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Scientific Gerrymandering & Bifurcation

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SCIENTIFIC GERRYMANDERING & BIFURCATION

MEGAN EDWARDS, KATRINA FISCHER KUH & FREDERICK A. McDONALD*

ABSTRACT

*Environmental litigation must often examine the propriety of corporate conduct in areas of scientific complexity. In the second generation of climate nuisance suits, for example, allegations of corporate participation in the climate disinformation campaign are woven into plaintiffs' claims. Toxic tort suits, currently and most notably in the Roundup and PFAS litigation, present another area of environmental litigation grappling with the legal ramifications of alleged corporate deception about scientific information. Toxic tort suits often surface allegations, and in many cases disturbing evidence, of what we term corporate "scientific gerrymandering"—corporate efforts to finesse, slow, or even mislead scientific understanding of the toxicity of chemicals and other products. The manner and extent to which scientific gerrymandering is explored and litigated within those suits is often driven by another typical feature of toxic tort litigation—the procedural device of bifurcation. Judges frequently bifurcate toxic tort suits into causation and negligence phases, with the causation phase heard first. Bifurcation in toxic tort suits involving issues of scientific gerrymandering requires judges to decide whether evidence of scientific gerrymandering is relevant to and may be presented during the causation phase of a toxic tort trial. And, typically, as Judge Vince Chhabria recently ruled in *In re Roundup Products Liability Litigation* (MDL No. 2741), judges hold that evidence of scientific gerrymandering cannot be presented or must be*

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significantly limited during the causation phase because scientific gerrymandering is not relevant to causation.

Rulings that prevent admitting evidence of scientific gerrymandering during the causation phase of bifurcated trials can, however, be critiqued on both doctrinal and normative grounds. First, from a doctrinal perspective, scientific gerrymandering—how a corporate defendant shaped scientific knowledge about a product's risk—is often directly relevant to causation—whether the product causes the relevant harm. This is so because effective corporate scientific gerrymandering can define the current state of science about product risk, particularly when questions about the extent of risk caused by a product lie at the frontiers of scientific knowledge. Additionally, numerous tort doctrines support shifting or reducing causal burdens in the face of defendant misconduct, like scientific gerrymandering—which might be likened to obscuring evidence.

Second, from a normative perspective, permitting consideration of scientific gerrymandering during causation can be justified even where the introduction of such evidence creates the risk that juries will erroneously find that a product causes harm. Condemnation of scientific gerrymandering is consistent with corrective justice because corporate scientific gerrymandering can occasion distinct and independent harm by creating a large group of exposed individuals who endure an extended period of fearful uncertainty until such time as the nature of that risk can be objectively resolved, even if that product is ultimately shown not to cause the suspected harm. Finally, from a policy perspective, allowing the introduction of evidence of corporate scientific gerrymandering during the causation phase of bifurcated toxic tort trials should discourage corporate actors from engaging in scientific gerrymandering, thereby improving the efficacy of regulation and bolstering public confidence.

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INTRODUCTION

Toxic tort suits often surface allegations, and in many cases bring to light disturbing evidence, of corporate efforts to finesse, slow, or even mislead scientific understanding of the toxicity of chemicals and related products.¹ We coin the term scientific gerrymandering to refer to this conduct. The term gerrymandering is meant to capture the sense that the conduct constitutes affirmative manipulation that can, like contorted election districts, insidiously but powerfully shape outcomes, in this context by defining the availability and interpretation of data. The term gerrymandering also nods to the idea that the meaning of the outcome—e.g., election results or the current state of scientific knowledge—must be evaluated against the process that produced it.

The manner and extent to which scientific gerrymandering claims are explored and litigated within toxic tort suits is often shaped by two other typical features of toxic tort litigation—the required causal showing and the procedural device of bifurcation. To establish causation, plaintiffs must provide evidence showing that, by a preponderance of evidence, “but for the defendant’s tortious conduct with respect to the toxic substance, the plaintiff would not have suffered harm.”² In the context of toxic tort litigation, this usually requires a showing of both general causation—the substance or

¹ A recent, high profile example is featured in the movie *Dark Waters*—based on the book by plaintiff’s attorney Robert Bilott—which shows how litigation revealed years of corporate efforts to obscure knowledge of the health impacts of perfluorooctanoic acid (PFOA). See ROBERT BILOTT, *EXPOSURE: POISONED WATER, CORPORATE GREED, AND ONE LAWYER’S TWENTY-YEAR BATTLE AGAINST DUPONT* (2019); see also CARL F. CRANOR, *TOXIC TORTS SCIENCE, LAW AND THE POSSIBILITY OF JUSTICE* 356–59 (2018) (describing “systematic efforts to mislead the public and regulatory agencies about what scientific evidence shows” and observing that current doctrine “tempts defendants to act in ways that function to corrupt the scientific fields and their literature”).

² RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010).

toxin in question has the capability of resulting in the disputed injury—and specific causation—the substance or toxin actually caused the plaintiff's injury.³ This can be a steep evidentiary hurdle for plaintiffs.

The already difficult causal burden imposed on plaintiffs in toxic tort litigation often becomes exacerbated when the trial is bifurcated—a procedural device used for efficiency reasons. Judges frequently bifurcate toxic tort suits into causation and negligence phases, with the causation phase heard first. Only if the plaintiff succeeds in establishing causation will the case proceed to the liability and damages phase. When a toxic tort suit involving issues of scientific gerrymandering is bifurcated, the judge must decide whether evidence of scientific gerrymandering is relevant to and may be presented during the causation phase. As evidenced recently by Judge Vince Chhabria's rulings in the bellwether trial *Hardeman v. Monsanto* in the *In re Roundup Products Liability Litigation* (MDL No. 2741), judges can view scientific gerrymandering as a distraction from core causation questions or unduly prejudicial, and thus significantly limit, or prohibit altogether, its presentation during the causation phase.⁴

Rulings that constrain or prevent the admission of evidence of scientific gerrymandering during the causation phase of bifurcated trials can, however, significantly enhance the reward to defendants for obfuscating the development of data on health risks by giving them a forum in which the sole focus of inquiry is the adequacy of that causation data, without acknowledging how the defendants actively shaped that data, or lack of data. These rulings can be critiqued on both doctrinal and normative grounds. From a doctrinal perspective, scientific gerrymandering is often directly relevant to causation. That is, how a corporate defendant shaped scientific knowledge about a chemical or product risk bears on what is known

³ See *Avila v. Willits Env't Remediation Tr.*, 633 F.3d 828, 836 (9th Cir. 2011).

⁴ See Transcript of Proceedings at 74, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. Jan. 28, 2019). As discussed *infra* Part I regarding bifurcation, it is generally recognized that limiting the focus to causation is often a means to prevent juries from hearing background evidence related to corporate conduct.

about whether the product caused the relevant harm. This is so because effective corporate scientific gerrymandering can define the current state of science about risk, particularly when questions about the presence or extent of risk lie at the frontiers of scientific knowledge.⁵ Additionally, common tort and evidence doctrines support shifting or reducing causal burdens in the face of defendant misconduct that exacerbates asymmetrical access to information, like scientific gerrymandering.⁶

From a normative perspective, permitting consideration of scientific gerrymandering during the causation phase of bifurcated toxic tort trials can be justified even if the introduction of such evidence increases the risk that juries will erroneously find that a chemical or product causes harm. Where a defendant is held liable, but subsequent research ultimately demonstrates that a chemical or product does not cause the relevant harm, scientific gerrymandering, which delays reaching a definitive conclusion, is nonetheless a “wrong” that creates independent and distinct harms. These harms include magnifying risks of exposure and extending a period of fearful uncertainty among those exposed until such time as the question of extent and nature of risk can be objectively resolved.⁷ Moreover, tort litigation can be a more effective process for surfacing and policing corporate scientific gerrymandering than regulatory or private governance alternatives.⁸ And, from a policy perspective, allowing the introduction of evidence of corporate scientific gerrymandering

⁵ See generally THOMAS O. MCGARITY & WENDY E. WAGNER, *BENDING SCIENCE: HOW SPECIAL INTERESTS CORRUPT PUBLIC HEALTH RESEARCH* 202 (2008).

⁶ See *infra* Part III (discussing alternate causation, *res ipsa loquitur*, and spoliation).

⁷ See Lisa Heinzerling, *Environmental Law and the Present Future*, 87 GEO. L.J. 2025, 2034–35 (1999) (“The special anxieties associated with prolonged hazards can affect tremendously the lives of individuals and communities. Individuals who have been exposed to substances whose physical effects likely will not become manifest for years, perhaps decades, have reported a wide range of adverse responses, including anxiety and anguish about their future health, depression, and physical conditions linked to emotional distress, such as insomnia, fatigue, headaches, diarrhea, and muscle pain.”) (citations omitted).

⁸ See *infra* Part IV (explaining how the adversarial process, discovery rules, and other attributes of tort litigation render it more effective than regulatory processes at ferreting out scientific gerrymandering).

during the causation phase of bifurcated toxic tort trials would discourage scientific gerrymandering, thereby increasing transparency and rigor in research, improving the efficacy of and public confidence in regulation, and enriching the informational landscape for understanding chemical effects.

Litigation is currently unfolding over harms allegedly caused by the manufacture, use, and disposal of glyphosate—in the *Roundup* cases⁹—and of per- and polyfluoroalkyl substances (PFAS).¹⁰ In both contexts, plaintiffs allege that manufacturers engaged in scientific gerrymandering, thus requiring judges to issue high stakes rulings on the admissibility of evidence pertaining to scientific gerrymandering.¹¹ A close examination of the doctrinal and normative considerations that should govern those rulings can inform litigants and judges, and can also correct undue judicial reticence to allow juries to hear evidence of scientific gerrymandering during the causation phase of bifurcated trials. Part I sets out the context in which questions about the admissibility of scientific gerrymandering arise during toxic tort suits and provides some illustrative examples of rulings on admissibility. Part II explains the evidence doctrines that govern the admissibility of evidence regarding causation in toxic tort suits. Parts III and IV then offer rationales, both doctrinal and normative, for why judges should be more willing to admit evidence of scientific gerrymandering, particularly in the causation phase of toxic tort suits.

I. THE PROCEDURAL CONTEXT: BIFURCATION & RULINGS ON ADMISSIBILITY

Procedural, factual, and doctrinal factors can combine to forestall the disclosure of evidence related to scientific gerrymandering at trial. Generally, when a toxic tort case is bifurcated, the causal

⁹ See, e.g., *Johnson v. Monsanto Co.*, 266 Cal. Rptr. 3d 111, 131–34 (Ct. App. 2020) (affirming that punitive damages were permissible because evidence suggested Monsanto disregarded the dangers of Roundup); *Pilliod v. Monsanto Co.*, No. RG17-862702, 2019 Cal. Super. LEXIS 843, at *11 (Ct. App. Jul. 26, 2019) (noting that there was substantial evidence that glyphosate can cause NHL and that it did cause the plaintiffs to develop NHL).

¹⁰ See Jane Luxton & William Walsh, *The 2020 Outlook for “PFAS” Chemical Litigation: An Expanding Target Zone*, WASH. LEGAL FOUND. (Jan. 31, 2020).

¹¹ See, e.g., Complaint at 11–18, *Hardeman v. Monsanto Co.*, No. 4:16CV00525, 2016 WL 11574934 (N.D. Cal. filed Feb. 1, 2016).

phase of the litigation is tried first. When, as is not uncommon in toxic tort suits, plaintiffs discover evidence of alleged scientific gerrymandering by the defendant, the presiding judge must determine whether the evidence can be presented to the jury during the causation phase of trial. The underlying facts related to allegations of scientific gerrymandering are often hotly disputed, difficult to interpret, and viewed as potentially inflammatory to jurors. Doctrinally, evidence rules focus judges on whether evidence of scientific gerrymandering is relevant—defined narrowly in a bifurcated trial to mean relevant to causation—and not unduly prejudicial. They also afford judges significant discretion. In navigating this procedural, factual, and doctrinal landscape, judges often appear to be extremely cautious about, if not hostile to, admitting evidence of scientific gerrymandering during the causation phase. This can have the unfortunate consequence of impoverishing plaintiffs' showings relating to causation, while protecting corporate defendants from the disclosure of gross scientific gerrymandering.

Denying admission of evidence of scientific gerrymandering in the causation phase of a bifurcated trial is potentially fatal to plaintiff's opportunity to demonstrate corporate negligence at all and can prevent that evidence from ever being publicly surfaced. This is so because a trial judge may rule that evidence of scientific gerrymandering will only be allowed during the trial's latter phase, but the trier of fact may conclude that the plaintiff has not met its burden on causation, in which case the trial will not proceed to further phases and that evidence—even if otherwise admissible—will never be heard. This outcome may be particularly frustrating for plaintiffs who contend that evidence of scientific gerrymandering may provide important context for evaluating the sufficiency of evidence on causation. While these evidentiary rulings—on whether specific items of evidence related to scientific gerrymandering should be admitted—can be difficult to resolve and are important to outcomes regardless of when they arise, such rulings have higher stakes when entertained during the causation phase of bifurcated trials.

All of these procedural, factual, and doctrinal factors are important for understanding how scientific gerrymandering is typically raised and analyzed in toxic tort suits. This Part provides an overview of the current treatment of scientific gerrymandering by explaining the ubiquity of bifurcation in toxic tort suits and describing

legal rulings that limit the admission of evidence of scientific gerrymandering, using the Roundup litigation as an illustrative example.

A. Bifurcation

Bifurcation is a case management technique formally designed to expedite the litigation process and conserve court resources. Federal Rule of Civil Procedure 42(b) provides that “for convenience, to avoid prejudice, or to expedite and economize, the court may order a separate trial of one or more separate issues, crossclaims, counterclaims, or third-party claims.”¹² Even if bifurcation might be efficient or the issues can easily be separated, however, this technique is not meant to be utilized when the separation of issues would unfairly prejudice one party.¹³ Furthermore, the Advisory Committee Notes to Rule 42 state that “separation of issues is not to be routinely ordered” and bifurcation has been characterized as a “drastic”¹⁴ and nonstandard case management approach.¹⁵ Despite the limited role envisioned for bifurcation, it is often used in environmental toxic tort cases, which frequently present complicated scientific questions.¹⁶

Courts offer a number of reasons for bifurcating cases when trying complex scientific issues within toxic tort litigation. First, separation of issues is understood to conserve judicial resources by

¹² FED. R. CIV. P. 42(b). *See also Bifurcate*, BLACK’S LAW DICTIONARY (11th ed. 2019) (describing bifurcation as “separat[ing] into two parts, esp. for convenience. Multiple aspects of litigation, such as discovery, motions, defenses, trial, and jury deliberations may be bifurcated to save time, reduce jury confusion, or achieve other benefits, with or without the same jury hearing both bifurcated parts.”).

¹³ *See Angelo v. Armstrong World Indus.*, 11 F.3d 957, 964 (10th Cir. 1993).

¹⁴ *See Nye v. Ingersoll Rand Co.*, Civ. No. 08–3481 (DRD), 2011 WL 4017741, at *3 (D.N.J. Sept. 8, 2011) (citing *Walker Drug Co., Inc. v. La Sal Oil Co.*, 972 P.2d 1238, 1245 (Utah 1998) (“To our knowledge, so drastic a technique has never been employed in Utah.”)).

¹⁵ *See* FED. R. CIV. P. 42 advisory committee’s note to 1966 amendments. The committee also notes that although the separation of issues should not be “routinely ordered, it is important that it be encouraged where experience has demonstrated its worth.” *Id.*

¹⁶ *See generally* Albert P. Bedecarré, *Rule 42(b) Bifurcation at an Extreme: Polyfurcation of Liability Issues in Environmental Tort Cases*, 17 B.C. ENVTL. AFFAIRS L. R. 123, 151 (1989).

preventing cases from moving forward if they fail on causation.¹⁷ Thus, bifurcation encourages judicial economy by “obviat[ing] the need for a jury trial on’ liability or punitive damages and sav[ing] time and money, ‘which properly serve[s] the goals of Rule 42(b).’”¹⁸ For example, bifurcation is employed in sprawling products liability cases, such as asbestos cases, to help courts manage an overwhelming caseload.¹⁹

Second, bifurcation may minimize the potential for prejudice and jury confusion, as evidence relevant to other issues in the litigation may influence a jury’s decision on causation.²⁰ That said, prejudice and fairness are also major concerns for those who oppose bifurcation as a case management tool.²¹ Plaintiffs generally argue that bifurcation deprives the jury of understanding the context of the litigation.²² Bifurcation can also be potentially burdensome for plaintiffs who have to recall experts and witnesses back to the courtroom to participate in subsequent phases of litigation.²³ Thus, the bifurcation of toxic tort suits has long engendered debate. It remains,

¹⁷ See *In re Richardson-Merrell, Inc. “Bendectin” Prods. Liab. Litig.*, 624 F. Supp. 1212, 1221 (S.D. Ohio 1985) [hereinafter “Bendectin”]. In this case, the court opined that the sheer volume of cases to be tried in the consolidated litigation, over 1100 cases, favored a bifurcated strategy. See *id.*

¹⁸ Monsanto Company’s Motion to Reverse Bifurcate the Group 1 Trials at 4, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. filed Dec. 10, 2018), Doc. No. 2282 (quoting *Allstate Ins. Co. v. Breeden*, 410 F. App’x 6, 9 (9th Cir. 2010)).

¹⁹ See *Angelo v. Armstrong World Indus.*, 11 F.3d 957, 964 (10th Cir. 1993).

²⁰ See Monsanto Company’s Motion to Reverse Bifurcate the Group 1 Trials, *supra* note 18, at 6. See generally *Bendectin*, 624 F. Supp. at 1212. The Bendectin case was a products liability litigation brought by women who took Bendectin during pregnancy, which resulted in birth defects for their children. In the Bendectin litigation, there was extreme concern that the presence of the affected children in the courtroom would prejudice the jury against defendants. This concern led the court to conclude that bifurcating the case and trying causation first—without the presence of the affected children in the courtroom—would be the fairest case management strategy. See *id.* at 1222–24.

