[J-92A-E-2019][M.O. - Donohue, J.]
IN THE SUPREME COURT OF PENNSYLVANIA
WESTERN DISTRICT

RICHARD THOMAS WALSH, EXECUTOR OF THE ESTATE OF THOMAS J. WALSH, DECEASED	:	No. 14 WAP 2019
	:	Appeal from the Order of the Superior Court entered 6/20/18 at No. 1661 WDA 2016 vacating the order of the Court of Common Pleas of Allegheny County entered 10/14/16 at No. GD 10-018588 and remanding
v.	:	
BASF CORPORATION; BAYER CORPORATION D/B/A BAYER CROPSCIENCE, L.P., AND BAYER CROPSCIENCE HOLDING, INC., AND/OR BAYER CROPSCIENCE, L.P. AND BAYER CROPSCIENCE HOLDING, INC., IN THEIR OWN RIGHT; BIOSAFE SYSTEMS, L.L.C.; CHEMTURA CORPORATION; CLEARY CHEMICAL CORP.; DOW AGROSCIENCES, L.L.C.; E.H. GRIFFITH, INC.; E.I. DU PONT DE NEMOURS AND CO., INC.; G.B. BIOSCIENCES CORPORATION; JOHN DEERE LANDSCAPING, INC., SUCCESSOR TO LESCO, INC.; MONSANTO COMPANY; NUFARM AMERICAS, INC.; REGAL CHEMICAL CO.; SCOTTS-SIERRA CROP PROTECTION CO.; AND SYNGENTA CROP PROTECTION, INC.	:	ARGUED: October 16, 2019
APPEAL OF: DOW AGROSCIENCES, LLC, BAYER CROPSCIENCE, LP, BAYER CORPORATION, AND BAYER CROPSCIENCE HOLDING, INC.	:	

RICHARD THOMAS WALSH, EXECUTOR OF THE ESTATE OF THOMAS J. WALSH, DECEASED	:	No. 15 WAP 2019
	:	Appeal from the Order of the Superior Court entered 6/20/18 at No. 1661 WDA 2016 vacating the order of the Court of

	:	Common Pleas of Allegheny County
	:	entered 10/14/16 at No. GD 10-018588
v.	:	and remanding
	:	
	:	
BASF CORPORATION; BAYER	:	ARGUED: October 16, 2019
CORPORATION D/B/A BAYER	:	
CROPSCIENCE, L.P., AND BAYER	:	
CROPSCIENCE HOLDING, INC.,	:	
AND/OR BAYER CROPSCIENCE, L.P.	:	
AND BAYER CROPSCIENCE HOLDING,	:	
INC., IN THEIR OWN RIGHT; BIOSAFE	:	
SYSTEMS, L.L.C.; CHEMTURA	:	
CORPORATION; CLEARY CHEMICAL	:	
CORP.; DOW AGROSCIENCES, L.L.C.;	:	
E.H. GRIFFITH, INC.; E.I. DU PONT DE	:	
NEMOURS AND CO., INC.; G.B.	:	
BIOSCIENCES CORPORATION; JOHN	:	
DEERE LANDSCAPING, INC.,	:	
SUCCESSOR TO LESCO, INC.;	:	
MONSANTO COMPANY; NUFARM	:	
AMERICAS, INC.; REGAL CHEMICAL	:	
CO.; SCOTTS-SIERRA CROP	:	
PROTECTION CO.; AND SYNGENTA	:	
CROP PROTECTION, INC.	:	
	:	
APPEAL OF: DEERE & COMPANY	:	

RICHARD THOMAS WALSH,	:	No. 16 WAP 2019
EXECUTOR OF THE ESTATE OF	:	
THOMAS J. WALSH, DECEASED	:	Appeal from the Order of the Superior
	:	Court entered 6/20/18 at No. 1661 WDA
	:	2016 vacating the order of the Court of
v.	:	Common Pleas of Allegheny County
	:	entered 10/14/16 at No. GD 10-018588
	:	and remanding
BASF CORPORATION; BAYER	:	
CORPORATION D/B/A BAYER	:	
CROPSCIENCE, L.P., AND BAYER	:	ARGUED: October 16, 2019
CROPSCIENCE HOLDING, INC.,	:	
AND/OR BAYER CROPSCIENCE, L.P.	:	
AND BAYER CROPSCIENCE HOLDING,	:	
INC., IN THEIR OWN RIGHT; BIOSAFE	:	
SYSTEMS, L.L.C.; CHEMTURA	:	

CORPORATION; CLEARY CHEMICAL CORP.; DOW AGROSCIENCES, L.L.C.; E.H. GRIFFITH, INC.; E.I. DU PONT DE NEMOURS AND CO., INC.; G.B. BIOSCIENCES CORPORATION; JOHN DEERE LANDSCAPING, INC., SUCCESSOR TO LESCO, INC.; MONSANTO COMPANY; NUFARM AMERICAS, INC.; REGAL CHEMICAL CO.; SCOTTS-SIERRA CROP PROTECTION CO.; AND SYNGENTA CROP PROTECTION, INC.

APPEAL OF: SYNGENTA CROP PROTECTION, INC.

RICHARD THOMAS WALSH, EXECUTOR OF THE ESTATE OF THOMAS J. WALSH, DECEASED

v.

