” Lentini, *Scientific Protocols in Fire Investigation* 13 (2d ed. 2013). And by 1986 the National Fire Protection Association (NFPA) released *Countdown to Disaster*, a 16-minute videotape of a residential fire simulation that exhibited a “flashover”—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.” *Id.* The fire-science community soon learned that flashover could occur in almost every compartment fire. Plummer & Syed, “*Shifted Science*” *Revisited* at 492. By 1992, the NFPA published its Guide for Fire and Explosion Investigations (NFPA 921), noting that “many of the physical artifacts previously thought to only occur in arson fires”—such as alligatoring of wood, crazed glass, depth and location of char, lines of demarcation in the burn patterns, sagged furniture springs, spalled concrete, low burning and holes in the floor, and time and temperature of the fire—could result where flashover occurred. *Id.* at 492–93. The flashover discovery would turn fire science on its head.

Despite these incremental discoveries, which have been codified in successive editions of NFPA 921, it was not until the early 2000s that they become generally accepted by the scientific community, and eventually by the legal profession—due, in part, to push back from law enforcement. Lentini, *Scientific Protocols of Fire Science* at 526. During that period, however, there existed a no-man’s-land where “the old ways persisted, the new ways existed, and the average defendant and attorney remained oblivious to the differences.” Plummer & Syed, “*Shifted*

Science” Revisited at 495. In the meantime, many defendants were convicted based on junk fire science. For example, Cameron Todd Willingham was convicted in 1992 and executed 12 years later after the fire investigator on his case, using a now outdated methodology, testified that he found 20 indicators that the house fire that killed Willingham’s three children was caused by arson. Gianelli, *Junk Science and The Execution of the Innocent Man* at 221. Incremental fire science discoveries would show that some of the indicators that the fire investigator relied on could result from flashover in an accidental fire. *See Id.* at 227–28. Fortunately, today, “old school” fire investigations have given way to science-based investigations.

B. Comparative Bullet Lead Analysis

From the 1960s to the 2000s, law enforcement used Comparative Bullet Lead Analysis (CBLA) to investigate and prosecute crimes of gun violence. Tobin, *Comparative Bullet Lead Analysis: A Case Study in Flawed Forensics*, *The Champion* (July 28, 2004) 15–17. The theory behind CBLA concerned “the process of bullet making, the metals used in that process, and the source of those metals.” Plummer & Syed, “*Shifted Science*” Revisited at 502. The discipline sought to analyze the trace elements contained in each lead bullet, including arsenic, antimony, tin, cadmium, bismuth, copper, and silver, and trace the lead bullet back to one source. *Id.* At trial, CBLA experts would often testify that a given bullet came from a specific source or location, such as from the same of box of bullets found at a suspect’s home. Tobin, *Comparative Bullet Lead Analysis: A Case Study in Flawed Forensics* at 13.

CBLA experts used a three-phase methodology whereby they would analyze the elemental makeup of a bullet, group the bullets by similar elemental composition, then infer the probative significance of finding similar compositions between the crime-scene bullet and other bullet samples. Plummer & Syed, “*Shifted Science*” Revisited at 503. Yet, in the 1990s CBLA came under scientific scrutiny, and incremental discoveries undermined the methods used at each stage

of the CBLA process. At phase one, scientists had trouble with replicating and verifying results because only those with access to a nuclear reactor could run a second test. *Id.* But even as the technology to analyze lead bullets improved, researchers discovered that of the seven trace elements used to group bullets, four were either always absent or always present in the same range of composition, so analysts were constrained to relying on compositional variation of only three elements, which increased the odds of misanalysis. *Id.* at 503–04. Grouping during phase two was able to determine only that two given samples grouped together were compositionally similar, not “analytically indistinguishable.” This was influenced by flaws in the measuring techniques and variations in the composition of different samples of the same bullet. *Id.* at 504–05. Lastly, the inferences made during phase three were based on false assumptions that each batch of molten lead has the same composition and that each source of molten lead is compositionally unique. *Id.* at 506. In 2004, “The National Research Council Report on CBLA, noted, homogeneity should not be assumed, and really, the evidence seems to prove a lack of it.” *Id.* at 506 (citing Nat’l Research Council, *Forensic Analysis: Weighing Bullet Lead Evidence* 29, 30 (2004)).