²¹ See Albert P. Bedecarré, *Rule 42(b) Bifurcation at an Extreme: Polyfurcation of Liability Issues in Environmental Tort Cases*, 17 B.C. ENV’T AFF. L. REV. 123, 137 (1989).

²² See *In re Beverly Hills Fire Litig.*, 695 F.2d 207, 217 (6th Cir. 1982).

²³ See Plaintiffs’ Opposition to Issue Bifurcation at 9–10, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. filed Dec. 13, 2018), Doc. No. 2302.

however, commonly employed, particularly in high stakes toxic tort suits.²⁴

Additionally, trial court bifurcation decisions are subject to little appellate oversight. Trial courts have broad discretion to bifurcate a trial and their decisions are reviewed under the deferential abuse of discretion standard.²⁵ Persuading judges not to bifurcate toxic tort suits where there is evidence of scientific gerrymandering could mitigate, in part, the concern that defendants will benefit twice from scientific gerrymandering: first, by using it to forestall the development of good data connecting their harmful products to human health harms, and second, by relying on that artificial lack of data during the causation phase of a bifurcated trial to achieve a quick dismissal of the case. For this Article, however, we focus on informing and encouraging greater permissiveness in admitting evidence of scientific gerrymandering even when trials are bifurcated. This may prove to be a more feasible prospect than revisiting burned-over debates about the propriety of bifurcation in the first instance. This approach also focuses needed scrutiny on scientific gerrymandering and its influence on litigation, and can have broader value by informing rulings on the admissibility of evidence that reveals scientific gerrymandering, even when a trial is not bifurcated.

B. *Hardeman* as an Illustration/Example of Evidentiary Rulings Involving Scientific Gerrymandering in Bifurcated Trials

A brief review of the allegations relating to scientific gerrymandering and admissibility rulings in *Hardeman v. Monsanto Co.* helps to illustrate the difficulties that can arise when courts evaluate the admissibility of evidence of scientific gerrymandering during the causation phase of a bifurcated toxic tort suit.²⁶

²⁴ See Steven S. Gensler, *Bifurcation Unbound*, 75 WASH. L. REV. 705, 725 (2000) (“[F]ederal judges regularly employ bifurcation in complex litigation such as mass tort cases. Bifurcation is also common in patent litigation, complex environmental litigation, antitrust litigation, and complex employment litigation.”) (listing cases) (citations omitted); see also Bedecarré, *supra* note 21, at 124–26 (noting and critically examining the increasing separation of causation from other trial phases in environmental toxic tort suits).

²⁵ See *Jinro Am. Inc. v. Secure Invs., Inc.*, 266 F.3d 993, 998 (9th Cir. 2001).

²⁶ See *In re Roundup Prods. Liab. Litig.*, 214 F. Supp. 3d 1346 (J.P.M.L. 2016) (centralizing cases in the Northern District of California). Note, some of the pre-trial rulings discussed were decided for and applicable to all of the centralized

1. Plaintiff/Defendant Claims and Arguments

In *Hardeman*—a bellwether trial in the centralized multidistrict litigation *In Re Roundup Products Liability Litigation*—the plaintiff alleged that Monsanto, the manufacturer of Roundup, failed to warn consumers about the alleged risk of the glyphosate-containing herbicide,²⁷ and that he developed Non-Hodgkin’s Lymphoma (NHL) after regularly using Roundup during home gardening beginning in the 1980s.²⁸ The plaintiff contended that other ingredients in Roundup, such as “the surfactant polyethoxylated amine (POEA), render Roundup even more toxic than glyphosate on its own.”²⁹

Plaintiff brought several causes of action against Monsanto regarding the safety of Roundup, including claims sounding in negligence, design defect, failure to warn, and breach of implied warranty.³⁰ Key to plaintiff’s claims were allegations that Monsanto misrepresented information about the risks of Roundup to consumers, the scientific community, and regulators through, in part, scientific gerrymandering.³¹ For example, plaintiff alleged that Monsanto employed a variety of strategies to distort, slow, obfuscate, or otherwise shape the development and understanding of risks posed by Roundup.³² Those strategies included covertly authoring, editing, or otherwise influencing the content of published articles, known as “ghostwriting”; aggressive promotion of Roundup-favorable studies, even those which Monsanto knew to be seriously flawed; suppression, misrepresentation, and unfounded attacks on research and

cases; other rulings were limited to Group 1 trials, and yet others were specific to the *Hardeman* case. *See id.* at 1348; *see also In re Roundup Prods. Liab. Litig.*, 2019 U.S. Dist. LEXIS 6820, MDL No. 2741, at *1 (N.D. Cal. Jan. 14, 2019).

²⁷ *See In re Roundup Prods. Liab. Litig.*, 214 F. Supp. 3d at 1347.

²⁸ *See id.* at 1348; Complaint at 11, *Hardeman v. Monsanto Co.*, No. 4:16CV00525, 2016 WL 11574934 (N.D. Cal. filed Feb. 1, 2016).

²⁹ *See In re Roundup Prods. Liab. Litig.*, 214 F. Supp. 3d at 1348.

³⁰ *See* Complaint at 11–18, *Hardeman v. Monsanto Co.*, No. 4:16CV00525, 2016 WL 11574934 (N.D. Cal. filed Feb. 1, 2016).

³¹ *E.g., id.* at 12 (alleging that Monsanto was negligent in part for “[c]oncealing information from the Plaintiff while knowing that Roundup was unsafe, dangerous, and/or non-conforming with EPA regulations” and “[i]mproperly concealing and/or misrepresenting information from the Plaintiff, scientific and medical professionals, and/or the EPA, concerning the severity of risks and dangers of Roundup compared to other forms of herbicides”).

³² *See* Plaintiffs’ Opposition to Issue Bifurcation, *supra* note 23, at 10–14.

researchers, that yielded unfavorable conclusions—which the plaintiff refers to as “academic bullying”; early cessation and suppression of unfavorable study results; and concerted and sometimes disingenuous lobbying of regulators by, among other things, withholding and misrepresenting data.³³

Pretrial proceedings first addressed general causation, that is, whether glyphosate can cause NHL at realistic levels of exposure.³⁴ This is an issue applicable to all of the Roundup cases that had been centralized into the multidistrict litigation. Specific causation, addressing whether a particular plaintiff’s NHL was caused by glyphosate, was left for independent resolution in each individual action.³⁵ As is typical in toxic tort suits, Monsanto moved for summary judgment on the ground that plaintiffs failed to produce evidence from which a rational juror could find that general causation was satisfied. Judge Chhabria, in what he characterized as a “very close question,” admitted the expert opinions of three of plaintiffs’ experts and denied Monsanto’s motion for summary judgment, finding that the plaintiffs had proffered sufficient evidence of general causation to proceed to trial.³⁶ Judge Chhabria’s pretrial order denying summary judgment on general causation and resolving the parties’ *Daubert*³⁷ motions undertook a close examination of the evidence relating to general causation and is discussed in greater detail in Part II.A.

Monsanto responded to the denial of its motion for summary judgment by moving to bifurcate the Group 1 trials into two phases:

³³ *See id.*

³⁴ *See In re Roundup Prods. Liab. Litig.*, 390 F. Supp. 3d 1102, 1108–11 (N.D. Cal. 2018).

³⁵ *See id.* at 1111.

³⁶ *See id.* at 1108–09.

³⁷ Judges must decide whether expert testimony is sufficiently reliable to be allowed into evidence and considered by factfinders (usually juries); they undertake their evaluation of expert testimony using the standard announced by the Supreme Court in *Daubert v. Merrell Dow Pharms., Inc.* *See Garcia v. Sec’y of Health & Hum. Servs.*, 2010 U.S. Claims LEXIS 390, at *1, n.4 (Fed. Cl. May 19, 2010) (“A *Daubert* motion is a motion to exclude methodologically unreliable expert witness testimony, typically filed *in limine*, to prevent such dubious testimony from confusing and even tainting the factfinder. It is premised on the Supreme Court case of *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993).”).

specific, or medical, causation (Phase 1), and negligence and damages (Phase 2).³⁸ Monsanto cited judicial economy as one rationale for bifurcation, claiming that it “could avoid the presentation of days of company conduct and regulatory evidence through multiple witnesses that might prove unnecessary if the jury finds for Monsanto on either of the ‘close’ questions of causation.”³⁹ Monsanto focused even more on the need for bifurcation to avoid undue prejudice and jury confusion on the issue of causation, emphasizing that the jury should concentrate on evaluating “causation based on the actual scientific studies and evidence.”⁴⁰ Monsanto argued that “bifurcation would avoid the risk that the jury becomes distracted or misled by extraneous evidence of corporate conduct” and cited to plaintiffs’ attorneys’ references to how Monsanto “generated junk science” and acted with a “desire to manipulate scientists” as examples of evidence that had “no relevance to the proposed phase one issue of causation.”⁴¹ Monsanto also drew the court’s attention to prior precedent—previous mass tort litigations involving asbestos, Bendectin, DES, diet drugs, and hormone replacement therapy—where courts employed bifurcation.⁴²

Plaintiffs resisted bifurcation, noting, in particular, that it would be “impossible to separate evidence that is probative of causation from evidence that is probative of liability” because of the “overlap in light of Monsanto’s pervasive manipulation, fabrication, and intimidation of the very science underlying causation.”⁴³ Plaintiffs highlighted evidence of scientific gerrymandering by Monsanto and explained that such evidence would be critical to both causation and liability, concluding:

There is considerable evidence that Monsanto engaged in various forms of scientific manipulation, including ghostwriting and academic bullying. These actions have infected the body of scientific work considered by the Parties’ experts, regulatory agencies,

³⁸ See Monsanto Company’s Motion to Reverse Bifurcate the Group 1 Trials, *supra* note 18, at 1. The Group 1 trials included three bellwether cases, *Hardeman v. Monsanto*, *Stevick v. Monsanto*, and *Gebeyehou v. Monsanto*. See *id.* at 11.

³⁹ *Id.* at 8.

⁴⁰ *Id.* at 2, 6, 8.

⁴¹ *Id.* at 7, 8 nn.7–8.

⁴² See *id.* at 1–2 & 5.

⁴³ Plaintiffs’ Opposition to Issue Bifurcation, *supra* note 23, at 1.

and overall academic community. In this context, the line between “liability” and “causation” evidence does not exist.⁴⁴

Plaintiffs also flagged that if bifurcation limited the presentation of evidence about scientific gerrymandering, it could prejudice the jury. Specifically, plaintiffs argued that, “if [they were] prevented from presenting evidence about how Monsanto influenced and corrupted science and regulators, then the jury [would] be left with a nagging question—if this product can cause cancer, why has it been on the market for over forty years with no warning?”⁴⁵

The parties’ briefing on the motion to bifurcate nicely frames the interplay between bifurcation and evidence of scientific gerrymandering. From Monsanto’s perspective, evidence of scientific gerrymandering was only relevant, if at all, to corporate conduct and liability but not to causation, and was, moreover, highly likely to confuse or prejudice jury evaluations of causation evidence. From plaintiffs’ perspective, evidence of scientific gerrymandering was deeply enmeshed with, and indeed crucial to, a full understanding of the state of science with respect to the causal question. Judge Chhabria eventually decided to bifurcate the trial.⁴⁶ The parties’ underlying dispute continued in the form of protracted wrangling about whether to admit specific items of evidence related to scientific gerrymandering during the causation phase.⁴⁷

2. Judge Chhabria’s Rationale for Bifurcation

In ruling to bifurcate the trial, Judge Chhabria drew a distinction between Monsanto’s efforts to mislead regulators and the public, on the one hand, and more direct interference with specific scientific studies, on the other.⁴⁸ He signaled that the former were

⁴⁴ *Id.* at 12.

⁴⁵ *Id.* at 10.

⁴⁶ See Pretrial Order No. 61 Re: Bifurcation at 1–2, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. Jan. 3, 2019), Doc. No. 2406.

⁴⁷ See *infra* Part I.B.3.

⁴⁸ See Pretrial Order No. 61 Re: Bifurcation, *supra* note 46, at 1–2.

relevant only to liability and thus not admissible during the causation phase.⁴⁹ He indicated that the latter, however, might be admissible during the causation phase, particularly in the context of plaintiffs' efforts to impeach expert witnesses offered by Monsanto.⁵⁰

Notably, both the parties and Judge Chhabria focused to a great extent on whether, when, and how jurors would be allowed to hear evidence about EPA's regulation of glyphosate,⁵¹ as well as a report

⁴⁹ See *id.* at 1 (“These issues are relevant to punitive damages and some liability questions. But when it comes to whether glyphosate caused a plaintiff’s NHL, these issues are mostly a distraction, and a significant one at that.”).

⁵⁰ See *id.* at 2 (“[I]f the plaintiffs have evidence that Monsanto manipulated the outcome of scientific studies, as opposed to agency decisions or public opinion regarding those studies, that evidence may well be admissible at the causation phase.”).

⁵¹ EPA conducted an initial peer review of glyphosate in 1985, classifying glyphosate as a Group C chemical, a Possible Human Carcinogen, based on the results of a study on male mice which developed kidney tumors after exposure to glyphosate. See EPA OFF. OF PESTICIDE PROGRAM, GLYPHOSATE ISSUE PAPER: EVALUATION OF CARCINOGENIC POTENTIAL 12–13 (2016), https://www.epa.gov/sites/production/files/2016-09/documents/glyphosate_issue_paper_evaluation_of_carcinogenic_potential.pdf [hereinafter GLYPHOSATE ISSUE PAPER]. Monsanto worked hard to persuade EPA to reconsider its determination by, among other things, hiring pathologists to re-evaluate the mouse study. See Carey Gillam, *Of Mice, Monsanto and a Mysterious Tumor*, U.S. RIGHT TO KNOW (June 8, 2017), <https://usrtk.org/pesticides/of-mice-monsanto-and-a-mysterious-tumor/>. One year after the initial review of glyphosate was conducted in 1985, EPA requested that the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) evaluate the carcinogenic potential of glyphosate, and this panel determined that the data which had been used to classify glyphosate as a Group C chemical did not reach statistical significance. See GLYPHOSATE ISSUE PAPER, *supra* note 51, at 12–13. This group also recommended that glyphosate be classified as a Group D chemical, “Not Classifiable as to Human Carcinogenicity.” *Id.* After this suggestion, two additional rat carcinogenicity studies were submitted and a new review of glyphosate was undertaken by the Carcinogenicity Peer Review Committee—this Committee concluded that glyphosate should be classified as a Group E Chemical, “Evidence of Non-Carcinogenicity for Humans based upon lack of evidence for carcinogenicity in mice and rats and the lack of concern for mutagenicity.” *Id.* at 13 (internal quotations omitted). The most recent study was done in September of 2015, when the Committee classified glyphosate as “Not Likely to be Carcinogenic to Humans.” *Id.* EPA published a comprehensive report on the carcinogenicity of glyphosate in 2016, and this review concluded that “[t]he strongest support is for ‘not likely to be carcinogenic to humans’ at doses relevant for human health risk.” *Id.* at 140. EPA’s evaluation of glyphosate has been criticized for being unduly influenced by Monsanto and other private interests, failing to cognize exposure levels consistent with Roundup application, failing to consider the full range of peer-reviewed literature, and failing to consider the effects of the

issued by the International Agency for Research on Cancer (IARC) classifying glyphosate as a Group 2A carcinogen.⁵² Judge Chhabria ultimately ruled that evidence relating to EPA's approval and IARC's classification were admissible during the causation phase, but he limited discussion of each organization's conclusions because "the primary inquiry is what the actual studies show," not what EPA or IARC concluded based upon them.⁵³ Plaintiffs' allegations of scientific gerrymandering focused on Monsanto's machinations to influence the presentation of science to, or the interpretation of the scientific conclusions of EPA and IARC.⁵⁴ Perhaps for this reason, the parties and Judge Chhabria often addressed questions about the admission of evidence of scientific gerrymandering in the context of evaluating the admission of evidence relating to EPA's and IARC's decisions. Judge Chhabria explained:

A significant portion of the plaintiffs' case involves attacks on Monsanto for attempting to influence regulatory agencies and manipulate public opinion regarding glyphosate. These issues are relevant to punitive damages and some liability questions. But when it comes to whether glyphosate caused a plaintiff's NHL, these issues are mostly a distraction, and a significant one at that. . . . [I]f the plaintiffs have evidence that Monsanto manipulated the outcome of scientific studies, as opposed to agency decisions or public opinion regarding those studies, that evidence may well be admissible at the causation phase. Any such evidence will likely overlap with evidence of liability, but it will not

full Roundup formulation (as opposed to glyphosate alone). See Charles M. Benbrook, *How Did the US EPA and IARC Reach Diametrically Opposed Conclusions on the Genotoxicity of Glyphosate-Based Herbicides?*, 31 ENV'T SCI. EUR., Jan. 14, 2019, at 1–3.

⁵² See *IARC Monograph on Glyphosate*, INT'L AGENCY FOR RSCH. ON CANCER (Mar 1, 2016), <https://www.iarc.fr/featured-news/media-centre-iarc-news-glyphosate/>. Group 2A, Probably Carcinogenic to Humans, indicates that "[t]here is strong evidence that a given chemical can cause cancer in humans, but at present it is not conclusive." *Standard IARC Classification*, SCI. COMMS., https://ec.europa.eu/health/scientific_committees/opinions_layman/en/electromagnetic-fields/glossary/ghi/iarc-classification.htm (last visited Nov. 10, 2020).

⁵³ Pretrial Order No. 78: Guidance for the Parties Re: Motions in Limine at 1, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. Feb. 12, 2019), Doc. No. 2707.