BASF CORPORATION; BAYER CORPORATION D/B/A BAYER CROPSCIENCE, L.P., AND BAYER CROPSCIENCE HOLDING, INC., AND/OR BAYER CROPSCIENCE, L.P. AND BAYER CROPSCIENCE HOLDING, INC., IN THEIR OWN RIGHT; BIOSAFE SYSTEMS, L.L.C.; CHEMTURA CORPORATION; CLEARY CHEMICAL CORP.; DOW AGROSCIENCES, L.L.C.; E.H. GRIFFITH, INC.; E.I. DU PONT DE NEMOURS AND CO., INC.; G.B. BIOSCIENCES CORPORATION; JOHN DEERE LANDSCAPING, INC., SUCCESSOR TO LESCO, INC.; MONSANTO COMPANY; NUFARM AMERICAS, INC.; REGAL CHEMICAL CO.; SCOTTS-SIERRA CROP PROTECTION CO.; AND SYNGENTA CROP PROTECTION, INC.

No. 17 WAP 2019

Appeal from the Order of the Superior Court entered 6/20/18 at No. 1661 WDA 2016 vacating the order of the Court of Common Pleas of Allegheny County entered 10/14/16 at No. GD 10-018588 and remanding

ARGUED: October 16, 2019

APPEAL OF: MONSANTO COMPANY	:	
RICHARD THOMAS WALSH, EXECUTOR OF THE ESTATE OF THOMAS J. WALSH, DECEASED	:	No. 18 WAP 2019
	:	Appeal from the Order of the Superior Court entered 6/20/18 at No. 1661 WDA 2016 vacating the order of the Court of Common Pleas of Allegheny County entered 10/14/16 at No. GD 10-018588 and remanding
v.	:	
BASF CORPORATION; BAYER CORPORATION D/B/A BAYER CROPSCIENCE, L.P., AND BAYER CROPSCIENCE HOLDING, INC., AND/OR BAYER CROPSCIENCE, L.P. AND BAYER CROPSCIENCE HOLDING, INC., IN THEIR OWN RIGHT; BIOSAFE SYSTEMS, L.L.C.; CHEMTURA CORPORATION; CLEARY CHEMICAL CORP.; DOW AGROSCIENCES, L.L.C.; E.H. GRIFFITH, INC.; E.I. DU PONT DE NEMOURS AND CO., INC.; G.B. BIOSCIENCES CORPORATION; JOHN DEERE LANDSCAPING, INC., SUCCESSOR TO LESCO, INC.; MONSANTO COMPANY; NUFARM AMERICAS, INC.; REGAL CHEMICAL CO.; SCOTTS-SIERRA CROP PROTECTION CO.; AND SYNGENTA CROP PROTECTION, INC.	:	ARGUED: October 16, 2019
APPEAL OF: BASF CORPORATION	:	

DISSENTING OPINION

CHIEF JUSTICE SAYLOR **DECIDED: JULY 21, 2020**

The majority deems it inconsequential whether or not this Court should denominate trial judges as gatekeepers relative to the admission of novel scientific

evidence in Pennsylvania courtrooms. *See* Majority Opinion, *slip op.* at 20. Personally, however, I find this to be the clear purport of most of this Court's decisions on the subject. My response to the majority opinion is set forth below. Since Justice Wecht has taken the opportunity, from a side position, to respond to my present remarks -- as well as to criticize the opinion that I authored in *Betz v. Pneumo Abex LLC*, 615 Pa. 504, 44 A.3d 27 (2012) -- I have also included my reply to his opinion.

I. Reply to the Majority Opinion

On an appropriate motion, trial judges in Pennsylvania bear the obligation to screen novel scientific evidence for reliability before permitting such evidence to be put before jurors. *See, e.g.*, *Grady v. Frito-Lay, Inc.*, 576 Pa. 546, 557, 839 A.2d 1038, 1044-45 (2003). This Court, like most others, has implemented this particular gatekeeping responsibility in light of the influential nature of expert testimony on complex subjects and the potential that distortions have to mislead laypersons. *See Betz*, 615 Pa. at 544-47, 44 A.3d at 52-54; *see also id.* at 532 n.15, 44 A.3d at 44 n.15 (quoting a cogent encapsulation by the Honorable Phyllis W. Beck in *Blum v. Merrell Dow Pharms., Inc.*, 705 A.2d 1314, 1325 (Pa. Super. 1997), *aff'd*, 564 Pa. 3, 764 A.2d 1 (Pa. 2000)); *accord In re Accutane Litig.*, 191 A.3d 560, 589 (N.J. 2018) (explaining that "the gatekeeping function prevents the jury's exposure to unsound science through the compelling voice of an expert" and "[d]ifficult as it may be, the gatekeeping role must be rigorous").

For these reasons, I have previously expressed the concern that the *Frye* standard should not be interposed in a way that deprives trial judges of the ability to screen expert opinions for sufficient reliability. *See Commonwealth v. Smith*, 606 Pa. 127, 186, 995 A.2d 1143, 1177 (2010) (Saylor, J., concurring and dissenting) ("[I]f the Court is going to interpret *Frye* so narrowly as to justify the admission of speculative

opinions, or opinions falsely couched in scientific literature, I believe the time has come for Pennsylvania to move to the *Daubert* standard.").

In this regard, to the degree that the majority opinion advocates that the *Frye* standard is superior to approaches taken by other courts in the modern litigation environment, *see, e.g.*, Majority Opinion, *slip op.* at 17-18, I respectfully disassociate myself from that view. *Accord Grady v. Frito-Lay, Inc.*, 576 Pa. at 570, 839 A.2d at 1052 (Saylor, J., concurring) ("Concerning the *Frye/Daubert* debate, I take the position that the *Frye* rule is and remains the law of the Commonwealth, unless and until informed advocacy is presented that would favor a new direction, with due reference to the substantial body of information that has developed concerning the experience of the federal courts and others under *Daubert*."). Significantly, I believe that there are benefits and drawbacks to each of the mainstream approaches, and I would reserve any assessment of the comparative merits to a setting in which the Court has the benefit of a developed analysis. *See, e.g.*, *Accutane*, 191 A.3d at 583-95 (reflecting the Supreme Court of New Jersey's recent refinement of the state's standard governing the admissibility of novel expert opinions, upon close consideration of the available options).

