

Supreme Court of Florida

No. SC00-490

JOHN CASTILLO, etc., et al.,
Petitioners,

vs.

E.I. DU PONT DE NEMOURS & CO., INC., et al.,
Respondents.

[July 10, 2003]

QUINCE, J.

We have for review E.I. DuPont De Nemours & Co., Inc. v. Castillo, 748 So. 2d 1108 (Fla. 3d DCA 2000), which expressly and directly conflicts with the opinion in Berry v. CSX Transportation, Inc., 709 So. 2d 552 (Fla. 1st DCA 1998). We have jurisdiction. See art. V, § 3(b)(3), Fla. Const. For the reasons set forth below, we quash the Third District's decision and hold that the expert testimony offered by the petitioners at trial was admissible under Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

Procedural History

This case involves a products liability and negligence claim against E.I. Du Pont de Nemours & Co., Inc. (DuPont), the manufacturer of Benlate, and Pine Island Farms, Inc. (Pine Island), the owners of a “u-pick” farm which used Benlate and operated in the petitioners’ neighborhood. Donna and John Castillo (the Castillos) allege that when Mrs. Castillo was seven weeks pregnant, she was exposed to Benlate, an agricultural fungicide used by Pine Island. They further allege that benomyl, the active ingredient in Benlate, entered her bloodstream and caused microphthalmia, a rare birth defect involving severely underdeveloped eyes, in her unborn son John.

The complaint against DuPont and Pine Island was filed after the Castillos were contacted by British reporter John Ashton, who was conducting an investigation into the relationship between Benlate and children born with microphthalmia in Great Britain. He asked Mrs. Castillo if she lived on or near a farm. She told him she lived near the “u-pick” farm. Ashton then contacted Lynn Chaffin, the manager of Pine Island, and asked him if Pine Island had sprayed Benlate on the “u-pick” field in November 1989. Chaffin told him that Pine Island had sprayed Benlate in November of 1989. Although at trial Chaffin testified that he did not remember such a conversation, telephone records confirm an eight-

minute phone conversation originating in London, England.

The Third District's opinion below recites the following facts:

According to Donna Castillo's trial testimony, she passed by the "u-pick" farm in question on either November 1st or 2nd, 1989, as she walked with her young daughter, Adriana, while pregnant with John. As she walked, she observed a tractor that she described as "bucking and jerking" and spraying "tons" of mist into the air. As the mist drifted over her (she indicated that it was a windy day), it completely drenched her. She returned to her home and did not shower that night. She was in her seventh week of pregnancy at the time.

The plaintiffs established that Pine Island purchased its chemicals from two suppliers: Helena Chemicals and S & M Chemicals. The evidence showed that in 1989, Pine Island purchased Benlate from Helena Chemicals on four occasions: March 20—thirty six pounds; April 29—twenty-four pounds; May 4—twelve pounds; and December 19—sixty pounds. Because S & M's records were destroyed by Hurricane Andrew in 1992, there was no evidence of purchase from S & M for 1989. Pine Island's general manager, Lynn Chaffin, testified that S & M was not a major provider of chemicals for his employer because their prices were too high. He likened S & M to a convenience store like "Quick Mart" where only small purchases were made. He further testified that when purchased chemicals were not used it was the company's practice to return them for credit. This practice was confirmed by Dan Daniels, branch manager for Helena Chemicals.

Additional evidence elicited during the plaintiff's case indicated that Pine Island's strawberry and tomato plants arrived from California on October 25, and that the strawberries were planted that day. The tomatoes were planted at some time after that date. There was testimony which established that Benlate can be used prophylactically as early as the first week after planting of tomatoes. If the tomato plants were planted on the same day as the strawberries, or on the next day, such a prophylactic spraying of the tomato plants would have occurred on November 1st or 2nd.

Castillo, 748 So. 2d at 1111-12 (footnotes omitted).

The Castillos' expert, Dr. Charles Vyvyan Howard, testified in pretrial

depositions that he believed that fetal exposure to benomyl at the concentration of 20 parts per billion (ppb) in the maternal bloodstream would cause microphthalmia in humans based on his conclusions from (1) rat gavage studies; (2) lab experiments on human and rat cells; and (3) the results of dermal exposure testing done by DuPont's own scientist. He testified that he considered epidemiological studies but that those studies were flawed and offered little information.