⁵⁴ See Pretrial Order No. 61 Re: Bifurcation at 1–2, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. Jan. 3, 2019), Doc. No. 2406.

be impossible, as the plaintiffs contend, to separate evidence of causation from evidence of liability.⁵⁵

However, it would ultimately prove time-consuming and vexing to separate evidence of causation from evidence of liability with respect to scientific gerrymandering.

3. Motions *in limine* and Other Rulings Relating to the Admission of Evidence of Scientific Gerrymandering

Bifurcating the case made it necessary to evaluate the admissibility of evidence of scientific gerrymandering during the causation phase. This produced protracted, high-stakes disputes over the resolution of motions *in limine* and other rulings,⁵⁶ as evidenced by contemporary news reports.⁵⁷ A review of the arguments made and decisions rendered about the admissibility of evidence of scientific gerrymandering illustrates both the difficulty of separating evidence of scientific gerrymandering from causation and the way in which situating decisions about admissibility of evidence of scientific gerrymandering within the causation phase skews against its admission.

Judge Chhabria attempted to establish a “guiding principle” to govern the admissibility of evidence of scientific gerrymandering in the causation phase, explaining that documents related to “a particular study that is going to be at issue with respect to causation” might be admissible, but “internal Monsanto communications about

⁵⁵ *Id.*

⁵⁶ See, e.g., Letter Brief, Monsanto’s Discovery of a Tumor in the Control Group When It Re-Reviewed the Knezevich and Hogan Mouse Study, *In re Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. filed Jan. 15, 2019), Doc. No. 2492 (briefing a dispute related to the admissibility of evidence relating to Monsanto’s efforts to finesse through reinterpretation study results previously submitted to EPA).

⁵⁷ Indeed, numerous news outlets reported that Bayer AG saw its share price rise 6% upon Judge Chhabria’s ruling to bifurcate the trial and limit the introduction of evidence of scientific gerrymandering during the causation phase. See, e.g., Donato Paolo Mancini, *Bayer Shares Jump After Monsanto Weedkillers Court Ruling*, WALL ST. J., Jan. 4, 2019; Tina Bellon, *U.S. Judge Stands by Ruling to Limit Evidence in Roundup Cancer Trials*, ST. LOUIS POST-DISPATCH, Jan. 4, 2019. See generally Daniel Siegal, *Monsanto Gets Gift with Two-Stage Roundup Bellwether*, LAW360 (Feb. 20, 2019) <https://www.law360.com/articles/1130082/monsanto-gets-gift-with-two-stage-roundup-bellwether>.

how to sway a scientist” would generally not be admissible.⁵⁸ From his perspective, internal Monsanto documents showing how Monsanto sought to influence the scientific and regulatory processes—memos “about the ways we can attack” a study—might be more akin to “a kind of political strategy document,” and, therefore, were less likely to be admissible than an internal Monsanto document offering an “objective assessment” of a study.⁵⁹ Judge Chhabria cited to the need to balance probative value and risk of prejudice under Rule 403 of the Federal Rules of Evidence.⁶⁰ In conducting such analysis, he stated that many internal Monsanto documents involving strategy about how to shape the science were “only tangentially relevant to the primary [issue] at hand in Phase I” and “a significant distraction.”⁶¹ Ultimately, resolution of questions about the admissibility of evidence of scientific gerrymandering were difficult, causing Judge Chhabria to remark, “sometimes it’s going to be hard to decide whether something falls in Phase I or Phase II but we’re going to do the work and we’re going to figure it out.”⁶²

Taken together, the parties’ arguments relating to the admissibility of evidence of scientific gerrymandering, Judge Chhabria’s reasoning in parsing those arguments, and the rulings that determined what evidence the jury was allowed—and not allowed—to hear, indicate that evidence of scientific gerrymandering is less likely to be admitted during the causation phase. In other words, undertaking evaluations regarding the admissibility of scientific gerrymandering evidence during the causation phase of bifurcated trials skews strongly against the admission of such evidence. That evidence is more likely to be admitted when trials are not bifurcated, and causation and negligence arguments are heard together.

In both cases—bifurcated trials and those that are not—decisions about whether to admit a particular item of evidence relating

⁵⁸ Transcript of Proceedings, *supra* note 4, at 5–6.

⁵⁹ *Id.* at 6–7. The guidelines articulated by Judge Chhabria were meant to provide a general approach for resolving specific admissibility determinations before and during trial.

⁶⁰ FED. R. EVID. 403 (“The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.”).

⁶¹ Transcript of Proceedings, *supra* note 4, at 6–7.

⁶² *Id.* at 42.

to scientific gerrymandering can be idiosyncratic to the specific evidence offered, and not all evidence of scientific gerrymandering will be admitted regardless of the phase of the trial in which it is offered—this is perhaps because, as explained below, it is deemed to be unduly prejudicial. Yet, generally speaking, it makes sense that plaintiffs will have a harder time persuading judges to admit evidence of scientific gerrymandering during the causation phase of bifurcated trials. This is so because, as discussed in further detail in Part II.B, the touchstone of admissibility is relevance. Evidence of scientific gerrymandering may not be as readily understood to speak directly to the core question of causation, namely whether a chemical in fact caused a harm. Moreover, evidence of scientific gerrymandering paints the defendant in a negative light, leading to concerns that it will prejudice the jury or confuse the issues. As judges weigh probative value against the potential for prejudice, the perception that evidence is less relevant in a particular context thus changes the calculation regarding admissibility. Additionally, judges making decisions about whether to admit evidence of scientific gerrymandering during the causation phase of bifurcated trials do so against the backdrop of the already-made decision to bifurcate, which is often justified, in part, by appeals to judicial economy. Defendants will argue—and judges may be concerned—that allowing scientific gerrymandering evidence will needlessly complicate and prolong the causation phase because such evidence will need to be revisited during the negligence phase of the trial. Finally, judges may have the sense that any negative impact of excluding evidence of scientific gerrymandering in causation phases is mitigated by keeping open the possibility that such evidence will be admitted in later negligence and damage phases.⁶³ Together, all of these factors conspire against the admission of evidence of scientific gerrymandering in the causation phase of bifurcated trials.

These dynamics were evident in *Hardeman*. For its part, Monsanto referred to plaintiffs' evidence about how it had worked to shape scientific understandings as "real sideshows that would mislead the jury" and that would not "advance the ball in terms of the bottom line of what the science shows."⁶⁴ Pushing back against

⁶³ Even though the failure to allow such evidence during the causation phase may reduce the chances of plaintiffs reaching the negligence and damage phases.

⁶⁴ Transcript of Proceedings, *supra* note 4, at 9, 17.

plaintiffs' request to admit a Monsanto scientists' email characterizing the results of a study, Judge Chhabria commented, "We're not saying it's irrelevant. We're saying it's not for Phase I, that under 403 it's a sideshow. . . . The emphasis should be on the science."⁶⁵ And his evidentiary rulings relating to evidence of scientific gerrymandering accordingly differentiate with respect to Phase 1 and Phase 2. Judge Chhabria granted Monsanto's motion *in limine* to exclude evidence of ghostwriting for Phase 1, but denied it for Phase 2, reasoning that the "evidence is not relevant (or, at best, is marginally relevant) to causation, so its admission during Phase 1 would be unduly prejudicial and would waste the jury's time. During Phase 2, however, this evidence is far more relevant."⁶⁶ Similarly, he granted Monsanto's motion *in limine* to entirely exclude evidence of public-relations activities for Phase 1 while observing that "[n]on-cumulative evidence of Monsanto's public-relations activities relating to glyphosate will generally be relevant and admissible during Phase 2," and inviting Monsanto to "bring a . . . targeted motion before the beginning of Phase 2" related to the admissibility of such evidence.⁶⁷

Judge Chhabria endeavored to draw a line between evidence that went "primarily to what did Monsanto know and when did it know it and how did it try to manipulate the regulators," which he viewed as generally not admissible in the causation phase, and evidence about the science of causation, which he viewed generally to be admissible.⁶⁸ However, this distinction did not necessarily resolve questions about Monsanto's *role in developing* the science of causation. In resolving disputes related to Monsanto's role, Judge Chhabria's approach was sometimes to limit the admission of evidence of scientific gerrymandering to impeachment, or to allow it only if Monsanto opened the door in some way, for example by re-

⁶⁵ *Id.* at 74.

⁶⁶ Pretrial Order No. 81: Ruling on Motions in Limine at 1–2, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. Feb. 18, 2019) WL 1371806, at *1.

⁶⁷ *Id.* at *2.

⁶⁸ Transcript of Proceedings, *supra* note 4, at 74–75.

lying on a specific study with respect to which plaintiffs had evidence of manipulation.⁶⁹ Referring at one point to evidence of, in Judge Chhabria's words, "Monsanto's efforts to work" a scientist, Judge Chhabria seemed inclined to think that such evidence was more likely to come in as impeachment evidence if Monsanto offered an expert whose testimony opened the door, but not as affirmative evidence of causation in plaintiffs' case in chief.⁷⁰ As another example, Monsanto sought a motion *in limine*, preventing the introduction of evidence of "post-use corporate conduct,"—meaning evidence of corporate conduct after a particular plaintiff stopped using Roundup—which included evidence of how Monsanto sought to influence scientific understandings of related health risks.⁷¹ While Monsanto conceded that "science going to causation is relevant even if it post-dates the Plaintiffs' use of Roundup," it nonetheless objected to such evidence, arguing that "Plaintiffs will seek to paint Monsanto's post-use activities as attempts by Monsanto to silence detractors of glyphosate, [and] influence science and regulators," which would be unduly prejudicial.⁷² Judge Chhabria granted Monsanto's motion to exclude post-use corporate conduct in both phases, "subject to a limited exception for evidence of Monsanto's alleged efforts to influence the outcome of a study that Monsanto relies on at trial."⁷³ This approach—allowing evidence of scientific gerrymandering in specific instances only if Monsanto opened the door—ultimately gave Monsanto control over how to structure its case so as to potentially avoid the admission of evidence of scientific gerrymandering by declining to present studies or experts where plaintiffs could point to evidence of their manipulation.

⁶⁹ See Pretrial Order No. 67: Ruling on Initial Evidentiary Submissions at 1, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 16-md-02741-VC (N.D. Cal. filed Jan. 30, 2019), Doc. No. 2586 (ruling that plaintiffs could only introduce an expert's evaluation "if Monsanto presents expert testimony . . . or otherwise opens the door through cross-examination").

⁷⁰ See Transcript of Proceedings, *supra* note 4, at 32–34.

⁷¹ See Monsanto Company's Notice of Motion and Motion in Limine No. 7 Re: Post-Use Corporate Conduct, *In re Roundup Prods. Liab. Litig.*, MDL No. 2741, No. 3:16-md-02741-VC (N.D. Cal. Jan. 30, 2019), Doc. No. 2775.

⁷² *Id.* at 3–5.

⁷³ Pretrial Order No. 81, *supra* note 66, at 3.

4. Implications of the *Hardeman* Motion Decisions

The treatment of evidence of scientific gerrymandering in *Hardeman* provides an illustrative example and descriptive context that inform the doctrinal and normative analyses that follow. There are, it should be noted, numerous other examples of scientific gerrymandering and associated evidentiary disputes. For example, DuPont's efforts to suppress, shape, and obfuscate information about the risk of PFOA⁷⁴ were revealed through discovery in landmark toxic tort litigation.⁷⁵ In his book, *The Optimistic Environmentalist*, David Boyd comments on the ubiquity of scientific gerrymandering and its influence on our understanding of chemical risk:

Industries whose products come under attack routinely follow a game plan based on tobacco industry tactics. First they deny the existence of any problems. They pay charlatan scientists to lie and say their products or emissions are safe. They finance scientific journals with official-sounding titles to publish bogus articles based on junk science. They wield their wealth in efforts to buy the support or acquiescence of politicians and bureaucrats.⁷⁶

He then goes on to illustrate this pattern beginning in the 1920s with respect to multiple chemicals and industries.⁷⁷ Scientific gerrymandering is thus common, well-documented, and recognized to have significant consequences. Our review of cases and the relevant literature supports a few key generalizations. Plaintiffs in toxic tort suits often allege that defendants engaged in a range of scientific gerrymandering activities, and discovery may reveal evidence that supports these claims.⁷⁸ Unfortunately, this evidence may never be

⁷⁴ PFOA is a type of synthetic chemical that when exposed to humans can cause adverse health effects. See EPA, EPA'S PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ACTION PLAN 9 (2019).

⁷⁵ See BILOTT, *supra* note 1, at 297 (describing how DuPont and 3M helped to perpetuate a "massive data gap" about the health impacts of PFOA).

⁷⁶ DAVID R. BOYD, *THE OPTIMISTIC ENVIRONMENTALIST: PROGRESSING TOWARDS A GREENER FUTURE* 133 (2015).

⁷⁷ See *id.* at 133–37 (referencing lead, mercury, asbestos, polybrominated diphenyl ethers, atrazine, and BPA as examples).

⁷⁸ Plaintiffs' attorneys can also engage in scientific gerrymandering. This Article focuses on corporate (defendant) gerrymandering, which tends to be more systemic, more sophisticated, more influential on scientific understanding, and less readily discovered and challenged through the traditional adversarial process. See MCGARITY & WAGNER, *supra* note 5, at 26–32 (recognizing that plaintiffs' attorneys sometimes bend science but concluding that "the regulated industries

heard by jurors. This is because cases are often bifurcated, with causation tried before negligence and damages. Causation is typically a difficult hurdle for plaintiffs in toxic tort cases and, while evidence of scientific gerrymandering can provide important context for evaluating plaintiffs' showings on causation, judges may be reluctant to hear evidence of scientific gerrymandering during the causation phase of the trial. As will be discussed in the next Part, this interplay may make it more challenging for plaintiffs to prove causation and could prevent evidence of scientific gerrymandering from ever coming to light.

II. RELEVANCE, SCIENTIFIC GERRYMANDERING, AND TOXIC TORT CAUSATION

Fierce debates about the complex scientific, doctrinal, and normative considerations attendant in evaluating causation in the toxic tort context have resulted in the development of a very specific showing required to establish causation. This standard, in turn, provides the backdrop against which judges rule on the admissibility of causation evidence in toxic tort suits, including evidence of scientific gerrymandering. For the reasons that follow, scientific gerrymandering can powerfully shape whether, when, and how plaintiffs are able to make necessary showings regarding causation and thus should be considered relevant to causation.

A. Causation and Scientific Gerrymandering

One of the greatest hurdles that plaintiffs face in toxic tort lawsuits is proving causation.⁷⁹ Before attempting to explain why and how evidence of scientific gerrymandering is relevant to causation, we first offer a detailed explanation of the requirements for establishing causation in toxic tort suits. To establish causation, a plaintiff

tend to be the dominant players in the science bending drama.”) (citation omitted). Evidence of scientific gerrymandering by plaintiffs should also, however, be admissible.

⁷⁹ See Thomas O. McGarity, *Proposal for Linking Culpability and Causation to Ensure Corporate Accountability for Toxic Risks*, 26 WM. & MARY ENV'T L. & POL'Y REV. 1, 6, 18 (2001) (“[C]ausation has proven a very effective stumbling block that has not only precluded compensation for all but the most clearly understood environmentally caused diseases, but has also stood in the way of ambitious attempts to protect the public health generally through toxic tort litigation.”).

must usually show both general and specific causation.⁸⁰ General causation requires a showing that the substance or toxin in question has the capability of resulting in the disputed injury.⁸¹ Specific causation, on the other hand, requires a showing that the substance or toxin actually caused the plaintiff's injury.⁸² Although both showings can be difficult for plaintiffs, general causation is often the threshold, if not central, question in toxic tort litigation.⁸³

To establish general causation, a plaintiff must "prove by a preponderance of the evidence that . . . the substance . . . [is] capable of causing the disease."⁸⁴ With very few exceptions,⁸⁵ the means for understanding the health impacts of a chemical are complex, expensive, push at the frontiers of or exceed current scientific capacity,⁸⁶

⁸⁰ See RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010) ("The plaintiff must prove by a preponderance of the evidence that, but for the defendant's tortious conduct with respect to the toxic substance, the plaintiff would not have suffered harm. When group-based statistical evidence is proffered in a case, this means that the substance must be capable of causing the disease ("general causation") and that the substance must have caused the plaintiff's disease ("specific causation"). In other cases, when group-based evidence is unavailable or inconclusive, and other forms of evidence are used, the general and specific causation issues may merge into a single inquiry.").

⁸¹ See *Avila v. Willits Env't Remediation Tr.*, 633 F.3d 828, 836 (9th Cir. 2011).

⁸² See *id.*

⁸³ See RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010) ("The special problem in these [toxic substances] cases, however, is proving the connection between a substance and development of a specific disease."); see also McGarity, *supra* note 79, at 18 ("Because the general causation issue does not involve factual evidence about the individual plaintiff, defendants frequently raise the general causation issue early in the development of a trial by way of motions for summary judgment.") (citation omitted).

⁸⁴ RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010).

⁸⁵ Some examples include chemicals with acute effects (i.e., an effect that develops quickly) or that cause signature diseases. See *id.*

⁸⁶ See *id.* ("Occasionally, biological-mechanism evidence is sufficiently developed to prove general causation. More frequently, however, the evidence consists of scientific studies comparing the incidence of disease in groups of individuals (epidemiologic evidence) or animals (toxicologic evidence) with different levels of exposure. . . . Epidemiologic studies are expensive and can take considerable time to design, conduct, and publish. For disease processes with long latency periods, valid studies cannot be performed until the disease has manifested

and rarely yield definitive results.⁸⁷ Each of these means, including controlled human studies, animal studies,⁸⁸ epidemiological studies,⁸⁹ and chemical studies, have their own sets of limitations.⁹⁰ Furthermore, plaintiffs generally suffer from both resource and information asymmetry, as defendants tend to have many more resources and superior access to information about the chemical.⁹¹

The practical, scientific challenges of discerning chemical effects on human health become even more daunting when considered in the context of a toxic tort suit and evaluated against the standard for proving causation. Proving causation almost always requires that the plaintiff offers expert testimony. Courts serve as “gatekeepers,” limiting which experts can testify, what studies can be used as the basis for that testimony, and whether evidence deemed admissible is sufficient for the plaintiff to get the case before the jury.⁹² Judges typically rule first on whether proffered expert testimony is admissible under Federal Rule of Evidence 702⁹³ and then, in deciding motions for summary judgment or other dispositive motions,

itself. As a consequence, some plaintiffs may be forced to litigate long before epidemiologic research is available.”).