In my view, Judge Wettick properly discharged his gatekeeping function in the present case. Upon review of scientific literature relied upon by Dr. Brautbar, Judge Wettick found that there were extensive, unexplained analytical gaps between the expert's opinions and the material upon which he relied. *See Walsh v. BASF Corp.*, No. GD-10-018588, *slip op.* at 2-19 (C.P. Allegheny Oct. 16, 2016); *see also Walsh v. BASF Corp.*, No. GD-10-018588, *slip op.* at 2-6 (C.P. Allegheny Dec. 27, 2016). And that finding is amply supported by the record.

Indeed, the record support for Judge Wettick's conclusion includes the testimony of Dr. Brautbar himself. For example, Dr. Brautbar acknowledged that dose response is a fundamental tenet of toxicology. *See, e.g.*, *See* Deposition of Nachman Brautbar, M.D., dated May 15, 2014 at 836; *accord* Joseph V. Rodricks*, Reference Guide on Exposure Science*, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 507 (Fed. Judicial Center 3d ed. 2011) ("Ultimately the dose incurred by populations or individuals is the measure needed by health experts to quantify the risk of toxicity.").[1] He proceeded, however, to render opinions about substantial-factor causation relative to Mr. Walsh, while repeatedly conceding that he was both unable to identify any dose-response threshold for any of the fourteen products at issue in this case, *see, e.g.*, N.B. at 798, and that he had no idea of the quantity of the dose experienced by Mr. Walsh for any particular product, *see, e.g.*, *id.* at 300-301, 552. At least in many other courts, such testimony would plainly be regarded as unscientific and insufficient to establish substantial-factor causation.[2]

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[1] The deposition of Dr. Brautbar spanned four days, but the pagination for the transcript was continuous. For convenience, the deposition is referred to hereinafter as "N.B. at __."

[2] *See, e.g.*, *McClain v. Metabolife Int'l, Inc.*, 401 F.3d 1233, 1241-42 (11th Cir. 2005) (relating that an expert's failure to lay a reliable groundwork for assessing the dose-response relationship in a toxic tort case "signals a methodological problem"); *Burleson v. Tex. Dep't of Criminal Justice*, 393 F.3d 577, 587 (5th Cir. 2004) (highlighting that a causation opinion where the expert "fail[s] to conduct a dose assessment" produces "too great an analytical gap between the data and the opinion proffered" (citation omitted)); *Mitchell v. Gencorp, Inc.*, 165 F.3d 778, 781 (10th Cir. 1999) ("[A] plaintiff must demonstrate the levels of exposure that are hazardous to human beings generally as well as the plaintiff's actual level of exposure to the defendant's toxic substance before he or she may recover."); *Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 199 (5th Cir. 1996) ("Scientific knowledge of the harmful level of exposure to a chemical, plus knowledge that the plaintiff was exposed to such quantities, are minimal facts necessary to sustain the plaintiffs' burden in a toxic tort case."); *Yates v. Ford Motor Co.*, 113 F. Supp. 3d 841, 861 (E.D.N.C. 2015) ("Rather than engage in any specific, meaningful comparison (continued…)

In this regard, Dr. Brautbar's notion of substantiality, in terms of the duration of exposure, doesn't conform at all to the legal standard, in that he defined the conception as merely being "not ridiculous, theoretical, or infinitesimal." *Id.* at 776. Furthermore, numerous defense experts highlighted the unscientific nature of Dr. Brautbar's analysis. *See, e.g.*, Deposition of Scott D. Phillips, M.D., dated Jan. 12, 2016, at 32 (reflecting the testimony of a medical toxicologist that Dr. Brautbar's methodology violated basic principles of toxicology in that he "simply stated that the dose was sufficient to cause his AML, which creates a circular logic reasoning kind of pathway"); Deposition of John Ross, Ph.D., dated Jan. 13, 2016, at 49 (remarking that Dr. Brautbar "repeated over and over again that it was the proximity, duration and frequency of exposure that allowed Mr. Walsh to be overexposed without providing a shred of evidence on what those were.").[3]

(…continued)
of the scientific data with [the plaintiff's] exposures, [the expert's] opinions essentially attempt to overwhelm with statistics and studies, lacking guidance as to how a juror ought to apply them[, which] is not a reliable method, and it will not assist a jury.").

I acknowledge that -- from my point of view at least -- a majority of this Court has previously sanctioned the admissibility of an expert opinion pertaining to substantial-factor causation on terms that would not meet (or even approach) the standards maintained in these other courts. *See Rost v. Ford Motor Co.*, 637 Pa. 625, 666-76 & n.6, 151 A.3d 1032, 1057-63 & n.6 (2016) (Saylor, C.J., dissenting) (explaining, *inter alia*, that the relevant expert "made no attempt to even roughly quantify either the dose experienced by [the decedent at his place of employment] or his cumulative exposure or dose."). That decision, however, arose in the discrete setting of an asbestos-mesothelioma case, and it remains to be seen whether, or to what extent, the position will be transported beyond that unique arena.