Today, there is no basis to draw the conclusion that two bullets might be from the same box. But from 1960 to 2002, the science was rarely questioned, and during that time, defendants such as James Earhart would be convicted and executed based on CBLA science. *See* Paul C. Giannelli, *Comparative Bullet Lead Analysis: A Retrospective*, 47 *Crim.L.Bull.* 306 (2011) (citing *Earhart v. State*, 823 S.W.2d 607, 614 (Tex. Crim. App. 1991)). Fortunately, courts have since accommodated these new discoveries in the postconviction proceedings and the FBI has abandoned its use of CBLA in criminal convictions. Plummer & Syed, “*Shifted Science*” *Revisited* at 510; *See United States v Mikos*, No. 02 CR 137, 2003 WL 22922197 (N.D. Ill. Dec. 9, 2003) (the CBLA expert’s “ultimate conclusion is based upon a series of determinations that

lack scientific accuracy.”); *Ragland v. Commonwealth*, 191 S.W.3d 569 (Ky. 2006) (concluding that CBLA was systemically flawed, which is fatal to its use as forensic tool).

C. The Shaken Baby Syndrome Hypothesis

The science surrounding so-called “Shaken Baby Syndrome” (SBS) (now also referred to as Abusive Head Trauma) has developed significantly in the past two decades. Plummer & Syed, *“Shifted Science” Revisited* at 511. The “SBS Hypothesis posits that intentional child abuse in infants and young children, can be reliably diagnosed from a finding of three symptoms: (1) encephalopathy (brain injury—usually brain swelling); (2) subdural hematoma (bleeding on the surface of the brain) and; (3) retinal hemorrhage (bleeding behind the eyes).” *Id.* These three symptoms are often referred to as the “triad,” which are usually identified using differential diagnosis. See Carbaugh, *Understanding Shaken Baby Syndrome*, Medscape (2004), https://www.medscape.com/viewarticle/478153_5?0=reg=1 (accessed August 28, 2023). The science supporting SBS arose in the 1970s but the application of the science to criminal prosecutions did not come until the 1980s. Tuerkheimer, *Flawed Convictions: “Shaken Baby Syndrome” and the Inertia of Justice*, Oxford Academic Books 2 (2014). As time went on, the number of prosecutions based on SBS grew exponentially to more than 200 between 1990 and 2000, and more than 800 between 2000 and 2010. Plummer & Syed, *“Shifted Science” Revisited* at 513.

Challenges to the SBS Hypothesis date back to the 1980s when studies evaluated the biomechanics underlying it. These early studies concluded that SBS is not usually caused by shaking alone. *Id.* at 513. By 2003, one study concluded that:

The issue of the evidence for SBS appears analogous to an inverted pyramid, with a small database (most of it poor-quality original research, retrospective in nature, and without appropriate control groups) spread to a broad body of somewhat divergent opinions. One may need reminding that repeated opinions based on poor-

quality data cannot improve the quality of evidence. . . . There exist major gaps in the medical literature about SBS.

Donohoe, *Evidence-Based Medicine and Shaken Baby Syndrome*, 24 Am.J. Forensic Med. & Pathology 239, 241 (2003).