⁸⁷ See McGarity, *supra* note 79, at 14–34 (identifying and exploring the complexities associated with these methods of risk assessment in the context of a toxic tort suit).

⁸⁸ Defendants in toxic tort lawsuits often attempt to exclude animal studies as not relevant during the causation inquiry. A common relevance problem that often arises with animal studies is that the levels of exposure animals undergo is often higher than that of human exposure. Aside from varying levels of exposure, another relevance concern is that the same level of exposure that affects one species (i.e., an animal) might not have the same effect on another species (i.e., a human). As such, courts can be reluctant to admit animal studies even though scientists and federal regulators rely on them. See, e.g., *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 139 (1997).

⁸⁹ See, e.g., *In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1223, 1239–40 (E.D.N.Y. 1985) (noting courts’ traditional reluctance to rely on epidemiological studies); Steve Gold, *Causation in Toxic Torts: Burdens of Proof, Standards of Persuasion, and Statistical Evidence*, 96 *YALE L.J.* 376, 379–80 (1986).

⁹⁰ See McGarity, *supra* note 79, at 14.

⁹¹ See WENDY WAGNER & WILL WALKER, *INCOMPREHENSIBLE!* 134–35 (2019) (explaining why chemical manufacturers are in the best position to assess the risk from the chemicals they produce).

⁹² See FED. R. EVID. 104(a) (“The court must decide any preliminary question about whether a witness is qualified, a privilege exists, or evidence is admissible.”).

⁹³ See FED. R. EVID. 702.

whether the admissible evidence is sufficient for a reasonable fact finder to find that the plaintiff has met its burden.⁹⁴ A trilogy of Supreme Court cases—*Daubert v. Merrell Dow Pharmaceuticals, Inc.*,⁹⁵ *General Electric Co. v. Joiner*,⁹⁶ and *Kumho Tire Co. v. Carmichael*⁹⁷—as well as the text of Federal Rule of Evidence 702, as amended in 2000, both firmly position judges as “gatekeep[ers]”⁹⁸ tasked with ensuring the relevance and reliability of scientific evidence offered in toxic tort suits.⁹⁹ The Supreme Court points judges toward a non-exhaustive set of rigorous factors to consider when evaluating the admissibility of scientific evidence¹⁰⁰ and invites judges to evaluate both experts’ “conclusions and methodology” and to reject testimony where “too great an analytical gap [exists] between the data and the opinion proffered.”¹⁰¹ Federal Rule of Evidence 702 expressly instructs judges to permit an individual to offer expert testimony only if “the testimony is based on sufficient facts or data” and “is the product of reliable principles and methods,” which “the expert . . . reliably applied . . . to the facts of the case.”¹⁰²

Within this framework, individual trial judges impose differing levels of stringency with respect to the scientific evidence that they deem admissible. Appellate courts review trial judges’ rulings on the admissibility of expert testimony under an abuse of discretion standard,¹⁰³ which is highly deferential.¹⁰⁴ Additionally, appellate

⁹⁴ See McGarity, *supra* note 79, at 18.

⁹⁵ See *Daubert v. Merrell Dow Pharms., Inc.* 509 U.S. 579, 597 (1993).

⁹⁶ See *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 142 (1997).

⁹⁷ See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999).

⁹⁸ *Daubert*, 509 U.S. at 597.

⁹⁹ See *id.* at 589–90.

¹⁰⁰ This includes whether a method can or has been tested; the known or potential rate of error; whether the methods have been subjected to peer review; and whether the methods are generally accepted. See *id.* at 593–94.

¹⁰¹ *Joiner*, 522 U.S. at 146.

¹⁰² FED. R. EVID. 702.

¹⁰³ See *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

¹⁰⁴ See *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 680 (6th Cir. 2010) (Martin, J., dissenting) (“[Abuse of discretion review] requires a reviewing court to be highly deferential when assessing not just a trial court’s analysis of each [*Daubert*] factor, but also the trial court’s initial selection of which factors are relevant to the case at hand.’ It is within the district court’s discretion to determine whether the testimony provided is inadmissible ‘junk science’ or testimony falling within the

courts in different circuits adopt divergent approaches for evaluating those rulings on expert testimony in toxic tort suits, as some circuits place more stringent requirements on expert admissibility than others.¹⁰⁵ Significant questions relating to expert testimony on causation might include whether a judge will deem animal studies relevant, require plaintiffs to produce an epidemiological study—perhaps even requiring that the study show a doubling of the relative risk of chemical exposure—or allow an expert to testify based on a weight of the evidence approach that takes into account a range of studies of varying types and weighing them to account for the limitations.¹⁰⁶ In particular, where knowledge about the health effects of a chemical is developing and disputed, judges' rulings about the admissibility of expert testimony offered by plaintiffs to prove causation can be crucial and outcome determinative. In light of the relevant timeframes and costs involved, it simply may not be possible for plaintiffs to cure identified deficiencies in their evidence of causation, even if further study later provides better evidence of chemical harm.

Despite variation in the standards employed by individual trial judges and across various circuits with respect to appellate review of those rulings,¹⁰⁷ as well as heated debate about the optimal level

'range where experts might reasonably differ.')

(first quoting *Johnson v. Manitowoc Boom Trucks, Inc.* 484 F.3d 426, 430 (6th Cir. 2007); then quoting *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 153 (1999)). As a result, "[a court] must conduct [its] review of [a trial court's] decision with great deference." *Tamraz*, 620 F.3d at 680.

¹⁰⁵ Compare *Milward v. Acuity Specialty Prods. Grp.*, 639 F.3d 11, 17, 20 (1st Cir. 2011) (holding that a trial judge erred by failing to admit expert evidence based on a holistic, weight of the evidence approach), with *Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 198 (5th Cir. 1996) (rejecting the weight of the evidence methodology).

¹⁰⁶ See *McGarity*, *supra* note 79, at 22–27; see also RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010) ("Occasionally, courts have suggested or implied that a plaintiff cannot meet the burden of production on causation without epidemiologic evidence").

¹⁰⁷ Compare *Milward*, 639 F.3d at 11, 17, 20, with *Allen*, 102 F.3d at 198. See also David E. Bernstein & Eric G. Lasker, *Defending Daubert: It's Time to Amend Federal Rule of Evidence 702*, 57 WM. & MARY L. REV. 1, 10 n.40, 41–42, 42 n.229 (2015) (discussing the circuit split and listing cases).

of judicial scrutiny and the minimum required showings from parties,¹⁰⁸ it seems fair to say that judges generally subject experts, the methodologies they employ, and the studies upon which they rely in toxic tort actions, to meaningful and often close judicial scrutiny. The *Hardeman* case is instructive on this point.¹⁰⁹ Judge Chhabria issued a sixty-eight page ruling on the parties' *Daubert* and summary judgement motions that related to both the admissibility of expert testimony regarding causation and whether plaintiffs had offered sufficient evidence of general causation to warrant the case proceeding to a jury.¹¹⁰ His decision reviews, in detail, the epidemiological studies, animal studies, and mechanistic data—evidence of the biological mechanism by which glyphosate might cause cellular changes—and, in addition, “examines each of the plaintiffs’ experts’ opinions, and analyzes whether those opinions synthesize all this evidence reliably enough to be admissible at trial.”¹¹¹

The decision shows how, to satisfy his “gatekeeping” role under *Daubert* and *Joiner*, Judge Chhabria undertook an in-depth examination of both the specific studies relied upon and methods employed by the experts whose testimony the parties sought to offer at trial. For example, he ruled that one aspect of a plaintiff expert’s testimony regarding biological plausibility in the assessment of animal carcinogenicity was inadmissible to the extent that the expert used a particular “pooling method” to assess whether glyphosate

¹⁰⁸ Compare McGarity, *supra* note 79, at 19 (lamenting that *Daubert* and its progeny have produced a “corpuscular” approach to the admissibility of causation evidence that unduly prevents claims from reaching juries), and Thomas O. McGarity & Sidney A. Shapiro, *Regulatory Science in Rulemaking and Tort: Unifying the Weight of the Evidence Approach*, 3 WAKE FOREST J. L. & POL’Y 65, 97–99 (2013), and CRANOR, *supra* note 1, at 138 (arguing for a weight of the evidence approach), with Bernstein & Lasker, *supra* note 107, at 40–43 (criticizing courts for being too permissive in admitting unreliable expert testimony on toxic tort causation and recommending that Federal Rule of Evidence 702 be amended to require greater scrutiny).

¹⁰⁹ Another instructive example is the scrutiny afforded to plaintiff’s evidence of causation in *General Electric Co. v. Joiner*. See 522 U.S. 136, 139 (1997); see also McGarity, *supra* note 79, at 19–21 (recounting how the Supreme Court upheld the district court’s rejection of myriad studies with respect to whether PCBs cause lung cancer).

¹¹⁰ See *In re Roundup Prods. Liab. Litig.*, 390 F. Supp. 3d 1102, 1108–09 (N.D. Cal. 2018).

¹¹¹ *Id.* at 1109.

causes cancer in various rodent carcinogenicity studies.¹¹² He carefully parsed another expert's treatment of latency across different studies.¹¹³ After careful review, he concluded that the testimonies of three experts for the plaintiffs were inadmissible for various reasons that were specific to aspects of each, even though he described the first expert as "eminently qualified" and having authored written reports of "high quality";¹¹⁴ noted that the second expert had "more than forty years of toxicology experience, and had worked for the National Cancer Institute and National Institute of Environmental Health Sciences," and was "for many years responsible for the preparation of the Report on Carcinogens, a congressionally mandated public health report";¹¹⁵ and recognized that the third expert was a hematologist and medical oncologist whose clinical practice focused on treating patients with NHL.¹¹⁶ Although Judge Chhabria organized his admissibility determinations around the relatively permissible Ninth Circuit standard for admitting expert testimony,¹¹⁷ he still engaged in a painstakingly detailed examination of the expert testimony as required under *Daubert* and *Joiner*, discussed above. Despite excluding the three proffered testimonies, Judge Chhabria did admit three plaintiff expert opinions. He emphasized, however, that it was a "close question," and that plaintiffs had made an adequate showing on general causation to resist summary judgment.¹¹⁸ He also augured that, "[g]iven how close the question is at the general causation phase, the plaintiffs appear to face a daunting challenge at the next phase," with respect to presenting sufficient evidence of specific causation.¹¹⁹ Notably, the fact that the IARC had recently classified glyphosate as probably carcinogenic to humans appears to have hindered as much as helped plaintiffs in the Rule 702 analysis. Judge Chhabria reasoned that the standard for the clas-

¹¹² See *id.* at 1134–38.

¹¹³ See *id.* at 1122.

¹¹⁴ See *id.* at 1144–46.

¹¹⁵ *Id.* at 1146.

¹¹⁶ See *id.* at 1148.

¹¹⁷ See *id.* at 1111.

¹¹⁸ See *id.* at 1151.

¹¹⁹ *Id.* at 1109.

sification differed from the legal standard for showing general causation—preponderance of the evidence—and thus critiqued plaintiffs’ experts for undue reliance on the IARC study.¹²⁰

B. Relevance and Scientific Gerrymandering

As has been shown above, developing sufficient evidence that a chemical causes harm, such that it can be heard by a jury, is quite difficult and subject to close judicial scrutiny. Indeed, admissibility sometimes turns on the availability or assessment of a single study or expert. This helps to illustrate the power of scientific gerrymandering; successfully stalling or tainting a single study might prevent plaintiffs from reaching a jury.

Scientific gerrymandering can take many forms. In two of his works,¹²¹ Thomas McGarity identifies and describes in detail the many “science-bending strategies for use in anticipation of litigation or regulation” deployed by “[r]isk-producing industries.”¹²² He begins by observing that “to the extent that the industries are the ones conducting or contracting for the relevant health and environmental studies, they have a great deal of influence over how the studies are conducted, and they can frequently control whether adverse results ever see the light of day.”¹²³ He then goes on to list and describe a host of mechanisms that companies use to shape science even when they do not have such direct control, including:

- Attacking studies with adverse conclusions prior to publication by orchestrating negative peer reviews and urging journals not to publish them;
- Demanding that journals retract or correct published scientific studies containing adverse conclusions;
- Financing critical letters to the editor in scientific journals after publication;

¹²⁰ See *id.* at 1108.

¹²¹ See Thomas O. McGarity, *Our Science Is Sound Science and Their Science Is Junk Science: Science-Based Strategies for Avoiding Accountability and Responsibility for Risk-Producing Products and Activities*, 52 U. KAN. L. REV. 897, 914–921 (2004); MCGARITY & WAGNER, *supra* note 5, at 38–40 (summarizing strategies for bending science, including “shaping science,” “hiding science,” “attacking science,” “harassing scientists,” “packaging science,” and “spinning science”).

¹²² McGarity, *supra* note 121, at 914.

¹²³ *Id.*

- Assembling a panel of sympathetic experts to evaluate adverse studies;
- Harassing scientists who produce adverse results by complaining to their superiors, threatening to sue them, and/or lodging spurious scientific misconduct complaints;
- Sponsoring counter-research aimed at producing contradictory results;
- Abusing the peer review process by using industry consultants and industry-funded academics to recommend against the publication of studies with adverse results; and
- Demanding and reanalyzing scientific data underlying research producing adverse results.¹²⁴

In their book *Incomprehensible!*, Wendy Wagner and Will Walker relate other tactics used by what they refer to as “Rule-Bender” chemical manufacturers, including observing that “[t]he Rule-Bender’s motivation to provide biased research can be so substantial that the Rule-Bender will even hire an entire cadre of scientists and reserve—through contract—the right to control their research.”¹²⁵ They report further that 15 percent of U.S. scientists admit to having “changed the design, methodology, or results of a study under pressure from a funding source.”¹²⁶

Through these efforts, chemical proponents can significantly shape and define the state of scientific knowledge about the health risks of chemicals.¹²⁷ It follows that they can complicate and, in some cases, delay or prevent development of an objective understanding of chemical risks, as well as slow or prevent government regulation and decrease the availability of evidence to satisfy the burden of showing causation in litigation.¹²⁸ Together, these efforts both forestall lawsuits and prevent cases from getting to the jury or

¹²⁴ See *id.* at 914–21.

¹²⁵ WAGNER & WALKER, *supra* note 91, at 141 (citation omitted).

¹²⁶ *Id.* at 141–42 (citing Meredith Wadman, *One in Three Scientists Confesses to Having Sinned*, 435 NATURE 718 (2005)).

¹²⁷ See MCGARITY & WAGNER, *supra* note 5, at 60–180.

¹²⁸ See WAGNER & WALKER, *INCOMPEHENSIBLE!*, *supra* note 91, at 140–47; see also MCGARITY & WAGNER, *BENDING SCIENCE*, *supra* note 5, at 181–203; BILOTT, *EXPOSURE: POISONED WATER, CORPORATE GREED, AND ONE LAWYER’S TWENTY-YEAR BATTLE AGAINST DUPONT*, *supra* note 1.

succeeding at trial.¹²⁹ The efficacy of gerrymandering, in turn, creates a strong temptation and incentive to engage in gerrymandering.

Scientific gerrymandering is thus relevant to causation. To be admissible, evidence must be relevant.¹³⁰ Evidence is considered relevant when “it has any tendency to make a fact more or less probable than it would be without the evidence; and . . . the fact is of consequence in determining the action.”¹³¹ In the present context, the question would be whether evidence of scientific gerrymandering helps a fact finder understand whether a chemical causes a particular harm.¹³² In the *Hardeman* case, for example, plaintiffs needed to prove that “glyphosate . . . can cause Non-Hodgkin’s Lymphoma (“NHL”) at exposure levels people realistically may

¹²⁹ In short, defendants can avoid lawsuits by obscuring the connection between plaintiff harm and chemical exposure and then, when lawsuits are brought, again rely on obscured causation and demanding evidentiary requirements to avoid liability. See McGarity, *supra* note 121, at 914–921, 927 (“In a toxic tort or products liability case, the plaintiff must introduce reliable evidence that is relevant to the question of cause and effect. The epidemiological evidence that is typically required to make this showing, however, is precisely the sort of evidence that is most susceptible to the corpuscular attacks and other science-bending strategies.”).

¹³⁰ See FED. R. EVID. 402 (“Irrelevant evidence is not admissible.”).

¹³¹ FED. R. EVID. 401. As indicated by Judge Chhabria in his rulings, select evidence of scientific gerrymandering may also be admitted in the context of impeaching an opposing party witness. It is important to note, however, that relying on impeachment for the admission of evidence of scientific gerrymandering is ultimately unsatisfying as much evidence might not fit in that box. Defendants could control whether impeachment evidence can be offered through their strategic trial choices and, moreover, impeachment must fall within specified categories, including contradiction, reputation for honesty, inconsistent statements, bias, perception, convictions, or prior bad acts. See FED. R. EVID. 408, 607, 608, 613, 609, 704. Though less common, psychiatric history is another category of impeachment. See *United States v. Lindstrom*, 698 F.2d 1154, 1161 (11th Cir. 1983) (“Although the use of psychiatric evidence ‘does not fall within the traditional pattern of impeachment, the law should be flexible enough to make use of new resources.’”).