[3] In terms of Dr. Brautbar's approach to the scientific studies, epidemiologist David H. Garabrant, M.D., testified that "scientists have an obligation to consider all relevant evidence and to weigh it." Deposition of David H. Garabrant, M.D., dated Jan. 7, 2016, at 42. Consistent with Judge Wettick's assessment, Dr. Garabrant explained that Dr. Brautbar neglected to do so and further failed to apply the Bradford Hill viewpoints (continued…)

The circularity inherent in Dr. Brautbar's opinions is demonstrated throughout his deposition testimony. For example, after repeatedly asserting that the amount of exposure to each of the defendants' products was substantial, the following interchange ensued between counsel for an appellant and Dr. Brautbar:

> Q. [I]n terms of duration and the proximity and frequency, you don't know how much of the chemical -- the pesticide he was exposed to for the duration or for how close he was to it or how frequently?
>
> A. No. I don't know.
>
> * * *
>
> Q. How -- how much [chlorothalonil] was Mr. Walsh exposed to during his work -- during his occupation?
>
> A. He was exposed to a substantial dose, sufficient to contribute to his genotoxicity.
>
> * * *
>
> Q. But you can't tell me how much besides saying substantial?
>
> A. Well, substantial is how much. And it is based on the duration, proximity, and frequency.

(…continued)
which he invoked in a reliable manner. *See id.* at 101. Rather, Dr. Garabrant testified that Dr. Brautbar "cherry pick[ed]." *Id.* at 127. In particular, Dr. Brautbar "never mentions the absence of dose-response relationship in the studies that have examined it for the pesticides at issue. And so his claim that the dose-response data tends to support a causal relationship is not true for the pesticides at issue in this case and for leukemia." *Id.* at 131; *see also id.* at 134 (asserting that Dr. Brautbar "misinterpreted a number of the [Bradford Hill viewpoints], he's failed to support others, and he has invoked chemicals not at issue in this case and diseases not at issue in this case in support of his views"). Judge Wettick's close review of some of the studies involved parallels this line of criticism.

Q. But you don't know the dose.

A. That's a dose.

* * *

Q. Don't you have to know the amount of the chemical for the duration and the proximity and the frequency to calculate the dose for an individual?

A. Are you asking me general, or are you asking --

Q. I'll ask -- chlorothalonil specifically. For any of the pesticides involved in this case.

A. No.

Q. No? You don't need to know the amount?

A. Well, the amount was substantial based on what I have described.

300-303.[4]

The record is replete with this sort of exchange, which is along the lines of what courts have denominated as unscientific *ipse dixit* (or assertions which are made but not proven). *Cf. Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146, 118 S. Ct. 512, 519 (1997) ("[N]othing in . . . the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert.").

[4] Although he repeatedly denied it, much of the purport of Dr. Brautbar's testimony was that, because he found there to have been an effect on Mr. Walsh's chromosomes that in his judgment could only be attributed to benzene or pesticides, Mr. Walsh must have experienced a sufficient dose from the defendants' pesticides to have caused it. *See, e.g.*, N.B. at 511-512. As Appellants explain at length, this represents another example of circularity in Dr. Brautbaur's reasoning. *See, e.g.*, Joint Brief for Appellants Bayer Cropscience LP, Bayer Corp., Bayer Cropscience Holding Inc. & Dow Agrosciences LLC at 28.

Ultimately, Dr. Brautbar resorted to faulting the appellant companies for the lack of data underlying his opinions concerning substantial-factor causation. *See, e.g.*, N.B. at 900 (reflecting Dr. Brautbar's response to an appellant's attorney that, an "[e]xposure model can be made if I'm provided with some data from all of you of air monitoring, which wasn't provided. So I'm going to throw this back to you."). There is, of course, no suggestion on this record that this sort of burden-shifting rationale reflects a generally accepted scientific methodology.[5]

The majority's holding appears to be that a trial judge must hew more closely to crediting or discrediting the competing expert testimony about what any particular study or studies say, rather than actually looking at the studies themselves in the *Frye* context. *See, e.g.*, Majority Opinion, *slip op.* at 25-26, 32. Respectfully, I believe this imposes an unreasonable constraint on the trial courts' ability to perform the essential review for reliability. In this regard, I fail to see how judges can be expected to test competing opinions from experts while being constrained in their ability to review the opinions' underpinnings. *Accord Walsh v. BASF Corp.*, 191 A.3d 838, 849-50 (Pa.

[5] There is also ample evidentiary support for Judge Wettick's rejection of Dr. Brautbar's "fingerprints" theory, as lacking any grounding in appropriate scientific methodology. For example, and as the majority recognizes, a defense expert testified, consistent with Judge Wettick's opinion, that this theory is wholly unsupported by the scientific literature. *See* Deposition of Marshall Lichtman, M.D., dated December 18, 2015, at 33-34 ("I did not see any accepted methodology and I could not find any support for the statement in the material that Dr. Brautbar used to arrive at his opinions."); *id.* at 35; *id.* at 45 (explaining that "there is [scientific] agreement that there is *no* cytogenetic pattern that can allow you to determine if a patient was exposed to a chemical that might have played a role in causing their case of acute myelogenous leukemia" (emphasis added)); *id.* at 49-50 ("That's a novel concept and, as far as I can tell, it's pulled out of the air."); *id.* at 76; *accord* Deposition of Michael I. Greenberg, M.D., dated Jan. 15, 2016, at 42-43 (reiterating that there is no support in the published literature for Dr. Brautbar's "fingerprints" opinion).

Super. 2018) (Bender, P.J.E., dissenting). And, upon such consideration, where the judge discerns a lack of appropriate scientific methodology, I cannot agree that it is inappropriate for him to so hold.