Over the next decade incremental discoveries would show that triad symptoms could be a result of accidental injuries, significantly undermining the hypothesis. Plummer & Syed, “*Shifted Science*” *Revisited* at 514. The American Academy of Pediatrics’ position on SBS amply frames the evolution of the science. In 2001, the AAP wrote that, “data regarding the nature and frequency of head trauma consistently support the need for a presumption of child abuse when a child younger than 1 year has an intracranial injury.” American Academy of Pediatrics Committee on Child Abuse and Neglect, *Shaken Baby Syndrome: Rotational Cranial Injuries—Technical Report*, 108 Pediatrics 206, 206 (2001). However, in 2009, the AAP revised its position in accordance with the growing medical research. It acknowledged that “the mechanisms and resultant injuries of accidental and abusive head injury overlap” and that “there is no single or simple test to determine the accuracy of the diagnosis.” Cindy W. Christian et al., *Abusive Head Trauma in Infants and Children*, 123 Pediatrics 1409, 1410 (2009). The 2009 statement also removed language advocating the “presumption of child abuse.” *Id.*

By 2017, research from the Karolinska Institute in Sweden found that the triad previously believed to be unique to intentional shaking was, alone, insufficient to diagnose intentional shaking or trauma, Lynøe et al., *Insufficient Evidence for ‘Shaken Baby Syndrome’—A Systematic Review*, *Acta Paediatrica* (2017), and in 2018, the American Academy of Pediatrics issued a consensus statement advising that, in cases of Abusive Head Trauma, medical professionals must exclude disease that can mimic Abusive Head Trauma and must consider alternative diagnoses. The

American Academy of Pediatrics, *Abusive Head Trauma in Infants and Children*, 145 Pediatrics 4 (2020).

As the science supporting the SBS Hypothesis has shifted, prosecutions and convictions based on the science have unfortunately persisted. Today, however, courts are increasingly granting postconviction relief. On August 1, 2023, the Tenth District Court of Appeals in *State v. Butts* denied the State leave to appeal the grant of Butt’s new trial motion, holding that “the mainstream medical community now recognizes (unlike in 2003) that many non-abusive mechanisms, including disease and accidental trauma, can mimic the constellation of injuries historically associated with [Abusive Head Trauma].” 2023-Ohio-2670 (10th Dist.); *see also State v. Edmunds*, 746 N.W.2d 590, 599 (Wis. Ct. App. 2008) (“[I]t is the emergence of a legitimate and significant dispute within the medical community as to the cause of those injuries that constitutes newly discovered evidence.”).

D. Microscopic Hair Comparison Analysis

The first reported use of Microscopic Hair Comparison Analysis (MHCA) in the United States was in 1882. Giannelli, *Microscopic Hair Comparisons: A Cautionary Tale*, Case Legal Studies Research Paper No. 2010-17, 1 n.2 (April 12, 2010). By the 1950s, MHCA became a widespread forensic tool. Generally, the process involves (1) discerning whether a sample is a hair or a fiber, and if it is a hair whether it is human hair, and (2) individuating the hair sample to a particular defendant or victim. *Id.* at 2–3. MHCA experts examine the sample on both the macro and micro levels for unique characteristics. *Id.* Investigators would then use that information to either narrow the class of possible sources or, more commonly, link the sample to a particular source. *Id.*

The validity of the latter determination became heavily scrutinized in the 1980s after the advent of DNA testing. Since then, nearly 75 people who were convicted based on MHCA have

been exonerated. National Associate of Criminal Defense Lawyers, *Microscopic Hair Comparison Analysis*, <https://www.nacdl.org/Landing/Microscopic-Hair-Comparison-Analysis> (accessed August 28, 2023). As a result, scientists took a close look at MHCA methodology, which revealed several flaws. First, there are no “uniform standards for the number of features on which hairs must agree before an examiner may declare a ‘match.’” National Research Council, National Academy of Sciences, *Strengthening Forensic Science in the United States: A Path Forward*, 156–57 (2009). Second, even if two hair samples come from the same person, there will be differences between samples. Hair strands, therefore, are not like fingerprints. Oien, *Forensic Hair Comparison: Background Information for Interpretation*, 11 *Forensic Sci. Communication* (2009). Because of this, examiners must make subjective judgments about the similarity of two samples. *Id.* These methodological shortcomings have resulted in inaccurate trial testimony. For example, experts might falsely testify that two samples are “microscopically indistinguishable” or overstate that a given hair sample “was unlikely to match anyone” other than the defendant. *See* Giannelli, *Microscopic Hair Comparisons: A Cautionary Tale* at 4–5.