¹³² See generally RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. c (AM. L. INST. 2010) (“The plaintiff must prove by a preponderance of the evidence that, but for the defendant’s tortious conduct with respect to the toxic substance, the plaintiff would not have suffered harm. When group-based statistical evidence is proffered in a case, this means that the substance must be capable of causing the disease (“general causation”) and that the substance must have caused the plaintiff’s disease (“specific causation”).”).

have experienced” and that “each particular plaintiff’s NHL was caused by glyphosate.”¹³³

In short, the relevance analysis could be stated as follows: does evidence of scientific gerrymandering help shed light on whether a chemical causes harm? As described above, in most toxic tort cases, whether a chemical causes harm is a complex question requiring reference to and evaluation of a large body of scientific evidence, explored through expert analysis of epidemiological, animal, and mechanistic studies. Evidence of scientific gerrymandering provides context for understanding, weighing, and interpreting that body of scientific learning.

Does the fact that Company X orchestrated a smear campaign against a researcher whose work showed that Chemical Y caused tumors in rodents make it more likely that Chemical Y causes cancer? No, of course not. But might the smear campaign have contributed to the failure of that researcher and her work to gain broader acceptance, dissuaded future work regarding the carcinogenicity of chemical Y, and helped chemical Y to avoid earlier or more rigorous scrutiny from regulators? It seems that the answer here is, almost certainly, yes. Further, it seems that understanding that Company X orchestrated the smear campaign would help a fact finder accurately evaluate the researcher’s work, including its reception by others in the field, as well as educate a fact finder about how to interpret the constellation of available studies. The smear campaign raises the possibility that a paucity of studies showing harm might not actually indicate a lack of harm, but, that the process through which studies are conducted and promoted was possibly subjected to pro-chemical corporate influence. From there, a fact finder might infer that Company X engaged in the smear campaign because the researcher’s work, in fact, raised legitimate substantive concerns about whether Chemical Y causes cancer—something akin to consciousness of guilt or consciousness of liability or responsibility—that is, the company’s own suspicion that the chemical might in fact pose risks.¹³⁴

¹³³ *In re Roundup Prods. Liab. Litig.*, 390 F. Supp. 3d 1102, 1108 (N.D. Cal. 2018).

¹³⁴ Courts adjudicating civil matters have admitted evidence of consciousness of guilt. See *W.P. RICHARDSON & JEROME PRINCE, PRINCE, RICHARDSON ON EVIDENCE* § 4-611 (11th ed. 1995) (citing *Parrott v. Pelusio*, 65 A.D.2d 914 (N.Y. App. Div. 1978)). However, many do not necessarily refer to this sort of evidence

Evidence of scientific gerrymandering is thus relevant to toxic tort causation because the landscape of evidence related to causation is complex and contested, with specific studies and conclusions embedded in and almost inseparable from the much larger corporate, scientific, and regulatory ecosystem that produces them.

Judges, however, seem inclined, almost reflexively, to view evidence of scientific gerrymandering as irrelevant or tangentially relevant to causation. In *Hardeman*, for example, Judge Chhabria granted Monsanto's motion *in limine* to exclude evidence of ghostwriting¹³⁵ during the causation phase, reasoning that the "evidence is not relevant (or at best marginally relevant) to causation, so its admission during Phase 1 would be unduly prejudicial and would waste the jury's time."¹³⁶ Yet, viewed in light of the scientific and evidentiary processes just described, a strong case can be made that evidence of ghostwriting is central to understanding the totality of the scientific evidence relating to causation.¹³⁷

As one specific example, plaintiffs alleged that Monsanto scientists ghostwrote the article *Safety Evaluation and Risk Assessment of the Herbicide Roundup and its Active Ingredient, Glyphosate, for Humans*, attributed to Williams, Kroes, & Munro.¹³⁸ The article,

as conscious of guilt, but rather, consciousness of liability, *see, e.g.*, *Rock v. McHenry*, 115 S.W.3d 419, 420–22 (Mo. Ct. App. 2003), or consciousness of responsibility, *see, e.g.*, *Birch v. Juehring*, No. 8-218, 2008 Iowa App. LEXIS 441, at *6–8 (App. Div. Iowa 2008).

¹³⁵ Ghostwriting is the "practice of . . . companies secretly authoring journal articles published under the byline of academic researchers." Chung-Lin Chen, *Assessing Potential Legal Responses to Medical Ghostwriting: Effectiveness and Constitutionality*, 5 J. L. BIOSCIENCES 84, 85 (2018).

¹³⁶ Pretrial Order No. 81, *supra* note 66.

¹³⁷ *See generally* MCGARITY & WAGNER, *supra* note 5, at 76–79 (describing the practice and effect of ghostwriting and observing that "[s]everal examples of ghostwritten articles downplaying the risks of a sponsor's products are available").

¹³⁸ Compare Carey Gillam, Remarks Before a Joint Hearing of the European Parliament Committee on the Environment, Public Health and Food Safety and the Committee on Agriculture and Rural Development 2–3 (Oct. 11, 2017), <https://usrtk.org/wp-content/uploads/2017/10/Presentation-before-the-European-Parliament.pdf>, with *Monsanto Did Not Ghostwrite the Williams et al. (2000) Glyphosate Paper*, MONSANTO NEWS RELEASE (March 17, 2017), <https://georgia.growingamerica.com/news/2017/03/monsanto-did-not-ghostwrite-the-williams-et-al-2000-glyphosate-paper-2017-03-17/>. *See also* E-mail from William Heydens, Chief Scientist, Monsanto, to Donna Farmer, Toxicologist, Monsanto (Feb. 19, 2015, 07:53), <https://perma.cc/8JN4-F7PB>.

which undertook a review of existing studies and research and concluded that there was “no convincing evidence” that Roundup or glyphosate were genotoxic, carcinogenic, or caused developmental toxicity, was highly influential.¹³⁹ It was cited over four hundred times, integrated into the science surrounding the toxicity of glyphosate, and likely influenced the extent and direction of future research, as well as regulatory decisions.¹⁴⁰ Plaintiffs contended that this “infected the body of scientific work” regarding Roundup,¹⁴¹ as the William, Kroes, & Munro article was considered the seminal piece about glyphosate and Roundup’s genotoxicity profile.¹⁴² As evidence that Monsanto impacted the direction of future research and regulation of Roundup at an important fork in the road, plaintiffs noted that the ghostwritten article was published not long after Monsanto allegedly buried a report that had called for further studies after it concluded that glyphosate was mutagenic and caused breakages in chromosomes that might lead to cancer.¹⁴³ This was but one example of Monsanto’s influence on the scientific landscape; journalist Carey Gillam reviewed documents released in conjunction with the Roundup litigation and concluded that Monsanto “did not merely produce or influence a few studies but ‘dozens or hundreds,’ which were subsequently re-cited in other publications as evidence refuting risk.”¹⁴⁴

¹³⁹ See Gary M. Williams et al., *Safety Evaluation and Risk Assessment of Herbicide Roundup and Its Active Ingredient, Glyphosate, for Humans*, 31 REG. TOXICOLOGY & PHARMACOLOGY 117 (2000).

¹⁴⁰ This figure was found through the citation report for this article generated by Web of Science. For an example of how the article was relied upon in later work, see, e.g., Helmut Greim et al., *Evaluation of Carcinogenic Potential of the Herbicide Glyphosate, Drawing on Tumor Incidence Data from Fourteen Chronic/Carcinogenicity Rodent Studies*, 45 CRITICAL REV. IN TOXICOLOGY 185, 202 (2015) (“With regard to potential carcinogenic effects of glyphosate, the unanimous outcome of these reviews has been that the data provide sufficient evidence to conclude that glyphosate should not be considered a carcinogen. Genotoxicity studies with glyphosate, conducted under conditions stipulated by internationally accepted testing guidelines and GLP, as reviewed in 2000 (Williams et al. 2000).”).

¹⁴¹ Plaintiffs’ Opposition to Issue Bifurcation, *supra* note 23, at 12.

¹⁴² See *id.* at 12–13

¹⁴³ See *id.*

¹⁴⁴ Katherine Drabiak, *Roundup Litigation: Using Discovery to Dissolve Doubt*, 31 GEO. ENV’T L. REV. 697, 702 (2019) (citing CAREY GILLAM,

When courts fail to recognize the relevance of evidence of scientific gerrymandering to causation, the practical implications can be compounded. In a bifurcated case, a finding that the evidence is not relevant to causation—although it may be relevant to negligence or damages—may significantly hamper the plaintiff's ability to make its case to the jury regarding causation and ultimately, that evidence may never be admitted if the jury does not find that the plaintiff has met its causal burden. Second, as discussed in greater detail below, even if a court views evidence of scientific gerrymandering as relevant, it will decline to admit the evidence if its probative value is substantially outweighed by a danger of “unfair prejudice, confusing the issues, [or] misleading the jury.”¹⁴⁵ A failure to appreciate the core relevance of evidence of scientific gerrymandering—that it is not just useful as evidence of bad corporate conduct relevant to assessing negligence or damages, but also critical to developing a nuanced understanding of the evidence of causation—may cause judges to erroneously treat evidence of scientific gerrymandering as unduly prejudicial.

III. UNFAIR PREJUDICE, SCIENTIFIC GERRYMANDERING, AND ESTABLISHED TORT AND EVIDENCE DOCTRINES

Even if scientific gerrymandering is relevant to general causation and therefore *prima facie* admissible, judges might nonetheless exclude evidence of scientific gerrymandering upon a finding that its probative value is substantially outweighed by a danger of “unfair prejudice, confusing the issues, [or] misleading the jury.”¹⁴⁶ This Part explains why judges should be less inclined to view evidence of scientific gerrymandering as problematically prejudicial and hence inadmissible, particularly at the causation phase. First, juror responses to evidence of scientific gerrymandering are not necessarily unduly prejudicial as an evidentiary matter. Second, to the extent that the risk about which courts are worried about comes to

WHITEWASH: THE STORY OF A WEED KILLER, CANCER, AND THE CORRUPTION OF SCIENCE (2017)).

¹⁴⁵ FED. R. EVID. 403 (“The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.”).

¹⁴⁶ *Id.*

fruition—i.e., jurors are influenced by evidence of scientific gerrymandering and overlook weak plaintiff evidence of causation—a number of other tort and evidence doctrines suggest that this is not in fact much of a risk, as that outcome is consistent with existing tort and evidence doctrines. This is further the case because normative arguments augur in favor of erring on the side of discouraging scientific gerrymandering conduct.

Juries presented with evidence of corporate scientific gerrymandering sometimes hold toxic tort defendants liable even where evidence of causation is relatively weak. It is oft-hypothesized that, in so doing, juries are commingling the substantive causal question—does Chemical X cause cancer?—with a desire to punish defendants for engaging in wrongdoing.¹⁴⁷ Judges may interpret this as unfair prejudice or confusion of the issues, the danger of which is sufficiently pronounced and potentially harmful to warrant exclusion of evidence of scientific gerrymandering during the causation phase of bifurcated toxic tort trials.¹⁴⁸

This approach seems reasonable on the surface. A defendant's efforts to avoid the development or acceptance of a scientific link between its chemical and harm, while unseemly, does not make the chemical more or less likely to cause cancer. Hence, the thinking

¹⁴⁷ E.g., David E. Bernstein, *The Breast Implant Fiasco*, 87 CAL. L. REV. 457, 505 (1999) (reviewing MARCIA ANGELL, M.D., *THE CLASH OF MEDICAL EVIDENCE AND THE LAW IN THE BREAST IMPLANT CASE* (1996)) (“[J]uries frequently rule against manufacturers in the absence of sufficient evidence of causation to punish them for misbehavior, particularly when there is scientific uncertainty on the underlying causation issue.”) (citing to articles by Margaret A. Berger, Feldman, and Wendy Wagner); Richard A. Nagareda, *Outrageous Fortune and the Criminalization of Mass Torts*, 96 MICH. L. REV. 1121, 1122–25, 1172–74 (1998); Lars Noah, *Civil Jury Nullification*, 86 IOWA L. REV. 1601, 1643 n.157 (2001) (identifying this as an example of civil jury nullification).

¹⁴⁸ Thomas McGarity posits that concerns about commingling on causal questions have even motivated the “corpuscular” approach to *Daubert* gatekeeping in toxic tort cases. See McGarity, *supra* note 79, at 41. In *In re Roundup Products Liability Litigation*, Judge Chhabria granted Monsanto’s request to bifurcate the trial and significantly limit the evidence of scientific gerrymandering that could be introduced during the causation phase, reasoning that “plaintiffs’ . . . attacks on Monsanto for attempting to influence regulatory agencies and manipulate public opinion regarding glyphosate. . . when it comes to whether glyphosate caused a plaintiff’s NHL, these issues are mostly a distraction, and a significant one at that.” Pretrial Order No. 61, *supra* note 55, at 1. He did, however, concede that the “evidence that Monsanto manipulated the outcome of scientific studies . . . might be admissible during the causation phase.” *Id.* at 2.

goes, weighing the fact that a defendant engaged in scientific gerrymandering when evaluating whether the plaintiff has shown that a chemical causes harm is unfairly prejudicial because it rests the decision of causation on an “improper basis,” moreover one that is “emotional” in the sense that it is driven by anger at the company.¹⁴⁹

Scratch the surface, however, and it becomes apparent that this reasoning is facile. As explained in Part II, through scientific gerrymandering, defendants deliberately shade and shape the universe of information about a chemical and its effects that is available to regulators, plaintiffs, and, eventually, fact finders in trials. It is therefore both proper and fair, when evaluating what causal conclusion to draw from the science, to learn not just the current state of the science, but also to understand that it has been defined and shaped, in part, by defendants’ strategic choices. This understanding also applies to remaining uncertainties and knowledge gaps in the science. Scientific gerrymandering can work in powerful ways to shape the availability, perceptions, and actual state of scientific knowledge on a subject. As McGarity and Wagner point out, “collective scientific knowledge does not always result from scientists dutifully applying the scientific method, but instead sometimes reflects successful efforts by advocates to influence researchers and research outcomes,” to the point where “the increasingly pervasive practice of shaping science appears to be altering the trajectory of scientific knowledge.”¹⁵⁰ As discussed in Part II, scientific gerrymandering includes a range of conduct intended to shape the state of science: declining to conduct research into product risks; suppressing internal research about product risks; withholding or misrepresenting data to researchers; shutting down studies whose early results look threatening; “actively work[ing] to obfuscate especially damaging information produced by others”; undertaking an “affirmative campaign of disinformation and obfuscation”; attacking the integrity of researchers to “distract or even intimidate academic or government scientists whose research has adverse implications for a company”;

¹⁴⁹ See FED. R. EVID. 403 advisory committee’s note.

¹⁵⁰ MCGARITY & WAGNER, *supra* note 5, at 95–96.

and “financ[ing] counter-research designed to refute third-party research, either by producing different results or by suggesting that the results of the independent research cannot be reproduced.”¹⁵¹

Moreover, it is consistent with long-established tort and evidence doctrines to consider informational asymmetries and interference when deciding whether a plaintiff has satisfied its burden, including specifically with respect to causation. As explained below, important tort doctrines—*Summers v. Tice* alternate causation and *res ipsa loquitur*—recognize that a defendant’s access to superior information and wrongful interference with the production of information provide compelling reasons to lessen the causal burden on plaintiffs.¹⁵² Juries responding to less-than-definitive evidence on causation can rationally determine, consistent with these doctrines and the element of general causation, that the defendant’s scientific gerrymandering impoverished the informational landscape and evaluate the parties’ respective showings on causation through that lens.¹⁵³ When juries do so, they are not making an “inferential error,”¹⁵⁴ but they are engaging in sound reasoning that many other doctrines attest is relevant to evaluating causation.¹⁵⁵ To deny juries

¹⁵¹ Wendy E. Wagner, *Commons Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L. J. 1619, 1641–49, 1651, 1655–56 (2004) [hereinafter Wagner, *Commons Ignorance*]; see also Wendy Wagner, *When All Else Fails: Regulating Risky Products Through Tort Litigation*, 95 GEO. L. J. 693, 716–17 (2007) [hereinafter Wagner, *When All Else Fails*].

¹⁵² See discussion *infra* Part III.A.

¹⁵³ See Wagner, *Commons Ignorance*, *supra* note 151, at 716–17 (positing that juries might, without inappropriate emotion or scientific misunderstanding, factor in the reasons for incomplete evidence on causation, such as a defendant’s misconduct, and grant a spoliation-like presumption on causation to the plaintiff).

¹⁵⁴ See Victor J. Gold, *Federal Rule of Evidence 403: Observations on the Nature of Unfairly Prejudicial Evidence*, 58 WASH. L. REV. 497, 506 (1983) (positing that evidence should be understood to be unfairly prejudicial based on its propensity to cause a trier of fact to commit inferential error and explaining that “[i]nferential error occurs when the jury incorrectly decides that evidence is probative of an alleged fact or event”).

¹⁵⁵ Indeed, judges may likewise rationally and without unfair prejudice or issue confusion give plaintiffs a boost on causation where a defendant obscures evidence of causation. See Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 CORNELL L. REV. 773, 832 (1997) [hereinafter Wagner, *Choosing Ignorance*] (explaining how a judge in the Missouri Court of Appeals overlooked deficiencies in plaintiffs’ proof on causation because the defendant’s own

that important contextual backdrop may, in fact, make it harder for juries to accurately assess causation, as it is widely recognized that the party bearing the burden “needs evidentiary depth to tell a continuous story.”¹⁵⁶ Moreover, the evidentiary doctrine of spoliation sanctions defendants for destroying evidence, often by inviting juries to infer that the disappeared evidence would have benefited the plaintiff. That doctrine likewise has some salience in the present context, where defendants use scientific gerrymandering to shape—or misshape—the state of scientific evidence about chemical risks.