At the Frye hearing, DuPont and Pine Island moved to exclude Dr. Howard's testimony, arguing that his methodology for determining whether and at what level Benlate could cause birth defects in humans was not generally accepted in the scientific community and thus was inadmissible. The trial court denied DuPont and Pine Island's motion and the expert testimony was admitted.

At the close of evidence at trial, DuPont moved for a directed verdict arguing that the Castillos failed to prove that Benlate is defective and that any such defect proximately caused the microphthalmia. The jury returned a verdict for the child, John Castillo, holding DuPont strictly liable and holding both DuPont and Pine Island negligent. The total award was \$4 million, allocating 99.5% against DuPont and .5% against Pine Island.

On appeal, Pine Island raised two issues: (1) that there was no evidence that Benlate was used on the farm in November 1989; and (2) that the Castillos'

scientific evidence should not have been admitted into evidence. As to the first issue, the Third District found Chaffin’s “admission” that Benlate was used in November 1989 compelling evidence against Pine Island and affirmed the trial court’s judgment. As to the second issue, involving the admissibility of the expert scientific testimony, the Third District reversed the jury verdict and determined that the testimony did not meet the test set out in Frye.

DuPont raised four issues, two of which the Third District did not address.¹ The arguments the Third District found persuasive, however, were (1) that the Castillos failed to prove that Mrs. Castillo was exposed to Benlate in their case against DuPont, since Chaffin’s admission was not admissible hearsay against DuPont; and (2) the scientific evidence should not have been admitted into evidence under Frye.

An amicus brief was filed by four doctors supporting DuPont’s and Pine Island’s position.

For the reasons discussed below, we quash the Third District’s decision and hold that the trial court properly admitted the Castillos’ experts’ testimony under

¹ The two arguments the Third District did not address were: (1) that the Castillos failed to prove that Benlate is defective; and (2) that the Castillos’ exposure theory was based on an unlawful misuse of Benlate inconsistent with a product defect because Benlate’s packaging warns against use in circumstances that would allow the product to drift.

Frye v. United States, 293 F. 1013 (D.C. Cir. 1923). We also hold that even absent Lynn Chaffin’s testimony against DuPont, there was enough direct evidence that Mrs. Castillo was exposed to Benlate to support the jury’s verdict against DuPont.²

Expert Testimony Under Frye

To determine whether expert testimony is admissible under section 90.702, Florida Statutes (2001), Florida courts follow the test set out in Frye v. United States, 293 F. 1013 (D.C. Cir. 1923):

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

Id. at 1014 (emphasis added). “This test requires that the scientific principles undergirding this evidence be found by the trial court to be generally accepted by the relevant members of its particular field.” Hadden v. State, 690 So. 2d 573, 576

² We agree with the Third District insofar as it found that Chaffin’s admission that Benlate was used in November 1989 was compelling evidence against Pine Island and fatal to Pine Island’s argument that there was no evidence that Benlate was used on the u-pick field in November 1989. We do not find merit to DuPont’s argument that the Castillos failed to prove Benlate is defective and do not agree with DuPont that the Castillos’ exposure theory was actually a warning or labeling argument which was preempted by federal regulation.

(Fla. 1997).

The proponent of the evidence bears the burden of establishing by a preponderance of the evidence the general acceptance of the underlying scientific principles and methodology. See Murray v. State, 692 So. 2d 157, 161 (Fla. 1997). The standard of review of a Frye issue is de novo. See Brim v State, 695 So. 2d 268, 275 (Fla. 1997); Berry v. CSX Transportation, Inc., 709 So. 2d 552, 557 (Fla. 1998). In Berry, we said, “Our de novo review of the Frye issue in these cases includes an examination of three methods of proof: (1) expert testimony, (2) scientific and legal writings, and (3) judicial opinions.” 709 So. 2d at 557 (citing Flanagan v. State, 586 So. 2d 1085, 1112 (Fla. 1st DCA 1991), approved, 625 So. 2d 827 (Fla. 1993)). Furthermore, the issue of general acceptance is to be made at the time of appeal, rather than at the time of trial. See Hadden, 690 So. 2d at 579.

The Castillos’ experts testified: (1) that benomyl is a teratogen; and (2) as to the dosage level at which it becomes a teratogen.³ We must consider whether the scientific principles upon which the Castillos’ experts based their opinions are generally accepted in the scientific community.