I also agree with Judge Wettick and Appellants that both of Appellee's experts inappropriately extrapolated from "pesticides" as a product class -- including numerous pesticides that Mr. Walsh never used -- to Appellees' specific products, with no analysis of whether the products were chemically, functionally, or toxicologically similar. *Accord McClain*, 401 F.3d at 1245-46 (explaining that ignoring differences in chemical structure "does not make for reliable opinions in toxic tort cases"). There is also abundant record evidence confirming that this form of extrapolation lacks general acceptance in the scientific community. *See, e.g.*, Deposition of David H. Garabrant, M.D., dated Jan. 7, 2016, at 36-37 (analogizing Dr. Zambelli-Weiner's opinion to the rendering of a homogenous opinion with respect to the toxic effects of such diverse substances as "a shot of bourbon, purified water, sugar-sweetened beverages like soda, beer," simply because all are beverages).[6]

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[6] As reflected above, I respectfully disagree with the majority's pronouncement that Dr. Brautbar's analysis was free from extrapolation in relevant regards. *See* Majority Opinion, *slip op.* at 29. Indeed, it is very difficult to understand Dr. Brautbar's testimony as anything else besides extrapolation from a class to particular products when he had no idea of the dose-response threshold associated with any specific product, *see e.g.*, N.B. at 798, nor any appreciation of the dose experienced by Mr. Walsh for any product, *see, e.g.*, *id.* at 300-301, 552, 798.

Dr. Zambelli-Weiner also extrapolated severely, since her opinion that pesticides as a class cause leukemia, *see, e.g.*, Deposition of April Zambelli-Weiner, Ph.D., dated Sept. 23, 2014, at 74, can only be understood to apply to Appellees' discrete products since they are pesticides, *accord id.* at 105 (reflecting Dr. Zambelli-Weiner's explanation that her opinions "are related to pesticides as a class" and "to the extent that a product is a pesticide, it is included in that opinion"). And I agree with Judge Wettick that such a gross form of extrapolation lacks any basis in accepted scientific methodology. *See Walsh*, No. GD-10-018588, *slip op.* at 19 (C.P. Allegheny Oct. 16, 2016).

With regard to Dr. Zambelli-Weiner specifically, I find Judge Wettick's assessment to be compelling that:

> Dr. Zambelli-Weiner's opinion regarding pesticides as a class is not in accordance with generally accepted scientific methodology because it fails to account for variations in composition of the universe of chemicals, compounds, or the like that might be considered a "pesticide." I find that failure to account for such an important variable is not in accordance with generally accepted scientific methodology.

Walsh v. BASF Corp., No. GD-10-018588, *slip op.* at 19 (footnote omitted); *accord* Joint Brief for Appellants Bayer Cropscience LP, Bayer Corp., Bayer Cropscience Holding Inc. & Dow Agrosciences LLC at 35 ("There was no evidence, including from Plaintiff's experts, that, for example, citing studies about completely different products to support a causation opinion is conventional."); *see also id.* at 43 (remarking that the class of pesticides encompasses such substances as cayenne pepper, chlordane, canola oil, baking soda, and wood preservatives). As Judge Wettick aptly observed, Dr. Zambelli-Weiner herself recognized that "[p]esticides represent a *heterogenous*[, or diverse,] group of formulated products that contain active ingredients and additives." *Walsh v. BASF Corp.*, No. GD-10-018588, *slip op.* at 19 n.17 (citing Deposition of April Zambelli-Weiner, Ph.D., dated September 23, 2014, at 104-107) (emphasis in original).

In other cases, and along with other Justices, I have recognized the difficulties facing plaintiffs in toxic tort cases involving exposure to multiple products and long latency periods. *See, e.g.*, *Gregg v. V-J Auto Parts, Inc.*, 596 Pa. 274, 291-92, 943 A.2d 216, 226 (2007). Again, I would permit a fair degree of latitude, for example in terms of estimating exposure and dose. *See, e.g.*, *Rost*, 637 Pa. at 676 n.13, 151 A.3d at 1063 n.13 (Saylor, C.J., dissenting). However, the proffer -- before a jury of laypersons --- of expert witnesses whose methodologies are replete with ungrounded extrapolations and other analytical gaps, large-scale abstractions, and patent circularity

goes far beyond any reasonable conception of appropriate leeway. *Accord Accutane*, 191 A.3d at 589 (emphasizing that the court's function on review of novel scientific opinions "is to distinguish scientifically sound reasoning from that of the self-validating expert, who uses scientific terminology to present unsubstantiated personal beliefs").

For the above reasons, I would reverse the order of the Superior Court.

II. Response to the Concurring Opinion by Justice Wecht

According to Justice Wecht, the opinion that I authored in *Betz* suffers from a "reliance upon potentially misleading terminology" and "so muddied the waters that this Court should stabilize its characterization of the *Frye* standard[.]" Concurring Opinion, *slip op.* at 5. In this regard, he intimates that *Betz* "introduced into Pennsylvania law a 'conventionality' requirement, suggesting that expert testimony in a scientific discipline is admissible only when the expert has 'applied accepted scientific methodology *in a conventional fashion* in reaching his or her conclusions.'" *Id.* at 14 (emphasis in original; citation omitted). Justice Wecht further cites, *inter alia*, to *Commonwealth v. Jacoby*, 642 Pa. 623, 170 A.3d 1065 (2017), as a decision evidencing the same deficiency which he attributes to *Betz*. *See* Concurring Opinion, *slip op.* at 14 & n.10.