But, by 1996, commentators declared that “if the purveyors of this dubious science cannot do a better job of validating hair analysis than they have done so far, forensic hair comparison analysis should be excluded altogether from criminal trials.” Smith & Goodman, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?*, 27 *Colum.Hum.Rts.L.Rev.* 227, 231 (1996). That same year, the Department of Justice issued a report discussing the significant role hair analysis played in wrongful convictions. Connors et al., *Convicted by Juries, Exonerated by Science: Case Studies in the Use of DNA Evidence to Establish Innocence After Trial* (1996). And by 2009, the National Academy of Science would conclude that “testimony linking microscopic hair analysis with particular defendants is highly unreliable.”

National Research Council, National Academy of Sciences, *Strengthening Forensic Science in the United States: A Path Forward* 161 (2009).

Again, despite these discoveries, defendants remain in prison based on MHCA. Fortunately, due to the shift in science, the Department of Justice and the FBI announced in 2012 that it would review approximately 21,000 cases that relied on testimony that misrepresented or overstated the efficacy of MHCA in identifying a defendant or victim. Federal Bureau of Investigation, *Root Cause Analysis for Microscopic Hair Comparison Analysis Completed*, <https://www.fbi.gov/news/press-releases/root-cause-analysis-for-microscopic-hair-comparison-analysis-completed> (accessed August 28, 2023); see Hsu, *FBI Admits Flaws in Hair Analysis Over Decades*, Wall Street Journal (April 18, 2015) (“Of 28 examiners with the FBI Laboratory’s microscopic hair comparison unit, 26 overstated forensic matches in ways that favored prosecutors in more than 95 percent of the 268 trials reviewed.”).

* * *

Each of these examples show both the unfortunate tension between science and law and the importance of providing a postconviction mechanism that evaluates and accommodates scientific advancement. These advancements, regardless of whether the basis was known at the time of the trial, could be outcome determinative in many cases. Laurin, 93 Tex.L.Rev. at 1759 (“[J]urors are far less apt to perceive weaknesses brought out by attorney cross-examination of expert witnesses than those highlighted by competing experts.”). Without any such mechanism, potentially innocent defendants will sit in prison for years until paradigm-shifting discoveries percolate down to the legal profession.

III. THE SCIENCE CONCERNING MR. GRAD'S CONVICTION IS SHIFTING AND WARRANTS REEVALUATION.

The scientific studies cited by Mr. Grad present the types of new discoveries that reflect shifting science and, thus, warrant a hearing. Namely, the studies suggest that the cause of W.G.'s injuries can be attributed to several causes other than child abuse and that there is reason to believe that the prosecution expert's diagnosis was wrong. Consider two of the cited studies.

The first study, published in 2017, examined 72 cases, over six years of infants with multiple fractures diagnosed to be caused by non-accidental trauma. Holick et al, *Multiple Fractures In Infants Who Have Ehlers-Danlos/Hypermobility Syndrome and or Vitamin D Deficiency*, *Dermato-Endocrinology* (2017). It concluded that Ehler-Danlos Syndrome, Osteogenesis Imperfecta/Ehlers-Danlos Syndrome, and vitamin D deficiency/rickets are all associated with fragility fractures in infants and can be misinterpreted as non-accidental trauma due to child abuse. These discoveries suggest that other genetic diseases could indeed cause W.G.'s injuries. *Id.* at 11.