³ DuPont and Pine Island also argue that the Castillos’ expert, Dr. Howard, is unqualified. This issue was determined by both the trial court and the Third District in the Castillos’ favor since DuPont’s expert himself testified that Dr. Howard was qualified. We agree with the Third District that Dr. Howard was a qualified expert in this case.

The Castillos' expert's methodology for reaching his opinion that benomyl is a human teratogen at 20 ppb, involved the following considerations:

- (1) animal studies, including DuPont's own rat studies, which showed that Benlate is teratogenic and that it specifically causes microphthalmia and anophthalmia;
- (2) in vitro tests performed by DuPont, Dr. Van Velzen, and Dr. Howard, which showed the levels at which Benlate can impair neurite growth and functioning and induce cell death – either of which could impair or prevent development of the eyes;
- (3) clinical epidemiological studies are not available because Benlate is a toxic chemical and thus not suitable for human experiment;
- (4) geneticists had conducted every conceivable genetic test and could find no known genetic cause of John Castillo's microphthalmia; and
- (5) there was no evidence of any other environmental cause.

DuPont and Pine Island attack the Castillos' expert alleging that (1) he failed to use epidemiological studies, (2) he erroneously relied upon differential diagnosis, (3) he failed to consider the fact that John Castillo did not have multiple malformations, (4) the in-vitro testing and rat gavage studies were inappropriate methods to determine the dosage at which benomyl becomes a human teratogen, and (5) the extrapolation of data was not an accepted scientific method. We will address each of these allegations.

Epidemiological Studies

DuPont's expert argues that Dr. Howard cites no epidemiological studies that support the thesis that benomyl is a human teratogen. Epidemiology is the study of the incidence, distribution, and control of disease in a population. See Merriam-Webster's Collegiate Dictionary 389 (10th ed. 1998). The purpose of epidemiology is to link cause and effect. The Castillos' epidemiological expert, Dr. Brad H. Pollock, testified at the Frye hearing as follows:

The purview of epidemiologists is generally limited to doing observational studies, not always, but generally, and there are a number of study designs which can be employed for doing observational studies, and the key point about an observational study is one which you observe the effects of an exposure rather than subject people to exposure.

This would run the gamut from studies that were case control studies, ecologic studies, cohort studies and some variations on a theme, cross sectional, prevalent studies, surveys that are done. These are all different type[s] of study designs that are employed in doing observation research.

.....

The studies with the most weight of evidence for observational studies would be those in which they were cohort studies, prospective cohort studies they're referred to as. That is where you identify levels of exposure in a population and prospectively follow up those individuals for disease occurrence, and you compare the rate of disease occurrence in two populations on the populations to find on the basis of exposure. That is the strongest study.

The Castillos assert that there are no valid epidemiological studies that exist as to the teratogenicity of benomyl because epidemiological studies are not conducive to this type of case. Epidemiological studies are valid for the study of

certain drugs when administered to humans in a control group because the subjects are known and can be followed and studied. With chemical exposure cases and in situations where exposure is very rare to begin with, there are inherent problems with epidemiological studies because a scientist cannot intentionally expose a human to a known teratogen in order to study the effects. It would be unethical to intentionally expose humans to benomyl for experimental purposes when science knows that benomyl is a teratogen in rats.⁴

DuPont and Pine Island reply that it is possible to study the effects of benomyl on humans using statistical analysis because the chemical has been widely used around the world for decades. They state that the Centers for Disease Control and Prevention (CDC) reveals no increase in the incidence of microphthalmia since Benlate was put on the market in 1970, and there are three actual studies, an Italian, a Norwegian, and a British study, which have found no link between exposure to benomyl and an increased risk of microphthalmia or other birth defects.

The Castillos counter that the Italian study was merely a review of hospital birth records where the instances of children born with anophthalmia or

⁴ All parties agree that benomyl is a teratogen in rats and that intentionally administering the chemical to pregnant humans to study the effects is unethical.

microphthalmia were weighed against general statistics to determine what percentage of children are born with those birth defects. The study does not consider whether the mothers of the children were exposed to Benlate. The other two studies DuPont and Pine Island point to are of the same general type and have the same limitations.

While epidemiology is considered generally accepted in the scientific community as a way of studying causal links between disease and chemicals, these types of studies are not necessarily required for a party to meet its burden of showing the causal link by a preponderance of the evidence. See United States Sugar Corp. v. Henson, 823 So. 2d 104 (Fla. 2002). In any event, the Castillos' experts did consider epidemiological studies. However, the parties disagree about the conclusions those epidemiological studies reached.