Notably, the identified tort and evidence doctrines go much farther than simply factoring informational absence or misfeasance into weighing parties’ showings on causation. These doctrines often shift the burden entirely to defendants to show that they did *not* cause the plaintiff’s harm.¹⁵⁷ In the case of spoliation, a judge may even require that relief be granted for the plaintiff.¹⁵⁸ These doctrines are not directly applicable to scientific gerrymandering, nor is it argued that they should be. Rather, the doctrines are raised and explored to support the more general propositions that: (1) linking evidence of informational misfeasance to evaluations of causation is common, accepted, and justified; and (2) even if juries do respond to such evidence by inferring that, in the absence of defendant’s scientific gerrymandering, better information supporting a causal connection between a chemical and harm would exist, that is a reasonable conclusion related to the causal question, and one that is not improper or unfairly prejudicial under Federal Rule of Evidence 403.

A. Tort Doctrine and Burden-Shifting Causation

The burden-shifting rule of *Summers v. Tice*, also called alternative-cause, allows a tort defendant who did not cause harm to the plaintiff to be held liable when certain conditions are met. In *Summers v. Tice*, two defendants carelessly discharged their shotguns in the direction of the plaintiff.¹⁵⁹ A shot from the gun of one of the

conduct wrongly prevented plaintiffs from accessing information about toxic chemical releases).

¹⁵⁶ *Old Chief v. United States*, 519 U.S. 172, 190 (1997).

¹⁵⁷ See discussion *infra* Parts III.A-III.B (describing the relevant doctrines).

¹⁵⁸ See *id.*

¹⁵⁹ See *Summers v. Tice*, 199 P.2d 1, 2 (Cal. 1948).

defendants hit the plaintiff in the eye, but the plaintiff, through no fault of his own, could not discern who had fired the shot.¹⁶⁰ The burden then shifted to each defendant to prove that it was not his shot that hit the plaintiff. This burden-shifting invites and blesses an outcome where a defendant who did not in fact cause the plaintiff harm, but is unable to prove so, is held liable.¹⁶¹

The situation where a plaintiff is harmed by exposure to a toxic substance and relevant information about causation is muddied by scientific gerrymandering is, in some obvious and significant ways, distinct from the *Summers v. Tice* paradigm. In a *Summers v. Tice* situation, a defendant's negligence clearly harms the plaintiff, although it is unclear whose. In the toxic tort situation, however, it is possible that the plaintiff's chief harm is not caused by negligence at all. For example, it may be that the plaintiff's cancer was not caused by exposure to the defendant's chemical. However, important policy justifications for the burden-shifting permitted in *Summers v. Tice* are not only present but arguably more pronounced when defendants engage in scientific gerrymandering that obscures whether the defendant's product caused the plaintiff's harm.

Summers v. Tice allows burden-shifting, in part, because of the asymmetry of information regarding causation between the plaintiff and defendant.¹⁶² The defendant is understood to be in a superior position to know or investigate whether it caused the plaintiff's harm.¹⁶³ This kind of information asymmetry is at its zenith as between a corporate chemical owner and an exposed individual.¹⁶⁴ The corporate chemical owner possesses proprietary information about the chemical, a team of in-house scientists, and access to data about chemical test results. Conversely, it may be challenging for a plaintiff to know that he was exposed to a given chemical, let alone that

¹⁶⁰ *See id.*

¹⁶¹ *See id.* at 3 ("The one shot that entered plaintiff's eye . . . could not have come from the gun of both defendants. It was from one or the other only.")

¹⁶² *See id.* at 4 ("The injured party has been placed by defendants in the unfair position of pointing to which defendant caused the harm. . . . Ordinarily defendants are in a far better position to offer evidence to determine which one caused the injury.")

¹⁶³ *See id.*

¹⁶⁴ *See Wagner, When All Else Fails, supra* note 151, at 698–700 (explaining the reasons for information asymmetry between a product manufacturer and exposed individual).

the chemical might cause a particular type of harm or, indeed, plaintiff's actual harm.¹⁶⁵ Those injured by toxic substances can properly be considered "the party least capable of initiating the lengthy scientific process needed to assess risk, as plaintiffs usually begin with no relevant information and inferior resources."¹⁶⁶

Information asymmetry is a strong justification for burden-shifting in tort law. For example, the doctrine of *res ipsa loquitur* allows fact finders to infer that a defendant's negligence caused the plaintiff's harm even in the absence of evidence about what caused the accident. This is because the defendant possesses superior knowledge or access to information about the occurrence, which weighs in favor of giving the jury a *res ipsa* instruction, or granting the plaintiff a *res ipsa* inference.¹⁶⁷ Indeed, eminent torts scholar Judge Guido Calabresi identifies information asymmetry as one of three considerations integral to understanding *res ipsa* cases, remarking on the importance of assessing "which of the parties is in a better position either to reveal or to seek out explanatory evidence" or "which side has more knowledge and therefore which side should bear the incentive to come forward with the evidence."¹⁶⁸

¹⁶⁵ See generally Wagner, *Commons Ignorance*, *supra* note 151, at 1633–58 (2004) (explaining information asymmetries involving the manufacturers of products and factors giving rise to and exacerbating those asymmetries).

¹⁶⁶ Margaret A. Berger, *Eliminating General Causation: Notes Towards a New Theory of Justice and Toxic Torts*, 97 COLUM. L. REV. 2117, 2131 (1997).

¹⁶⁷ See *Pacheco v. Ames*, 69 P.3d 324, 327 (Wash. 2003) ("[T]he purpose of the rule is to require the defendant to produce evidence explanatory of the physical cause of an injury which cannot be explained by the plaintiff.") (quoting *Morner v. Union Pac. R.R. Co.*, 196 P.2d 744, 751–52 (Wash. 1948)). Indeed, asymmetry of information is required in some jurisdictions to invoke the doctrine of *res ipsa loquitur*. See *DeBusscher v. Sam's E., Inc.*, 505 F.3d 475, 481 (6th Cir. 2007) ("Under Michigan's version of the doctrine of *res ipsa loquitur*, the plaintiff must establish that . . . [e]vidence of the true explanation of the event must be more readily accessible to the defendant than to the plaintiff.").

¹⁶⁸ *Williams v. KFC Nat'l Mgmt. Co.*, 391 F.3d 411, 424 (2d Cir. 2004) (Calabresi, J., concurring); see also RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 17 (AM. L. INST. 2010) ("[E]ven though the defendant's superior access to information is not a prerequisite for *res ipsa loquitur*, courts sometimes consider the extent of the defendant's access in *res ipsa* cases.").

Another factor justifying burden-shifting in the *Summers v. Tice* context is the relative culpability of the plaintiff and defendant.¹⁶⁹ In that case, the innocent plaintiff was shot from out of nowhere.¹⁷⁰ The defendants, meanwhile, through their negligence risked harming the plaintiff with the discharge of their guns—even if one of the defendants did not shoot the bullet that hit the plaintiff—and their actions together led to the uncertainty about causation. Thus, even the “innocent” defendant—the defendant whose shot did not connect—is in some sense culpable, and clearly more culpable than the plaintiff.

This justification for burden-shifting is also present in the toxic tort context. Indeed, corporate scientific gerrymandering can properly be considered more culpable than mere negligence that obscures causation. Unlike in the case of the careless shooter, the corporate defendant who engages in scientific gerrymandering may do so purposefully in the face of suspected or known risk in the name of profit.¹⁷¹ While such defendants do not directly seek to harm plaintiffs exposed to their products and may not know that disease is substantially certain to result, they still engage in scientific gerrymandering purposefully, making their conduct akin to an intentional tort with heightened conceptions of responsibility and culpability.¹⁷²

¹⁶⁹ See *Summers v. Tice*, 199 P.2d 1, 2, 4 (Cal. 1948) (“[D]efendants were negligent in so shooting and plaintiff was not contributorily negligent. . . . They are both wrongdoers—both negligent toward plaintiff.”).

¹⁷⁰ See *id.* at 1.

¹⁷¹ Even the failure to exercise due care to discern product risk is culpable. See Berger, *supra* note 166, at 2134 (proposing that “[i]f a corporation fails to exercise the appropriate level of due care, it should be held liable to those put at risk by its action, without regard to injuries that eventually ensue; it is culpable because it has acted without taking into account the interests of those who will be affected by its conduct.”). And it is hard to imagine a “good reason” for engaging in scientific gerrymandering that would make that conduct ethical. See generally David G. Owen, *Philosophical Foundations of Fault in Tort Law*, in PHIL. FOUNDS. OF TORT L. 201, 226 (David G. Owen ed., 1995) (“Thus, the basic ethic revealed to lie behind responsibility for accidental harm is captured in the dual-faceted choice-blame principle, that choosing to risk harm to others without good reason is blameworthy, but that so choosing for good reason is proper.”).

¹⁷² See Owen, *supra* note 171, at 207, 218 (explaining the values underlying tort law and observing that “a person should not choose to harm others solely to advance interests of his own” and that “the bodily integrity interest is accorded a higher abstract value than property”); see also *id.* at 220 (reasoning that “conduct is faulty, as a preliminary matter, if it reflects a choice to cause harm to another”).

Thus, as in *Summers v. Tice*, corporate defendants who engage in scientific gerrymandering can be deemed more culpable than wholly innocent exposed plaintiffs.

The foregoing analysis should not be taken to argue that *Summers v. Tice* burden-shifting applies whole cloth to toxic tort suits involving scientific gerrymandering. As noted at the outset, one important aspect of *Summers v. Tice* is that the harm was negligently caused and the burden was shifted to a group of defendants who were all negligent and whose negligence obscured the question of causation.¹⁷³ The analysis does, however, show that two important “reasons of policy and justice”¹⁷⁴ underlying the *Summers v. Tice* burden-shifting are not only present, but pronounced, in the context of toxic tort suits accompanied by scientific gerrymandering. Those reasons include the asymmetry of information between plaintiff and defendant and the relative culpability of plaintiff and defendant. That such burden-shifting reasons exist suggests that the risk of prejudicing a jury against the defendant is outweighed by the probative value. In short, there is evidence that we are less concerned about holding a defendant liable, even though they did not cause—or cannot be proven to have caused—harm, if the defendant committed a wrong and that wrong makes it harder to understand whether the defendant caused the plaintiff’s harm.¹⁷⁵

¹⁷³ See, e.g., *State Dep’t of Env’t Regul. v. CTL Distrib., Inc.*, 715 So. 2d 262, 264 (Fla. Dist. Ct. App. 1998) (“The case law addressing burden-shifting or market share liability involves situations where *each* of the defendants acted negligently but there was a lack of evidence as to which of the negligent defendants had caused the plaintiff’s injury.”); RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 28(b), § 28 cmt. F (AM. L. INST. 2010) (specifying that *Summers v. Tice* alternative-cause applies “[w]hen the plaintiff sues all of multiple actors and proves that each engaged in tortious conduct that exposed the plaintiff to a risk of harm”).

¹⁷⁴ *Tice*, 199 P.2d at 5.

¹⁷⁵ See Wagner, *Commons Ignorance*, *supra* note 151, at 1632 (observing that “common law courts have sometimes . . . requir[ed] actors to disprove that they caused harm when they are best situated to know how their activities might affect others” and citing to shifting of the burden of proof under *Summers v. Tice* or in response to evidence destruction and the application of the doctrine of *res ipsa loquitor*); see also AMERICAN LAW INSTITUTE, A CONCISE RESTATEMENT OF TORTS § 28 cmt. G (2013 3d ed.) (discussing how defendants’ negligence and asymmetrical access to information inform alternative liability) (“In at least some cases, it appears that the defendants’ better access to proof and doubts about the

There are, moreover, non-frivolous arguments that can be made for burden-shifting in these types of toxic tort cases, even though such arguments would require an extension of existing doctrine. In addition to alternative-cause doctrine and *res ipsa loquitur*, there is a line of cases holding that a defendant's contribution to increased risk can be used to show causation, as exemplified by *Zuchowicz v. United States*.¹⁷⁶ Some combination and extension of *Summers v. Tice*, *res ipsa* doctrine, and cases holding that increased risk can be used to show causation, could be invoked to permit burden-shifting with respect to causation. These types of toxic tort cases arguably fall within a category of tort cases "where the evidence that the defendant was negligent was sufficient,¹⁷⁷ but where the evidence that the plaintiff was injured on account of that negligence was seemingly weak," or cases "in which it often was not clear whether (1) negligent behavior (2) of the defendant was a cause of the injury."¹⁷⁸ Judge Calabresi, discussing *Summers v. Tice*, *res ipsa*, and *Zuchowicz*, observed that "recently . . . a consensus [has] developed that such cases should go to a jury upon a relatively light showing by the plaintiff of but for causation."¹⁷⁹ For present purposes, the above-described doctrines are invoked for a much more limited purpose: to explain why evidence of scientific gerrymandering is important and should appropriately be considered in evaluating causation. If such evidence prompts a jury to view the plaintiff's evidence on causation more favorably, *Summers v. Tice*, *res ipsa*, and *Zuchowicz* together help demonstrate why that outcome can be understood as a doctrinally-grounded and rational inference as opposed to an unfairly prejudicial or improper basis for decision.

plaintiff's ability to extract that evidence from the defendants, even with modern discovery, have influenced the courts to employ burden shifting.")

¹⁷⁶ See *Zuchowicz v. United States*, 140 F.3d 381, 391 (2d Cir. 1998) (declining to overturn a trial court's finding that plaintiff who claimed to have developed a fatal condition as a result of defendant negligently prescribing an excessive amount of a drug had established causation even though plaintiff was not able to produce epidemiological evidence linking the overdose to the condition).

¹⁷⁷ In the present context, the negligent conduct might be conceived of as the failure to warn about a suspected product risk, promoting exposure in the face of suspected risk, or simply the failure to establish safety prior to exposure.

¹⁷⁸ *Williams v. KFC Nat'l Mgmt. Co.*, 391 F.3d 411, 429–31 (2d Cir. 2004) (Calabresi, J., concurring).

¹⁷⁹ *Id.* at 429–31.

B. Spoliation

The familiar evidentiary doctrine of spoliation provides another example of how the common law permits fact finders to consider informational misconduct in making findings. Courts possess inherent power to sanction parties for engaging in spoliation of evidence—meaning destroying, altering, or failing to preserve evidence relevant to an anticipated or pending legal action.¹⁸⁰ While the showing required to justify the imposition of sanctions for spoliation differs across jurisdictions, typical requirements include: first, that there be an obligation to preserve evidence, usually arising from litigation or the reasonable anticipation of litigation; second, that the party interfered with evidence with a culpable state of mind, which, depending on the jurisdiction, could range from negligence to bad faith; and third, that a reasonable fact finder could conclude that the evidence would have been relevant.¹⁸¹ Relevance in this context means that “the lost evidence would have supported the claims or defenses of the party that sought it,”¹⁸² but—importantly—bad faith or willful spoliation can give rise to a presumption that the missing evidence would have supported the opposing party’s claim.¹⁸³ Sanctions for spoliation can include an adverse inference instruction to the jury, meaning that the jury is invited to infer that the missing evidence would have benefited the opposing party. The spoliation doctrine thus permits the fact finder to alter their interpretation of causation evidence, and even adjust causal burdens, when there is bad faith conduct. If a court finds that conduct is sufficiently egregious, it may simply issue a default judgment

¹⁸⁰ See *Spoilation of Evidence*, BOUVIER’S LAW DICTIONARY (Desk ed. 2012).

¹⁸¹ See *Victor Stanley, Inc. v. Creative Pipe, Inc.*, 269 F.R.D. 497, 520–21 (D. Md. 2010) (summarizing these requirements as the showing required in the Fourth Circuit and observing that “[d]istrict courts in the Second, Fifth, Sixth, Seventh, and Ninth Circuits have identified the same factors for sanction-worthy spoliation”); see also *Jimenez-Sanchez v. Caribbean Rests., LLC*, 483 F. Supp. 2d. 140, 143 (D.P.R. 2007) (explaining that an adverse inference instruction is warranted where a foundation for spoliation is established by “evidence sufficient to permit the trier of fact to find that the party against which the inference is sought to be made knew of (1) the litigation or the potential of litigation and (2) the potential relevance of the missing evidence to the litigation.”).

¹⁸² *Victor Stanley, Inc.*, 269 F.R.D. 497 at 520–21.

¹⁸³ See *id.* at 532 (“When the party alleging spoliation shows that the other party acted willfully in failing to preserve evidence, the relevance of that evidence is presumed in the Fourth Circuit.”).

against the defendant—a remedy that goes well beyond even burden-shifting.¹⁸⁴

Scientific gerrymandering, however, does not typically constitute spoliation. Perhaps, if a defendant improperly failed to preserve the results of a study assessing whether a chemical caused a harm, the jury could infer that the study would have showed that the chemical does in fact cause the harm. That said, scientific gerrymandering typically encompasses much broader and earlier-in-time efforts to slow, shape, distort, and limit the development and public availability of scientific evidence. It might perhaps be better viewed as preventing the creation of evidence, or predetermining and defining the scope of available evidence, as opposed to destroying it.

Scientific gerrymandering does, however, bear salient similarities to spoliation. Both spoliation and scientific gerrymandering involve contexts where there is information asymmetry.¹⁸⁵ Moreover, in both contexts, the party with superior access to information obtains or seeks to maintain its advantage in a culpable manner. And in both contexts, it is often unknowable if the evidence would, in fact, have aided the party who has made it unavailable. In the context of spoliation, an allegedly malfunctioning product might disappear before it can be examined; in the context of scientific gerrymandering, certain studies might simply never occur due to a manufacturer's promotion of misleading evidence of safety, or a bogus study may slow or taint the development of scientific understanding.¹⁸⁶

¹⁸⁴ See *id.* at 533–34 (“Sanctions that a federal court may impose for spoliation include assessing attorney’s fees and costs, giving the jury an adverse inference instruction, precluding evidence, or imposing the harsh, case-dispositive sanctions of dismissal or judgment by default.”) (citing *Goodman v. Praxair Servs.*, 632 F. Supp. 2d 494, 506 (D. Md. 2009); *Gordon Partners v. Blumenthal (In re NTL, Inc. Sec. Litig.)*, 244 F.R.D. 179, 191 (S.D.N.Y. 2007)).