The second study, published in 2019, studied 78 cases in which parents were accused of child abuse. Holick et al, *Findings of Metabolic Bone Disease in Infants with Unexplained Fractures in Contested Child Abuse Investigations*, *J. Pediatrics, Endocrinology, Metabolism* (2019). The study concluded that 75 of the 78 cases "showed poor bone mineralization," suggesting susceptibility to fractures from causes other than abuse. *Id.* at 1103. This study suggests that Metabolic Bone Disease could be caused by any one or more risk factors including vitamin D deficiency, prematurity, maternal drug use, gestational diabetes, or Ehlers-Danlos Syndrome in the infant or parents. *Id.*

These studies not only provide evidence of alternative causes of W.G.'s injuries, but they undermine the prosecution's expert's differential diagnosis of W.G. "Differential diagnosis"

describes the process of isolating the cause of a patient's symptoms through the systematic elimination of all potential causes." *Valentine v. Conrad*, 110 Ohio St. 3d 42, 2006-Ohio-3561, 850 N.E.2d 683, ¶ 22; see Federal Judicial Center, Reference Manual on Scientific Evidence (1994) 214. Although differential diagnosis is a standard scientific method for determining causation, its use is appropriate only when considering potential causes that are scientifically known. *Id.* "To approach a patient and immediately opine that their injuries/symptoms must have been caused by one thing means the doctor never made a differential diagnosis." *Butts*, 2023-Ohio-2670, ¶11, n.2. "[O]nly after some study of the case can [a diagnosing doctor] reach a successful conclusion about what it is." *Id.* Therefore, because "law lags science," differential diagnosis is only so good as the science known at the time of diagnosis. Differential diagnosis becomes outdated when new scientific developments add to the universe of scientifically known causes of a given injury. *Valentine*, 2006-Ohio-3561, ¶23. In other words, as science develops, so too must differential diagnosis to assess alternative causes. See *Butts* at ¶62 (concluding that advancement in the medical community's knowledge broadened the differential diagnosis applicable to cerebral edema and subdural hemorrhage injuries).

Here, the discoveries cited by Mr. Grad both expand the universe of causation and undermine the State's expert, which warrants a hearing. Indeed, the theories under which these discoveries were made existed at the time of Mr. Grad's conviction. But as courts have seen with other forensic disciplines, scientific understanding regarding the cause of W.G.'s injuries has developed such that the theory on which Mr. Grad's experts relied before his conviction has shifted. In light of these developments, this Court has the ability to avoid the protracted Percolation Problem and instead order a hearing to evaluate the new evidence and, ultimately, the validity of the prosecution's expert testimony.

IV. HOLDING A HEARING ON A MOTION FOR LEAVE TO FILE A NEW TRIAL MOTION IS AN APPROPRIATE MECHANISM TO ASSESS WHETHER A SCIENTIFIC DISCOVERY WARRANTS A NEW TRIAL.

The procedures are already in place for courts to assess claims of whether a scientific discovery constitutes “new evidence.” Courts are already required to hold a hearing on a defendant’s motion for leave to file a motion for a new trial under Crim.R. 33 when a defendant “provides documents that on their face support the defendant’s claim that discovery of the evidence was unavoidably delayed.” *E.g.*, *State v. Gaven*, 10th Dist. Franklin No. 16AP-645, 2017-Ohio-5524, ¶ 16, quoting *State v. Bush*, 10th Dist. No. 08AP-627, 2009-Ohio-441, ¶ 8. At the subsequent hearing, the court then considers the “threshold issues” raised by those documents in determining whether the defendant has produced clear and convincing evidence of unavoidable delay. *See, e.g.*, *State v. McConnell*, 170 Ohio App.3d 800, 2007-Ohio-1181, 869 N.E.2d 77, ¶ 18–19 (2d Dist.) (holding that defendant was entitled to a hearing on his motion for leave to file a motion for a new trial based on an affidavit from the defendant’s wife relaying the victim’s recanting of her previous assault accusation).