It is clear that the Castillos do not need to present epidemiological studies to meet their burden. It is also clear that there were at least three studies at the time of the Frye hearing that the Castillos' experts considered and then deemed inconclusive to establish a causal link between benomyl exposure and microphthalmia, or lack thereof. DuPont and Pine Island's objections are to the conclusions the Castillos' experts reached, not the methodology itself. The Castillos' experts did indeed consider epidemiological studies, and the

consideration of the studies in light of the parties' assertions as to their effect was properly put to the jury.

Differential Diagnosis

Differential diagnosis is “a term used ‘to describe a process whereby medical doctors experienced in diagnostic techniques provide testimony countering other possible causes . . . of the injuries at issue.’” Berry v. CSX Transportation, Inc., 709 So. 2d 552, 562 n.9 (Fla. 1st DCA 1998) (quoting Hines v. Consolidated Rail Corp., 926 F.2d 262, 270 n.6 (3d Cir. 1991)). “It is well-settled that an expert’s use of differential diagnosis to arrive at a specific causation opinion is a methodology that is generally accepted in the relevant scientific community.” United States Sugar Corp. v. Henson, 787 So. 2d 3, 19 (Fla. 1st DCA 2001) (citing Berry, 709 So. 2d at 571)).

DuPont’s expert, Dr. Robert L. Brent, stated in his affidavit presented at the Frye hearing, “One should eliminate the more likely causes of a birth defect before determining that another cause is probable. This is the generally accepted method. . . . Dr. Howard cannot and does not exclude the most likely cause of John Castillo’s microphthalmia, which is genetic.” Amici also argue that the Castillos’ experts failed to rule out all possible causes for the malformation.

Donna Castillo testified that genetic causes were, in fact, eliminated as a

cause of John Castillo's birth defect. After her son's birth, she and her husband were tested for genetic incompatibility and she was told that there were no known genetic causes for the microphthalmia. She also testified that all the drugs and previous procedures she had undergone were ruled out as causes. The Castillos argue that all the experts who testified for all the parties in this case agree that the Castillo family was subjected to a full battery of all available genetic testing, and the tests showed that there was no known genetic cause for the malformation. Amici admit that Dr. Howard, the Castillos' expert, employed differential diagnosis, which is a generally accepted methodology, stating in their brief that, "[w]hile Dr. Howard employed a generally accepted methodology for addressing specific medical causation (differential diagnosis), he did not use a generally accepted methodology for determining whether a substance is a human teratogen." Clearly, the Castillos' experts did utilize differential diagnosis, and as amici admit, this was a generally accepted method for addressing specific medical causation.

Multiple Malformations

DuPont and Pine Island assert that when embryonic cells are exposed to toxic substances, the cells of the embryo produce multiple malformations, not an isolated malformation as in John Castillo's case. The Castillos counter that in the rat studies, the pregnant rats exposed to benomyl whose offspring had

microphthalmia did not have multiple malformations. Also, the Castillos' expert,

Dr. Van Velzen, testified at the Frye hearing as follows:

If you give human beings continuous benomyl during pregnancy, I'm sure that the pattern will be different than if you give it only once on one day and on the particular day that the retina is developing at its top speed. So the absence or presence of multiple malformations in a drug exposure to me does not mean you can exclude a priori a drug if it is discussed in the presence of multiple or if it is discussed in the presence of a single malformation.

The most important thing to start looking at is was it a single hit exposure, what is the metabolism time, was it one dose exposure or was it repeated and, if so, how long, or was it chronic and, for example, did it already start before birth, was the egg cell poisoned to start with?

On cross-examination at the Frye hearing, Dr. Van Velzen was again asked about multiple malformation. Defense counsel inquired as follows:

Q. If the brain, from which the eyes develop, were affected by a toxin, any toxin that could interrupt development of the eyes, would you not also expect there to be some other involvement of the brain?

A. Yes, but let me explain to you why and how. The effect I would expect is that there were reductions of numbers of cells. I would not expect, for example, there to be an encephali or there to be no gyri or to be malformations of the brain. What I would expect is a lack of numbers. Unfortunately, in the eye, lack of brain numbers results in the failure of induction of the other structures of the eye. In the rest of the brain, no other appendices are dependent on that. You don't develop a skull, for example, based on having enough neurons or ear flaps, for example.