¹⁸⁵ See Wendy E. Wagner, *What’s It All About, Cardozo?*, 80 TEX. L. REV. 1577, 1592–93 (2002) (observing that spoliation sanctions can be understood at least partly as a means by which “courts might shift or adjust liability rules around problems of asymmetrical information” where “the plaintiff . . . is disadvantaged by the defendant’s superior access to information”).

¹⁸⁶ And this uncertainty can have important impacts on the assessment of causation in litigation. See Sanne H. Knudsen, *Adversarial Science*, 100 IOWA L. REV. 1503, 1531 (2015) (“[G]enerating debate within the scientific literature has direct and predictable consequences on the outcome of cases. Because the plaintiff bears

In circumstances similar to scientific gerrymandering, the spoliation doctrine provides for a strong medicine of sanctions to deal with comparable informational misconduct. Yet the current approach to scientific gerrymandering presents a stark difference. The judicial posture toward scientific gerrymandering could be characterized as one of judicial agnosticism, wherein judges treat scientific gerrymandering like any other type of evidence. In certain instances, the posture appears to be judicial deference to the gerrymanderers, in light of the fact that judges seem inclined to protect gerrymanderers from evidence of their wrongdoing during the causation phase. The similarities between spoliation and scientific gerrymandering suggest that neither agnosticism nor deference is compelled and may in fact be unwarranted. If anything, judges should adopt a hostile posture toward gerrymanderers and be inclined to admit, rather than exclude, evidence of scientific gerrymandering.

C. Admissibility of Scientific Gerrymandering Evidence During Causation Phases, in Context

Against the backdrop of the tort and evidence doctrines described above, in light of the balancing required by Federal Rule of Evidence 403,¹⁸⁷ and as compared to myriad proposals that will be discussed below, our proposition is modest. We merely recommend that judges should recognize the relevance of scientific gerrymandering, particularly during the causation phase of bifurcated toxic tort suits. Scholars have proposed numerous significant reforms to address the steep informational and evidentiary burden that plaintiffs face in establishing toxic tort causation. Margaret Berger offers a proposed model under which “liability in negligence would be imposed for failure to provide substantial information relating to risk and proof that the failure caused plaintiff’s injury would not be required.”¹⁸⁸ She reasons that “if a defendant is negligent in discovering and disseminating substantial adverse information about its

the burden of proof, scientific uncertainty on issues like causation will almost always benefit the defendant.”); *see also* MCGARITY & WAGNER, *supra* note 5, at 97–156.

¹⁸⁷ *See* FED. R. EVID. 403 (“The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.”).

¹⁸⁸ Berger, *supra* note 166, at 2143–44.

product . . . it should be liable for adverse health effects in those exposed, and plaintiffs should be relieved of proving general causation.”¹⁸⁹ Similarly, Wendy Wagner proposes that if a manufacturer cannot publicize minimal safety research prior to marketing a product, “the plaintiff is entitled to a presumption that the insufficiently tested product caused her harm.”¹⁹⁰

Some reform proposals focus specifically on scientific gerrymandering. Robert McGarity proposes that when a defendant is found to have engaged in scientific gerrymandering-like activities such as “funding bogus science, screening and hiding negative studies, and stopping ongoing studies when they appeared to be going the wrong way,” courts should allow certain culpability-based causal presumptions regarding general causation.¹⁹¹ Namely, if the plaintiff proves to the jury’s satisfaction that the defendant was culpable, including by engaging in some types of scientific gerrymandering conduct,¹⁹² “a presumption . . . arise[s] that the substance was capable of causing the plaintiff’s disease.”¹⁹³ These proposals, seeking significantly more far-reaching reform, underscore the relative modesty of requiring defendants to bear the risk that their scientific gerrymandering may be admitted into evidence, and perhaps even influence jury decisions on general causation.

The Federal Rules of Evidence also permit, if not compel, the introduction of gerrymandering evidence, including during causa-

¹⁸⁹ *Id.* at 2147. Notably, Berger makes this assertion after describing evidence of how Merrell engaged in scientific gerrymandering with respect to Bendectin. *See id.* at 2146–47.

¹⁹⁰ Wagner, *Choosing Ignorance*, *supra* note 155, at 834–35 (“The plaintiff thus establishes a prima facie case with proof of the following: (1) inadequate minimal testing on a product, (2) normal or foreseeable exposure to the product, and (3) serious harm that might be causally linked to exposure to the product.”).

¹⁹¹ McGarity, *supra* note 79, at 55 n.218.

¹⁹² As defined by McGarity, culpability would consist of: “(1) a significant violation by the defendant of existing state or federal regulatory requirements governing the sale, distribution, use or disposal of the agent; (2) a serious attempt to manipulate inappropriately a state or federal agency risk assessment or standard setting process applicable to the agent; or (3) a successful attempt to mislead at-risk members of the public (including the plaintiff) with respect to the nature and magnitude of the risk posed by the agent.” *Id.* (citation omitted).

¹⁹³ *Id.* at 57 (“The plaintiff would prevail on the general causation issue unless the defendant proved with Daubert-reliable expert testimony that the substance was incapable of causing the disease.”).

tion phases. Under the applicable doctrinal test, set forth in the Federal Rule of Evidence 403, relevant evidence of scientific gerrymandering should be excluded only upon a finding that “its probative value is *substantially outweighed* by a danger of . . . *unfair prejudice*.”¹⁹⁴ The above analysis illustrates that it is not unfairly prejudicial for juries to factor evidence of scientific gerrymandering into their evaluation of the strength of causal evidence.¹⁹⁵ Juries’ evaluations of causation in the shadow of scientific gerrymandering should not be dismissed merely as “emotional” desires to punish bad corporate behavior.¹⁹⁶ A jury may, in fact, be well positioned to discern the motivations behind gerrymandering and draw accurate conclusions about causation therefrom.¹⁹⁷ Indeed:

[T]he ability of twelve laypersons to interject human sensibilities into a proceeding otherwise dominated by the cold logic of the law arguably embodies the true worth of the jury system. This ability adds to, rather than detracts from, truth and accuracy by advancing the jury’s empathic understanding of what the participants likely did and why.¹⁹⁸

¹⁹⁴ FED. R. EVID. 403 (emphasis added).

¹⁹⁵ Courts have noted that adverse inferences imposed as sanctions for spoliation do not constitute unfair prejudice. Viewed through the lens of spoliation, there is no prejudice created by admitting evidence of scientific gerrymandering. Even if a jury were to infer that absent defendant’s interference better scientific evidence of a connection between defendant’s chemical and plaintiff’s harm would exist, that simply speaks to the presence or absence of general causation—a proper basis for decision. See *Jimenez-Sanchez v. Caribbean Rests., LLC*, 483 F. Supp. 2d 140, 145 (D.P.R. 2007) (“The possibility of undue prejudice is not great, since evidence of spoliation could only lead to a reasonable jury inferring that the [missing evidence] in some way hurt CR’s case and that is not an improper basis for a decision.”).

¹⁹⁶ Although even that, arguably, is not unfairly prejudicial. It is, indeed, a jury’s prerogative to infuse its decisions with normative assessments of culpability. See *Gold*, *supra* note 154, at 504 (“Emotive aspects of a case have an effect on a jury because those aspects are commonly perceived as vital to the rendition of justice. Eliminating evidence with emotional appeal would thus also eliminate public confidence in our system of laws as a moral force.”).

¹⁹⁷ Differentiating rigorous efforts to accurately discern the risk of chemicals may in some cases be difficult to distinguish from strategic scientific gerrymandering, but presumably no more difficult than parsing the complex science of toxic causation that judges and juries are regularly required to navigate. Indeed, juries may be particularly suited to identifying and evaluating motive and culpability.

¹⁹⁸ *Gold*, *supra* note 154, at 504.

One need not accept, however, that introducing evidence of scientific gerrymandering during the causation phase creates *no* risk of unfair prejudice to conclude that, as a matter of straightforward application of existing doctrine, it is admissible. It is enough to accept *any* of the following propositions—that there is high probative value to evidence of scientific gerrymandering, that it is not improper to consider scientific gerrymandering when weighing causation, *or* that even if there is a danger of unfair prejudice, it does not substantially outweigh probative value. Furthermore, when evaluating whether to exclude evidence as prejudicial, judges are meant to deliberate “with an appreciation of the offering party’s need for evidentiary richness and narrative integrity in presenting a case.”¹⁹⁹ When evaluating probative value and prejudicial risk, the court considers “the full evidentiary context of the case as the court understands it.”²⁰⁰ Here, recognizing how scientific gerrymandering can shape the existing state of science on causation is an important aspect of that evidentiary context.

In summary, evidence of scientific gerrymandering is often approached as dangerously likely to lead to unfair prejudice by encouraging jurors to ignore causal requirements and simply punish corporate bad actors. Evidence of scientific gerrymandering is relevant to causation and, moreover, even if jurors were to rely on evidence of scientific gerrymandering improperly, giving greater credit to plaintiffs’ evidence of causation, well-established existing doctrines such as alternative-cause, *res ipsa loquitur*, and spoliation indicate that existing doctrine blesses reducing or even reversing causal burdens where there is wrongful conduct that exacerbates asymmetrical access to information. The arguments that have been offered to this point have operated within existing doctrinal constructs. There are also, however, powerful arguments that it is also normatively desirable to allow juries to hear evidence of scientific gerrymandering, including during the causation phase. Notably, many of the same normative rationales motivate the far more aggressive proposals,

¹⁹⁹ *Old Chief v. United States*, 519 U.S. 172, 183 (1997).

²⁰⁰ *Id.* at 182 (“An item of evidence might be viewed as an island, with estimates of its own probative value and unfairly prejudicial risk the sole reference points in deciding whether the danger substantially outweighs the value and whether the evidence ought to be excluded. Or the question of admissibility might be seen as inviting further comparisons to take account of the full evidentiary context of the case as the court understands it when the ruling must be made.”).

referenced above, to reform causal requirements in toxic tort litigation and address scientific gerrymandering.

IV. NORMATIVE CONSIDERATIONS

Put simply: scientific gerrymandering is bad; tort law is a useful and appropriate venue for surfacing and discouraging scientific gerrymandering; and admitting evidence of scientific gerrymandering during the causation phase enhances tort law's ability to function in this manner. Notably, this normative case for greater policing of scientific gerrymandering, particularly within the causation phase of toxic tort trials, does not require fealty to one side or the other in the larger, vociferous, and heated debate about the propriety and stringency of causal requirements in toxic tort suits more generally.²⁰¹ While admissibility during causation would likely be viewed as a step in the right direction by those who favor reducing the causal burdens of toxic tort plaintiffs, others might support it simply as a means to dissuade scientific gerrymandering.

A. Scientific Gerrymandering Harms

Scientific gerrymandering exacerbates the risk of harmful chemical exposures, undermines public confidence in the public health system, and contributes to public anxiety about personal safety. Many—most notably, Wendy Wagner—have argued persuasively that existing regulatory and common law regimes combine to discourage quality research into the health effects of chemicals, leading to widespread public exposure to chemicals of uncertain

²⁰¹ Compare Richard J. Pierce, Jr., *Causation in Government Regulation and Toxic Torts*, 76 WASH. U. L.Q. 1307, 1312 (1998) (arguing that reduced causal burdens in toxic tort “would produce a series of adverse effects. . . . The direct adverse effects would include a massive increase in the use of scarce judicial resources to decide toxic tort cases, a massive increase in the cost of many socially beneficial products, and unavailability of many socially beneficial products. The indirect effects would include deterioration in the overall health of the population.”), with Berger, *supra* note 166, at 2119 (“[E]liminating causation furthers tort law’s corrective justice rationale that liability is linked to moral responsibility.”), and McGarity, *supra* note 79, at 6 (“[C]ausation has proven a very effective stumbling block that has not only precluded compensation for all but the most clearly understood environmentally caused diseases, but has also stood in the way of ambitious attempts to protect the public health generally through toxic tort litigation.”).

safety.²⁰² In this account, the tort and regulatory systems discourage manufacturers from undertaking research in the first instance. This is because, first, the difficulty of discerning long-term health impacts associated with specific chemicals makes it hard for plaintiffs to establish causation for such long-term impacts, rendering it unlikely that the tort system will impose liability on defendants.²⁰³ Second, manufacturers recognize that internal research that suggests or reveals a health risk could spur regulation or become evidence in a tort suit.²⁰⁴ Reports or suspicions of adverse health effects may spur additional inquiry by a manufacturer, but sometimes the response is to scientifically gerrymander. For instance, the company might conduct an inquiry—or orchestrate an attack campaign—focused on exonerating a chemical as opposed to objectively investigating its effects.²⁰⁵ Scientific gerrymandering can, in this way, impede the recognition, prompt assessment, informed regulation, and even medical treatment of a chemical's potential health risk, thereby increasing the magnitude of exposure in terms of duration, extent, and, in some cases, health consequences. Delays occasioned by scientific gerrymandering can thus extend an already lengthy process for understanding risks.²⁰⁶ Even in the best of all possible worlds—with prompt detection of a risk and diligent efforts to study it—“time is needed” because “[e]xcept in the atypical case in which a rare and serious effect is almost instantly discernible, an immediate answer will not be forthcoming; often a considerable interval must elapse

²⁰² See, e.g., Wagner, *Commons Ignorance*, *supra* note 151, at 1625–59; Wagner, *Choosing Ignorance*, *supra* note 155, at 790–95 (detailing how the common law system, including the requirement that plaintiff prove causation, creates disincentives for manufacturers to develop information about product risk).

²⁰³ Wagner, *Choosing Ignorance*, *supra* note 155, at 791–96.

²⁰⁴ See *id.*

²⁰⁵ See Thomas O. McGarity, *Defending Clean Science from Dirty Attacks by Special Interests*, in *RESCUING SCI. FROM POL.* 24 (Wagner & Steiznor, eds. 2006) (“When a new scientific study suggests that an industry’s products or activities may be causing unanticipated adverse effects on health or the environment, a typical reaction by that industry or other affected stakeholders is to attack the messenger.”).

²⁰⁶ See MCGARITY & WAGNER, *supra* note 5, at 97–156 (describing how manufacturers hide or attack science in ways that delay proper regulation and protection, including with respect to tobacco, MTBE, TCE, BPA and tremolite asbestos).

before the scientific community reaches even tentative conclusions on issues of causation.”²⁰⁷

Sometimes, this will not result in actual, physical harm as the chemical will ultimately be exonerated; other times, it will result in more individuals being exposed for longer periods at higher levels and delay monitoring for and treatment of any associated health effects.²⁰⁸ Either way, it increases the period in which individuals lack the opportunity to make an informed choice about whether to expose themselves to a chemical in light of the suspected health risk. Among those who are exposed, it also extends the anxiety-producing period of uncertainty about the effects of exposure once a suspected risk becomes known and is being further examined.²⁰⁹

Scientific gerrymandering also dupes regulators and the public. Once exposed, it thereby undermines public faith in, and the integrity and efficacy of, laws and institutions tasked with protecting human health and the environment.²¹⁰ Doubt about whether the existing system protects against chemical risk contributes to a broader sense of vulnerability and anxiety about personal safety as well as loss of control over bodily integrity.²¹¹ Thomas McGarity asserts

²⁰⁷ Berger, *supra* note 166, at 2119 (citing to the development of information about the health risks posed by asbestos as an example).

²⁰⁸ See MCGARITY & WAGNER, *supra* note 5, at 127 (discussing the fact that releasing preliminary results may “unnecessarily frighten the public”).

²⁰⁹ And the period of dread with respect to exposure and possible latent disease imposes a significant psychological burden that should not be dismissed lightly. See Lisa Heinzerling & Cameron Powers Hoffman, *Tortious Toxics*, 26 WM. & MARY ENV'T L. & POL'Y REV. 67, 79–80 (2001) (“[L]atent threats are special in this sense: they can convert what would otherwise be a discrete, diffuse kind of harm—one death here, another there—into a catastrophe that tears the web of a whole community. When an exposed community will not know for many years whether anyone will fall ill or die as a result of their exposure, when, indeed, they may never know whether the illnesses and deaths they experience came from the exposure or from something else, the whole community becomes involved in the threat of death—even if, ultimately, only a handful of illnesses and deaths will reasonably be attributed to the exposure they fear. A long temporal lag between exposure and physical effects can thus transform a diffuse and individual harm into a collective harm, a disaster.”).

²¹⁰ See generally Carl F. Cranor, *The Dual Legacy of Daubert*, in RESCUING SCI. FROM POL. 122 (Wagner & Steiznor, eds. 2006) (concluding that as a result of scientific gerrymandering, “[t]he legitimacy of the law as an institution is being threatened”).

²¹¹ Indeed, some have suggested that the growth of the wellness industry reflects, in part, anxiety about the need to protect oneself from toxic exposures. See

that existing causation rules encourage scientific gerrymandering and are likely to lead to what he terms an “accountability crisis”:

[The] . . . comforting message to corporate America [is] that companies will not be held liable in tort for damages they did not clearly cause will be heard by at least some companies as an invitation to press the limits of corporate responsibility. The recently exposed tobacco documents reveal with startling clarity how potential toxic tort defendants can “bend science” to meet their litigative and public relations needs. That capacity and the general inability of resource-strained regulatory agencies to uncover and punish illegitimate attempts to manipulate the regulatory process will combine to produce an accountability crisis that will ultimately precipitate strong political demands to change the system.²¹²

Scientific gerrymandering thus inflicts harms on our institutions and systems of government, and on the public sense of security and well-being that are independent of any manifested health impact related to chemical exposure.²¹³

For society as a whole, the negative consequences of scientific gerrymandering outweigh any potential utility of such conduct. It could be argued that transparency about suspected health harms and worrisome initial study results would create more public anxiety, as it is often difficult for laypeople to understand information about chemical testing and risk, which can create unnecessary fear about

DAVID WALLACE WELLS, *THE UNINHABITABLE EARTH* 185 (2019) (“[H]owever manipulated by marketing consultants, and however dubious its claim to healthfulness, wellness also gives a clear name and shape to a growing perception even, or especially, among those wealthy enough to be insulated from the early assaults of climate change: that the contemporary world is toxic, and that to endure or thrive within it requires extraordinary measures of self-regulation and self-purification.”).