Indeed, the prima facie evidence of a shift in the relevant science could take the same form as that submitted in other contexts. Ohio courts have long held that affidavits of prosecution witnesses recanting their trial testimonies are sufficient to warrant a hearing on a defendant’s motion for leave. *See, e.g., id.* (collecting cases). Thus, an affidavit from a reputable researcher in the relevant scientific field warrants the same. *See Han Tak Lee v. Tennis*, W.D. Pa. No., 2014 WL 3894306, *1, fn.1 (June 13, 2014), *aff’d* by *Han Tak Lee v. Houtzdale SCI*, 798 F.3d 159 (3rd Cir. 2015). In *Han Tak Lee*, a case that turned on the shifting science of fire investigations, the court explained that a “nationally renowned forensic scientist who specializes in arson detection” had submitted an affidavit describing the shifting science regarding fire investigations. *Id.* That scientist provided “uncontested” testimony at an evidentiary hearing regarding Mr. Lee’s claims

of newly discovered evidence, *id.* at *1, 12, resulting in the court learning of the “revolutionary changes in human understanding of fire science,” *id.* at *1, fn.1.

Other examples abound of times when, without a hearing on the defendant’s motion for leave, the law would not have a chance to catch up to the changing science. Take just two more examples. First, in *Howard v. State*, 300 So. 3d 1011 (Miss.2020), the Supreme Court of Mississippi granted Howard a new trial based on a shift in bite-mark analysis after his trial. At Howard’s 2000 trial, the “only evidence that strongly linked Howard to the crime” was the prosecution’s expert testimony by a member of the American Board of Forensic Odontology (ABFO). *Id.* at 1017. The expert testified that his comparison of Howard’s dental impressions to bite marks on the victim established that Howard was “the single individual who could have been responsible” for those marks. *See id.* By 2013, however, the ABFO and the National Academy of Sciences determined that there was no scientific basis for bite-mark evidence. *Id.* (“research conclud[ed] that even board-certified forensic dentists could not reliably identify a human bite mark on human skin, much less compare and accurately match an alleged bite mark to the teeth of a single individual to the exclusion of all others”). Second, and as explained above, in *State v. Butts*, 2023-Ohio-2670, the court granted Butts a new trial based on new developments in the medical community concerning the diagnosis of Shaken Baby Syndrome.

The common factor that helped each of the courts in *Han Tak Lee*, *Howard*, and *Butts* discover the truth was an evidentiary hearing. And when that changing science goes directly to the basis of a defendant’s conviction, courts cannot slam the door on that evidence at the motion-for-leave stage. Prima facie evidence of changing science is prima facie evidence that a defendant may have been wrongfully convicted—which, at minimum, entitles a defendant to a hearing so the court can further explore those issues. Without the law’s willingness to open its courtrooms to

science and educate itself about these scientific advancements, scores of innocent people would still be sitting in prison for crimes that science can prove they did not commit.

CONCLUSION

Justice John Marshall Harlan extolled the “fundamental value determination of our society that it is far worse to convict an innocent man than to let a guilty man go free,” *In re Winship*, 397 U.S. 358, 372 (1970) (Harlan, J., concurring). Therefore, “[w]hen scientific advances give the courts the tools to ensure that the innocent can go free, those advances in science will necessarily dictate changes in the law.” *State v. Ayers*, 2009-Ohio-6096, ¶ 24, 185 Ohio App. 3d 168, 174, 923 N.E.2d 654, 659. This Court has the tools ensure the innocent go free. We urge it to hold that (1) new scientific discoveries are new evidence even if they are based on an existing scientific theory, and (2) defendants need only make a prima facie showing of such discoveries to secure a hearing on their motion for leave to file a new trial motion.

Dated: September 5, 2023

Respectfully submitted,

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CERTIFICATE OF SERVICE

I certify that the foregoing **Amicus Brief of the Innocence Network In Support of Defendant-Appellant** was served by email to counsel of record for Plaintiff-Appellee, State of Ohio, and Defendant-Appellant, Kenneth Alex Grad, on September 5, 2023.

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