The multiple malformation issue does not involve the methodology the

Castillos' experts used. While this may be an appropriate issue to explore during trial, it is irrelevant to the reliability of the underlying methodology used by the Castillo's experts.

The Castillo's experts did consider multiple malformation and determined that a single malformation was consistent with their assessment of the scientific evidence. The method used in reaching this conclusion is not being attacked; the conclusion itself is. This is a proper issue for the trier of fact.

In-Vitro Testing

DuPont and Pine Island challenge whether Dr. Howard's in-vitro testing of sample tissues from human lungs and rats is generally accepted in the scientific community for the purpose of determining the dose at which benomyl becomes a teratogen.

DuPont and Pine Island assert that this is the only testing the Castillo's experts relied upon to make the determination that benomyl is a human teratogen at 20 ppb, and that as a sole means of determining toxicity, it is scientifically rejected. The Castillo's assert that in-vitro testing is wholly appropriate and scientifically accepted, and in fact necessary. Most importantly, the Castillo's argue, their experts did not rely solely on in-vitro testing, but as one source of data in conjunction with various other sources of reliable scientific data to calculate their

conclusion that benomyl is a human teratogen at 20 ppb.

Throughout his testimony at the Frye hearing, Dr. Van Velzen agreed with DuPont and Pine Island's position that in-vitro testing alone cannot establish a low effect level for benomyl, or any other toxic substance, in human beings. Dr. Van Velzen repeatedly stated that he did not solely rely upon the in-vitro testing in coming to the conclusion that the low effect level in humans is 20 ppb. He repeatedly asserted that he used the in-vitro testing as one source of data, in conjunction with other reliable data, to reach the conclusion. He testified that the consideration of all the data together is a commonly accepted scientific practice.

DuPont, Pine Island, and amici continually refer to Dr. Van Velzen's in-vitro testing as a pioneering effort and repeatedly argue that in-vitro, in and of itself, is not scientifically accepted as a method of determining the dose at which benomyl becomes toxic in humans. Dr. Van Velzen concedes that the use of in vitro testing in the particular manner in which he used it is new. DuPont and Pine Island argue that it is therefore not scientifically accepted.

DuPont and Pine Island's position that Dr. Van Velzen's technique fails the Frye standard solely because it is a new technique is contrary to Frye. The whole purpose of Frye is to weed out "junk science" from valid science and is only used when new scientific methodology is being presented. Clearly "new" scientific

methodology can be admissible when it is shown that it is not “junk science.” If we accepted DuPont and Pine Island’s position, every new scientific method would be denied. “This Court, as most other courts, will accept new scientific methods of establishing evidentiary facts only after a proper predicate has first established the reliability of the new scientific method.” Ramirez v. State, 542 So. 2d 352, 355 (Fla. 1989); see also Brim v. State, 779 So. 2d 427 (Fla. 2d DCA 2000) (stating the Frye test is utilized in Florida to guarantee the reliability of new or novel scientific evidence). Indeed, amici even list in-vitro studies as one of the scientific methods necessary, among others, to determine whether a substance is a human teratogen, and at what level it becomes so. It is clear that in-vitro studies are commonly accepted scientific studies. In this case, the data from the in-vitro studies was used in conjunction with certain other reliable data to reach a conclusion. DuPont and Pine Island disagree with the conclusion, and the disagreement between the parties was properly put before the jury to resolve.

Rat Gavage Studies

DuPont and Pine Island argue the Castillos’ expert exposed rats to benomyl through the gavage method, not dermal exposure, that rats were exposed to far greater quantities than the 20 ppb which Dr. Howard concludes is the low effect level for benomyl to become a human teratogen, and rats are different species than

humans so there can be no analogy from the rat gavage data to humans.

The Castillos respond that rats are used for in-vivo testing because, as in humans, the placenta in rats has no barrier system between the mother's blood and the fetal blood. Animal testing is done because a known or suspected toxic substance cannot ethically be administered to humans. Gavage studies, in which the substance is delivered to the rat through a tube as opposed to lacing its food, are done because the quantity of the dose is more accurately measured and rats do not have a vomit reflex. Because animals are resistant to chemicals, the doses have to be high in rats, but then the scientist statistically compares dose response relations. The Castillos' experts calculate that, compared to the amounts given to the rats, the human would have to ingest, or the skin would have to absorb, about 1/35th or 1/38th of an ounce of benomyl to see the same effects. As for various species of mammals being tested, Dr. Howard testified that he relied upon the basic principle of toxicology and pharmacology that in qualitative extrapolation, one can usually rely on the fact that a compound causing an effect in one mammalian species will cause it in another species.