As an initial matter, Justice Wecht's opinion demonstrates a misunderstanding of the *Betz* decision, in that the "conventional fashion" language simply wasn't used to redefine *Frye*'s general-acceptance standard. Rather, the phrase appears, in *Betz*, solely in a section entitled, "The Decision to Conduct a *Frye* Hearing." Consistent with this heading, the passage discusses only the concept of the novelty of scientific evidence, which serves as the threshold to the entitlement to a *Frye* hearing. *See Betz*, 615 Pa. at 544-46, 44 A.3d at 52-53 ("We conclude that *a Frye hearing is warranted when* a trial judge has articulable grounds to believe that an expert witness has not

applied accepted scientific methodology *in a conventional fashion* in reaching his or her conclusions." (emphasis added)).

Notably, this is the same limited context in which conventionality was considered in the *Jacoby* decision referenced by Justice Wecht. *See Jacoby*, 642 Pa. at 667, 170 A.3d at 1091. Indeed, the novelty threshold was the only tier of a *Frye* analysis that the *Jacoby* Court was able to review, given that the trial court had denied the defendant's motion for a *Frye* hearing, and accordingly, no application of the *Frye* general-acceptance test whatsoever had occurred in the case. *See id.* at 640, 170 A.3d at 1075.[7]

Viewing the contested phraseology in its appropriate setting, I do not find it to be confusing, at all, to say that scientific methodology applied in an unconventional fashion fairly translates into novel scientific evidence (particularly since novelty and unconventionality are often used as synonyms). And the Court's unanimous determination on this subject, in *Betz*, didn't stray off course. Instead, the question of

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[7] The "conventional fashion" language taken from *Betz* was also used in this manner in each of the remaining decisions and responsive opinions in this Court cited by the concurrence. *See Mitchell v. Shikora*, ___ Pa. ___, ___ n.12, 209 A.3d 307, 319 n.12 (2019); *Commonwealth v. Walker*, 625 Pa. 450, 489, 92 A.3d 766, 790 (2014); *Commonwealth v. Treiber*, 632 Pa. 449, 538, 121 A.3d 435, 488 (2015) (Saylor, C.J., dissenting).

Parenthetically, the majority opinion in *Jacoby* does manifest an idiosyncrasy in its own right, since it characterizes unconventionality in methodology as the *exclusive* measure for novelty. *See Jacoby*, 642 Pa. at 667, 170 A.3d at 1091. On the novelty issue, however, *Betz* only decided the issue that was before the Court -- *i.e.*, whether the concept of novelty *subsumed* generally-accepted methodology applied in an unconventional fashion. There should never have been any doubt that *Frye* also extends to "novel science" -- for example, a new scientific test for truth-telling -- in the first instance. *See Betz*, 615 Pa. at 545, 44 A.3d at 53 (citing *Grady*, 576 Pa. at 557, 839 A.2d at 1045).

whether the concept of novelty extended to novel (or unconventional) applications of otherwise-accepted scientific methodology was squarely presented by the litigants as a main, contested issue in the case.[8] Furthermore, contrary to Justice Wecht's characterization, the matter was decided on amply-developed reasoning.[9]

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[8] In this regard, the issue was raised and developed -- and discussed extensively -- by the parties and their *amici*. *Compare Betz*, 615 Pa. at 530-31, 44 A.3d at 43-44 (reflecting that the defendant-appellants contended that a *Frye* hearing was warranted because, while the challenged expert "ostensibly accepted the applicability of" conventional scientific methodology, his opinion "in substance, nevertheless disregards this elemental precept in its entirety"), *with id.* at 542-43, 44 A.3d at 51 (summarizing the plaintiff-appellees' argument that there was "no justification for conducting a *Frye* hearing," since their expert's methodology was "utterly mainstream").

[9] *Betz* relates that Pennsylvania courts tend to downplay access to other rule-based tools for trial judges to screen scientific evidence, such as the ability to refuse to admit evidence to avoid unfair prejudice, confusion of the issues, or misleading the jury. *See Betz*, 615 Pa. at 544, 44 A.3d at 52 (citing Pa.R.E. 403, as well as the helpfulness consideration of Rule of Evidence 702). This, of course, tends to elevate the importance of appropriate screening under *Frye.* Additionally, the Court reasoned as follows:

> Various reasons underlie the preference to limit the courts' involvement in determining the admissibility of scientific evidence. There is the concern that liberality in allowing challenges would substantially increase the number of challenges (and cases in which lengthy pre-trial proceedings would ensue). The competency of trial judges to accept or reject scientific theories remains a legitimate subject of controversy. Additionally, a claim or defense in many cases may rise or fall based upon expert testimony and, therefore, there is some reluctance on the part of courts to deprive litigants of their day in court.
>
> On the other hand, this Court has recognized the influential nature of expert testimony on complex subjects, and the potential that distortions have to mislead laypersons. *See* [*Grady*, 576 Pa.] at 558, 839 A.2d at 1045; *Topa,* 471 Pa. at 231–33, 369 A.2d at 1281–82. It would be naïve, in this

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In any event, the digression about passages from *Betz* dedicated to novelty seems to me to be of little relevance to this case, since the claim that prevailed before Judge Wettick was that Dr. Brautbar's methodology was not only unconventional, but it was wholly unscientific.[10] One of the pillars of the *Betz* opinion is that trial judges are authorized -- and obliged upon proper challenge -- to screen against expert witnesses who profess to apply accepted scientific methodology but instead, present analyses suffering from material analytical gaps. *See Betz*, 615 Pa. at 553, 44 A.3d at 57-58.