²¹² McGarity, *supra* note 79, at 3–4.

²¹³ See generally MCGARITY & WAGNER, *supra* note 5, at 229–30 (“The public’s faith in science, while never easy to measure, may finally be eroding under the steady flow of reports of manipulated and distorted research.”). Notably, a key rationale for spoliation sanctions is protection of the judicial system itself, not just compensation for party’s unjustly denied access to evidence. See also *Spotted Horse v. BNSF Ry. Co.*, 350 P.3d 52, 57–58 (Mont. 2015) (“The intentional or negligent destruction or spoliation of evidence cannot be condoned and threatens the very integrity of our judicial system.”).

chemicals that will ultimately be proven safe.²¹⁴ In a system cleansed of scientific gerrymandering, however, the public could better trust that manufacturers would share information and work cooperatively with regulators to promptly and diligently evaluate product risk, limiting the perceived need for individuals to self-police exposures.

If, in the absence of scientific gerrymandering, quicker and more thorough cooperative investigation leads to a regulatory pause in the use of a chemical, it could also be argued that this deprives the public of the benefit of the chemical in the interim.²¹⁵ One might take the view that most chemicals turn out to be safe and thus scientific gerrymandering is actually beneficial in that it forestalls unnecessary limits on chemical use or private eschewing of chemicals during the extended period required to establish product safety. A difficulty with this view is that scientific gerrymandering is not costless, even when a chemical ultimately turns out not to pose physical harm. As described above, scientific gerrymandering imposes independent and significant systemic and institutional harms. Moreover, it is hard to justify entrusting decisions about whether and when the utility of a chemical should outweigh risks from exposure to the manufacturer, who has a strong incentive to overvalue utility.²¹⁶

²¹⁴ See generally STEPHEN BREYER, *BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION* 36–39 (1993) (explaining the difficulties of communicating risk to the lay public and the potential for overreaction); W. Kip Viscusi, *Predicting the Effects of Food Cancer Risk Warnings on Consumers*, 43 *FOOD DRUG COSM. L.J.* 283, 288 (1988) (analyzing consumer response to risk information, in particular information about small risks, and concluding in part that “when individuals are informed of small risks there will be a tendency for them to over-react to the information and to treat the risk as being greater than it actually is. It will be very difficult to convey information to people in a meaningful fashion about very low probability risks. Perhaps the major danger from any risk-communication effort is that instead of informing people these programs will serve to unduly alarm them”).

²¹⁵ See MCGARITY & WAGNER, *supra* note 5, at 127.

²¹⁶ See *id.* at 104 (“While scientific norms counsel against the premature release of incompletely analyzed or vetted findings, in public health research this norm is countered by the worrisome possibility that leaving the decision of when to share preliminary evidence of adverse effects solely to sponsors or their researchers could lead to under-protective, self-interested decisions by manufacturers to ‘wait and see.’”).

It can also be argued that even diligent corporate efforts to identify, understand, and manage chemical risks may, *ex post*, be mischaracterized as scientific gerrymandering.²¹⁷ Indeed, companies engaged in scientific gerrymandering might not be as morally culpable as they appear; they might, for example, be motivated by a genuine belief that a chemical is useful and safe, as opposed to a calculated decision to minimize or hide health risks. Another concern is that companies contemplating the legal implications of perceived scientific gerrymandering might find their approach to the assessment of risks chilled, as concerns about appearing to have scientifically gerrymandered might cause them to replace inquiry with inaction, exacerbating gaps in knowledge about chemical risks.

These concerns, while fairly raised, do not seem significant on closer examination. Evidence of scientific gerrymandering is sometimes *already* admissible, albeit often at a later phase of trial, and judges must *already* make evidentiary rulings relating to its admissibility. Difficulties relating to line-drawing and admissibility are thus already present in the existing system; the current proposal just raises the stakes relating to the outcome of that line-drawing exercise by pushing it to the causation phase. Thus, any “chilling” of good scientific inquiry would be incremental. And, for a variety of reasons explained further below, the tort system, while not perfect, may be best positioned to reveal and address scientific gerrymandering in a responsible fashion, because it includes mechanisms for weeding out baseless accusations of gerrymandering. Importantly, it provides a structure wherein corporate defendants have the opportunity, typically with the benefit of very able legal counsel, to explain corporate decisions and actions relating to the assessment of risk.

With respect to chilling corporate information-gathering related to chemical effects, while it is possible that companies might respond to more robust policing of scientific gerrymandering in litigation with a “see no evil, hear no evil” approach, it seems just as likely—if not more likely—that companies might be advised to avoid an appearance of impropriety when evaluating risks. Avoiding the appearance of impropriety—which would presumably include increased transparency and taking care to ensure objectivity

²¹⁷ *Id.* at 127 (discussing the “dilemma” faced by private sector entities).

in analysis—could improve the type and quality of scientific inquiry. Finally, while scientific gerrymandering may sometimes be motivated by a genuine but mistaken belief—nurtured by the rose-tinted glasses of corporate culture—that a chemical is indeed safe, the fact that corporate teams are susceptible to this type of optimism bias suggests that greater transparency is needed to provide a more objective assessment of even early hints of chemical-related risk.²¹⁸

B. Institutional Suitability of Tort Law

Tort law is generally recognized as an effective process to ferret out evidence of scientific gerrymandering, particularly as compared to the regulatory process.²¹⁹ The adversary process provides plaintiff attorneys with the incentive and means, through the discovery process, to surface evidence of scientific gerrymandering.²²⁰ Indeed, “[t]he success of litigants in uncovering and exposing suppressed adverse research is a signature feature of most toxic tort claims.”²²¹ Judges can perform an effective gatekeeping function with respect to sorting, identifying, and making rulings on the admissibility of conduct that constitutes scientific gerrymandering, providing some assurance that courts can weed out false or baseless accusations of scientific gerrymandering.

Of course, even if tort law is good at discovering scientific gerrymandering, this does not speak to whether it is good at responding

²¹⁸ See generally Shannon M. Roesler, *Evaluating Corporate Speech About Science*, 106 GEO. L.J. 447, 499 (2018) (collecting sources describing how optimism bias and other cognitive biases can shape corporate knowledge and decision-making).

²¹⁹ See McGarity, *supra* note 79, at 60–61 (“One of the considerable advantages of a tort reparations regime is its capacity to get to the truth of the matter in ways that are largely unavailable to regulatory agencies engaged in traditional rule-making and enforcement.”) (citation omitted); Berger *supra* note 166, at 2150 (referencing tort law’s ability to “ferret out smoking guns”). See generally Wagner, *When All Else Fails*, *supra* note 151, at 697–701 (explaining the myriad advantages that courts enjoy regarding access to information about the risk of products held by manufacturers as compared to political and regulatory processes).

²²⁰ See McGarity, *supra* note 79, at 60–61 (“Private attorneys . . . are adept at uncovering evidence of culpability in the discovery that precedes common law trials, and they are willing to spend the resources necessary to copy and organize documents, take depositions, and fight the company’s efforts to resist discovery.”).

²²¹ Wagner, *When All Else Fails*, *supra* note 151, at 711.

to or deterring revealed scientific gerrymandering. One strong argument concerning tort law generally is that it is an inadvisable mechanism for redressing scientific gerrymandering since it is blunt and overly punitive. More specifically, evidence of scientific gerrymandering in toxic tort suits, particularly when presented during the causation phase, may increase the risk that liability will be imposed for phantom harms—cases where a chemical does not in fact cause plaintiff's harm. Richard Nagareda, for example, critiques mass tort litigation for serving as a means of moral condemnation by punishing defendants' bad behavior—for instance, failing to warn about possible health risks or lying about widely known health risks—even when that behavior does not cause plaintiffs' harm, whether because the possible health risks are ultimately disproved or because, despite defendants' fraud, plaintiffs knew the risks posed by the product.²²² He argues that this moral condemnation should occur “not through the vehicle of tort litigation but, if at all, through democratic deliberation in the political process.”²²³

Nagareda's arguments are persuasive in some circumstances, but significantly less so where, as in the case of scientific gerrymandering, the defendant's misconduct actively obscures the causal question itself. When defendants gerrymander the science about product risks, they not only decline to share information about possible risk with plaintiffs, but—recognizing a potential risk about which they have exclusive knowledge—actively seek to discourage the objective assessment of the nature of the risk, which can hinder the development of regulation that could minimize the number of individuals exposed. As explained above, this not only denies consumers of informed consent and exposes them to possible risk through a failure to warn, but also (1) extends the duration of uncertainty and fear for exposed individuals until the scientific uncertainty can be resolved;²²⁴ and (2) causes a delay in scientific understandings of the risk, which can, in turn, delay identification and

²²² See Nagareda, *supra* note 147, at 1122–25 (referring to this situation as one of “outrageous fortune,” or “situations in which a manufacturer may have engaged in conduct that many might regard as irresponsible or morally culpable, but where that manufacturer, nonetheless, may have had the sheer good luck not to cause harm to consumers”).

²²³ *Id.* at 1125.

²²⁴ See generally Heinzerling, *Environmental Law and the Present Future*, *supra* note 7 (explaining the dread of toxic exposure and latent disease).

treatment of effects and increase the number of individuals exposed, the intensity of their exposure, and the severity of adverse consequences.²²⁵ Notably, these harms—extended periods of fear and uncertainty, an increase in the magnitude of the harm risked—arise *whether or not the product in fact causes the suspected harm*.

Permitting evidence of scientific gerrymandering to be factored into causation is thus warranted even though it may lead to an increased risk of imposing liability where there is not in fact causation. This is so for several reasons. As an initial matter, liability without causation does not impose unusually pronounced justice concerns in this context. While the increase in risk cannot be quantified, it is useful to recall that defendants possess numerous tools to respond to and rebut allegations of scientific gerrymandering and its effect on causal knowledge.²²⁶ Juries may conclude that there was no gerrymandering, or that even in its absence, a chemical would not have been more closely linked to harm. The extent of the risk of erroneous findings on causation and liability is thus unclear, but there are reasons to believe it is not overwhelming. It is also useful to recall that “there is a risk of error whenever circumstantial evidence is relied on in reaching findings of negligence”²²⁷ and that, with respect to many substances, there is unlikely to be definitive evidence or consensus about harm.²²⁸

²²⁵ See Berger, *supra* note 166 at 2143 (“The failure to disseminate information about the ill-effects of asbestos, known to its manufacturers from a wide variety of sources, undoubtedly delayed the regulation of asbestos products. As a consequence, many workers and their families suffered exposures to asbestos, some of which produced, or will produce, disease and, in some instances, death.”).

²²⁶ Defendants can also benefit from increased admissibility to the extent that plaintiffs’ attorneys attempt to gerrymander science. See MCGARITY & WAGNER, *supra* note 5, at 29–32 (explaining how plaintiffs’ attorney can attempt to bend science, although typically not to the same extent and effect as chemical manufacturers).

²²⁷ RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 17 (AM. L. INST. 2010) (recognizing that this risk of error “does produce an element of discomfort [in the context of *res ipsa*], inasmuch as the defendant can be found negligent without any evidence as to the nature or circumstances of the defendant’s actual conduct.”).

²²⁸ See CRANOR, *supra* note 1, at 270 (“Given the widespread ignorance about substances, a better presumption would be that there might be little or no human epidemiological evidence and no mechanistic information about the effects of any particular substance.”).

Moreover, when the risk of error comes to fruition and a defendant is held liable for a specific harm that it did not in fact cause, it is not so objectionable in the present context. After all, the act of scientific gerrymandering is itself culpable and imposes independent harms that are tightly linked to causation.²²⁹ Additionally, while tort law generally eschews liability for negligence that does not cause harm, the type of negligence confronted here is distinct. As one scholar has noted:

It is one thing to allow individual misbehavior that puts a few lives at risk to go unpunished and thus undeterred by the tort system. . . . It is quite another thing to allow a company to put thousands of lives at risk negligently with no common law or criminal remedy, as occurs in the toxic tort context when exposed plaintiffs are unable to prove causation.²³⁰

Finally, and perhaps most importantly, defendant manufacturers are in a position to reduce the risk *ex ante* by taking care not to engage in scientific gerrymandering. Wagner's account of outcomes in the breast implant litigation illustrates this point well.²³¹ Manufacturers knew about and suppressed evidence that silicone implants could leak, which in turn contributed to large jury awards for plaintiffs.²³² Once research developed, showing that the leaked silicone did not in fact cause connective tissue and autoimmune diseases, jury verdicts petered off, causing Wagner to conclude that:

[H]ad the manufacturers conducted research on the safety of implants prior to marketing and made that information available to juries, jury verdicts would likely have been favorable to them. . . . [T]he very fact that they took advantage of their asymmetric access to information and withheld information from patients contributed to juries awarding significant judgments against them.²³³

²²⁹ See generally Wagner, *Choosing Ignorance*, *supra* note 155, at 816 ("The traditional common-law approach to assigning responsibility for proving causation in toxic tort cases creates, at least in theory, a 'recurring miss'; manufacturers can act negligently, but avoid liability precisely because of that misconduct.") (citation omitted).

²³⁰ Bernstein, *supra* note 147, at 504.

²³¹ See Wagner, *When All Else Fails*, *supra* note 151, at 715–17.

²³² See *id.*

²³³ *Id.*

Inviting evidence of scientific gerrymandering into the causation phase would thus deter scientific gerrymandering, place the risk of an inaccurate finding of causation on the defendant who engaged in scientific gerrymandering, and afford the plaintiff some correction for the impoverished and distorted state of scientific knowledge on causation. Notably, this parallels the “prophylactic, punitive, and remedial rationales underlying the spoliation doctrine” which “serve both normative—designed to punish culpable conduct and deter it in others—and compensatory—designed to put the party adversely affected by the spoliation in a position that is as close to what it would have been in had the spoliation not occurred—functions.”²³⁴ These functions are to “(1) deter parties from engaging in spoliation; (2) place the risk of an erroneous judgment on the party who wrongfully created the risk; and (3) restore the prejudiced party to the same position he would have been in absent the wrongful destruction of evidence by the opposing party.”²³⁵

There is thus a strong normative case that courts should seek to discourage scientific gerrymandering and that admitting more evidence of such conduct, particularly in the causation phase of toxic tort trials, could do so. Scientific gerrymandering gives rise to individual, societal, and institutional harms—forcing guinea pig consumers to take a high stakes gamble, creating fear of potential disease in those exposed, and undermining trust in regulatory bodies—even when the chemical it shields from scrutiny is ultimately proven to be benign. Tort law processes can enable the discovery of evidence of scientific gerrymandering while providing protections against its misuse. Strong doctrinal claims exist that support admitting evidence of scientific gerrymandering, suggesting that it is not only possible but relatively easy to achieve these important normative aims.

CONCLUSION

Scientific gerrymandering that slows and obscures timely and objective understanding of chemical risks is unfortunately just one

²³⁴ Victor Stanley, Inc. v. Creative Pipe, Inc., 269 F.R.D. 497, 533–34 (D. Md. 2010) (citations omitted).

²³⁵ *Id.*

manifestation of a broader problem of strategic manipulation of science. What we offer here is a small fix that chips away at the broader problem in a single context. But, it is a fix that is realistic, could be immediately and readily realized, and has the potential to discourage scientific gerrymandering behavior.

In *Hardeman*, Judge Chhabria reasoned that internal Monsanto deliberations about how to “sway a scientist” or get a scientist to “move from his position” were likely inadmissible under Rule 403 because they were “only tangentially relevant” and “a significant distraction” during the causation phase.²³⁶ We have endeavored to show that such evidence is not just relevant, but provides important context for a jury to understand, weigh, and interpret the complex body of scientific learning, and evaluate the totality of the scientific evidence. Such evidence is also unlikely to be unfairly prejudicial. Even if evidence of scientific gerrymandering causes jurors to give greater credit to plaintiff’s evidence of causation, well-established doctrines, such as alternative-cause, *res ipsa loquitur*, and spoliation, reduce or even reverse causal burdens when wrongful conduct exacerbates asymmetrical access to information. Finally, from a normative perspective, scientific gerrymandering harms individuals, society, and institutions; a more open embrace of the airing of such evidence could deter corporate actors from engaging in gerrymandering behavior. In short, our small but significant aim is to challenge prevailing assumptions that evidence of scientific gerrymandering is barely, if at all, relevant to causation and is highly likely to cause unfair prejudice. As such, when judges are faced with the task of developing “guided principles”²³⁷ to govern scientific gerrymandering admissibility, particularly in bifurcated trials, if they follow our proposal, those principles will properly reflect the value of evidence of scientific gerrymandering.

By presenting strong doctrinal and normative explanations for why and how scientific gerrymandering efforts are relevant to causation and are appropriate for jury consideration during the causation phase of bifurcated toxic tort suits, we hope to lend force to plaintiffs’ arguments for the admissibility of evidence of scientific

²³⁶ Transcript of Proceedings, *supra* note 4, at 5–8 (recognizing that such evidence might come in through impeachment).

²³⁷ See *id.* at 5 (announcing “guided principles that will apply to . . . admission”).

gerrymandering and to encourage judges to more readily admit such evidence. This would discourage companies from engaging in even the appearance of scientific gerrymandering, and potentially hold them accountable when they do. Allowing evidence of scientific gerrymandering may change incentives sufficiently such that, instead of abruptly halting studies with initial adverse outcomes, working to silence concerned voices, and attempting to stack the deck with covertly-funded and rigged studies, chemical companies would take care to encourage objective investigation and rigorous testing.