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> regard, to assume that the possibility for distortion is limited to the very newest realms of science. *Cf. Grady,* 576 Pa. at 557, 839 A.2d at 1045 (explaining that *Frye* applies not only to novel science, but also where scientific methods are utilized in a novel way).
>
> We therefore agree with Appellants that a reasonably broad meaning should be ascribed to the term "novel."

Betz, 615 Pa. at 545, 44 A.3d at 53.

[10] In this regard, since unscientific methodology is also unconventional, there is a great deal of overlap between the terms. And I would submit that the greater range of cases in which scientific evidence is excluded, as this one, address evidence that is both unconventional *and* unscientific. *See supra* note 2.

Certainly, the substantive *Frye* test shouldn't be applied so stringently as to absolutely forbid scientific methodology applied in a unique way, so long as the new manner itself can reasonably be viewed as scientific (or as being sufficiently grounded in generally-accepted principles). This is why the *Betz* Court chose the "unconventional" litmus solely to identify situations where the courts should take a close look (*i.e.*, conduct a *Frye* hearing) to screen against unscientific lapses in the methodology, such as analytical gaps and abstractions.

As related above and below, the particular strain of "unconventionality" embedded in Dr. Brautbar's opinions -- *i.e.* material analytical gaps and abstractions -- is and should be excluded from courtrooms. *See infra*.

The alternative to permitting trial courts to consider whether experts actually adhere to the methodology that they only facially espouse is to accept the sort of expert self-validation which is of great concern to most courts.[11]

One need look no further than the FBI's recent revelation that, for decades, the government engendered the presentation of faulty forensic-science evidence -- in the form of microscopic hair analysis -- potentially impacting tens of thousands of criminal cases across the nation. *See* FBI Press Release, *FBI Testimony on Microscopic Hair Analysis Contained Errors in at Least 90 Percent of Cases in Ongoing Review*, at 2

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[11] As a separate matter, during the course of his critique of *Betz*, without citation, Justice Wecht restates the holding as follows:

> In *Betz*, . . . the Court appeared to hold, and unquestionably implied, that when an expert testifies that any exposure to a toxic substance enhances the risk that the exposed party will suffer injury as a consequence of that particular exposure, the expert inadmissibly suggests that the exposure in question, even when *de minimis*, is a substantial cause of the injury.

Concurring Opinion, *slip op.* at 20. In *Betz*, however, there simply was no reason for the Court to infer anything about substantial-factor causation from discussions by the challenged expert about increased risk in the abstract. Rather, the case concerned the challenged expert's *explicit* opinion that was offered as the sole evidence to address the plaintiff-appellees' burden to prove substantial-factor causation. In this regard, the specific opinion at issue was that *de minimus* exposure -- *i.e.*, breathing a single asbestos fiber from a defendant's product -- was a substantial factor in causing any given instance of asbestos-related disease in any individual who was so exposed. *See Betz*, 615 Pa. at 510, 44 A.3d at 31.

Along these lines, I find the concurrence's assertion that *Rost* appropriately overruled the above rationale attributed to *Betz* to be equally misplaced. *See* Concurring Opinion, *slip op.* at 20-21.

I have acknowledged nonetheless, that the majority decision in *Rost* did work a distinct retrenchment relative to *Betz*, at least insofar as concerns asbestos-mesothelioma cases. *See supra* note 2.

(Apr. 2, 2015). Of course, the misuse of science in courtrooms tends to impugn the integrity of the judicial system. *See, e.g.*, *Commonwealth v. Chmiel*, 643 Pa. 216, 225, 173 A.3d 617, 622 (2017) (referencing a Washington Post article charging that the FBI's review was "a watershed in one of the country's largest forensic scandals, highlighting *the failure of the nation's courts* for decades to keep bogus scientific information from juries" (emphasis added)). *See generally* Edward J. Imwinkelreid, *The Best Insurance Against Miscarriages of Justice Caused By Junk Science: An Admissibility Test That Is Scientifically and Legally Sound*, 81 ALB. L. REV. 851, 851 (2018) ("Inaccurate expert testimony is a 'recurrent theme[]' in wrongful conviction studies.").

Accordingly, courts that look beyond mere acceptance of an expert's own personal claim to adherence to an accepted scientific methodology quite appropriately seek to protect the integrity of the judicial process.

Notably, other jurisdictions adhering to *Frye*'s general-acceptance litmus have approved judicial screening against the admission of faulty expert analyses in a fashion very similar to that required under *Betz*. *See, e.g.*, *Goeb v. Tharaldson*, 615 N.W.2d 800, 816 (Minn. 2000) (applying a *Frye* analysis to require a proponent of scientific evidence to show that the "methodology used [by the expert] is reliable *and in the particular instance produced reliable results*," and affirming the exclusion of testimony from an expert whose analysis made "too great a leap" from the data gathered (emphasis added)). *See generally Blackwell v. Wyeth*, 971 A.2d 235, 254 (Md. 2009) ("The 'analytical gap' concept also has been employed by some of our sister states in a *Frye* analysis." (citing, *inter alia*, the Minnesota Supreme Court's decision in *Goeb*)).[12]

[12] Maryland maintains a variant of the *Frye* test which distinguishes between generally accepted methodology and generally accepted analysis, while clarifying that both are required "to avoid the pitfalls of an 'analytical gap.'" *Blackwell*, 971 A.2d at 255. In my view, it is largely a semantic issue whether an expert who professes to have applied a (continued…)

Nor was *Betz*'s review of a scientist's actual methodology a novelty in Pennsylvania. In *Blum v. Merrell Dow Pharmaceuticals, Inc.*, the challenged expert testified at a *Frye* hearing that his opinions "were based on generally accepted methods." *Blum by Blum v. Merrell Dow Pharmaceuticals, Inc.*, 705 A.2d 1314, 1321 (Pa. Super. 1997), *aff'd*, 564 Pa. 3, 764 A.2d 1 (2000). Nevertheless, the Superior Court concluded that such self-validating testimony was "not enough" to carry the proponent's burden at a *Frye* hearing. *Id.* Significantly, in affirming this conclusion, this Court reviewed the record and explained that the expert "engaged in a selective review of the data from several" studies; "detached the underlying data from the controls set up by the studies"; and "worked backwards through the science, from the statistical results back to the studies in the first place." *Blum*, 564 Pa. at 7 n.5, 764 A.2d at 4 n.5. As such, and as in *Betz*, the Court concluded that "[t]his procedure cannot be fairly described as generally accepted methodology for purposes of the *Frye* standard." *Id*.

As I have previously explained, I don't believe the present case presents an appropriate vehicle for engaging in a merits defense of either the *Frye* or *Daubert* criteria or any other existing or proposed standard, since there is no present advocacy on the subject. I observe, however, that some of the authorities that Justice Wecht

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generally accepted scientific methodology -- but who has in fact failed to do so -- hasn't applied that methodology as a factual matter, or has been deficient in his applied reasoning. Under either understanding, the expert's unscientific and misleading testimony presents precisely the same danger associated with its misuse in a courtroom.

In this regard, a constant and contested theme, in this line of cases, is that one party's expert will say that he or she followed generally-accepted scientific methodology, and the adversary's expert will say this is not so. There would be no reason for a *Frye* hearing if a neutral judicial official were not interposed to resolve such a material factual dispute.

discusses in his defense of *Frye* depart greatly from his central thesis. For example, the concurrence references an article by law fellow and Ph.D. candidate James R. Dillon to support the propositions that judges lack the expertise to address scientific evidence in the courtroom, and that *Frye* more appropriately delegates the question of the reliability of the actual methodology or reasoning employed to experts selected by the litigants. *See* Concurring Opinion at 19 (citing James R. Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. 247, 260, 272 (2018)).

Relative to the comment about judicial expertise, however, the article also espouses the view that jurors lack the necessary competence to assess the reliability of scientific evidence. *See, e.g.*, Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. at 278 (opining that "[j]urors often fail to understand and apply scientific testimony correctly, even when the underlying science itself is relatively clear," and that jurors tend to rely on "cognitive shortcuts," such as a focus upon "perceived expertise"). Moreover, the theme runs throughout the Dillon article that judges must implement an effective gatekeeping function to keep faulty science out of courtrooms, at the risk of compromising the integrity of the judicial system. In this regard, the author departs roundly from Justice Wecht's position concerning the effectiveness of traditional adversarial tools of common-law adjudication, including cross-examination, the introduction of competing evidence, and argumentation by counsel. *Compare* Concurring Opinion, *slip op.* at 8, *with* Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. at 280 ("The empirical literature also casts doubt on the effectiveness of the traditional tools of the adversarial model . . . in mitigating jurors' cognitive fallibilities.").

The author further submits that the *Frye* approach, devised in 1923, had failed to counteract a "sporting theory" associated with the use of partisan expert witnesses in courtrooms, which was appalling to the public and produced a crisis of confidence in the

judicial system, at least until courts began to "apply *Frye* more stringently in the 1970s." *Id.* at 259. Ultimately, the author proposes the appointment of a "scientific adjunct with expertise in each relevant scientific domain," in every civil and criminal case, who would have the authority to engage in *sua sponte* gatekeeping; to conduct and implement independent research and analyses, respectively; and to overturn jury verdicts which the adjunct finds to be contrary to scientific fact. *Id.* at 297-300.

Plainly, this article does not comport with Justice Wecht's position that Pennsylvania should remain "a *Frye* stalwart" with no further consideration of any other alternative. *Compare* Concurring Opinion, *slip op.* at 13, *with* Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. at 312 ("Maintaining the status quo is not a viable option.").

Personally, at this point in time, I wouldn't endorse the Dillon article any more than I would subscribe to Justice Wecht's *sua sponte* defense of *Frye*.[13] Instead, I reiterate my belief that very serious and difficult questions remain that would be better addressed by this Court upon developed argumentation and with due consideration of the many concerns arising out of the ongoing experience with the misuse of faulty science in courtrooms.[14]

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[13] I note that there are other proposals for improvement that may also merit serious consideration. *See, e.g.*, Imwinkelreid, *The Best Insurance Against Miscarriages of Justice Caused By Junk Science: An Admissibility Test That Is Scientifically and Legally Sound*, 81 ALB. L. REV. at 865-66.

[14] Notably, as well, the *Betz* Court never made a definitive ruling as to whether trial courts could separately enforce Rule of Evidence 702's requirement that expert opinion must assist the trier of fact to understand the evidence or determine a fact in issue, or Rule 403's screening requirement against unfair prejudice, confusion of the issues, or misleading of the jury. *See* Pa.R.E. 403, 702. From my point of view, close consideration also should be accorded to empowering trial courts to separately enforce these material requirements in the expert-testimony arena. *But see* Majority Opinion, *slip op.* at 21 n.7 ("To the extent that Pennsylvania trial courts conduct an 'essential (continued…)

Justice Todd joins this dissenting opinion.

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review for reliability,' that review may consist only of establishing that the expert utilized generally accepted methodologies in reaching his or her scientific conclusions." (internal citation omitted)).