DuPont and Pine Island's dispute is not that rat gavage studies are inappropriate scientific studies per se, but that the dosages given to the rats were far greater than any amount a human would be exposed to, and thus the study in

this case was invalid. The underlying scientific methodology in general is undisputedly accepted in the scientific community. DuPont and Pine Island do not argue that rat gavage studies are per se “junk science.” What DuPont and Pine Island dispute is the result that the Castillos’ experts reached. That is not what Frye considers, and DuPont and Pine Island had the opportunity to attack the findings and conclusions at trial.

Extrapolation

DuPont and Pine Island argue that the Castillos’ experts improperly extrapolated the dosage level of 20 ppb, which the Castillos’ experts say is the low effect level, or the level at which cells exposed to benomyl are damaged. They argue, citing Wade-Greaux v. Whitehall Laboratories, Inc., 874 F. Supp. 1441, 1484 (D.V.I.), aff’d, 46 F.3d 1120 (3d Cir. 1994), that, “in vitro animal test data are not relied upon by experts in the field of teratology for extrapolating the results found directly to the human experience.” Id. They further argue that direct extrapolation of data from tissue soaked in benomyl in a petri dish to the human body makes no sense, and that scientists do not generally accept this extrapolation.

The Castillos respond that the petri dish studies are common. It does not matter that the tissue samples are soaked for a 24-hour period of time because the cell only divides once. The study examines the dosage at which the cell’s division

is affected. The information provides indicia for the substance's potential for toxicity but still requires further testing to determine whether the metabolic processes of a living organism will increase, decrease, or have no effect on the toxicity of the substance. Because scientists cannot ethically administer benomyl to humans, they use animal testing, which is the reason for the rat gavage study. Dr. Howard used DuPont's own studies which indicate that benomyl has a half life of 45 minutes, and that it would make one full pass through the mother's circulatory system in approximately 60 to 90 seconds, with the full dose in the mother's system passing through the placenta and to the fetus. According to the Castillos' expert, the fetus cannot rid itself of the toxin, so it soaks in it until the next pass through the mother's circulatory system, when it is slightly diluted. DuPont's data also suggests that in a dermal exposure incident, approximately 15% of the chemical penetrates the skin. Dr. Howard considered what clothes Donna Castillo was wearing when she was exposed, and her height and weight to determine the amount of skin exposed, and used DuPont's data to calculate the amount of benomyl that would have been absorbed and passed through her system to the fetus.

The Castillos also respond that extrapolation is common in the scientific community, and quote a passage from Bernard D. Goldstein & Mary Sue Henifin,

Reference Guide on Toxicology, in Reference Manual On Scientific Evidence 401, 410 (2d ed. 2000):

Two types of extrapolation must be considered: from animal data to humans and from higher doses to lower doses. In qualitative extrapolation, one can usually rely on the fact that a compound causing an effect in one mammalian species will cause it in another species. This is a basic principle of toxicology and pharmacology.

The issue is not whether the in-vitro tests or the DuPont tests or the fact that the Castillos' experts relied upon professional experience are scientifically accepted methodologies. The issue is whether the use or extrapolation of the data from all of these sources to reach a conclusion is in itself generally accepted. The underlying methodology is not so much the testing as it is the use of the test results from the methodology to bridge the gap from raw data to a conclusion.

Two Illinois cases directly address this "extrapolation" method. In Duran v. Cullinan, 677 N.E.2d 999 (Ill. App. Ct. 1997), the plaintiffs alleged that a birth defect was caused by a birth control pill taken while the mother was pregnant. In discovery, the plaintiffs' experts submitted essays explaining the time frame of the mother's ingestion of the pill and the ordinary development of the nervous system during pregnancy, then stated that additional "supporting data for the causal connection between oral contraceptives and this unfortunate child's birth defects are extrapolated from a wide variety of defects appearing in the literature." Id. at

1001. The plaintiffs submitted forty-three epidemiological studies involving various birth defects and extrapolated the data from those studies. The essays additionally noted that animal studies indicate that oral contraceptives have significant teratogenic potential. The trial court granted the defense's motion for summary judgment. The appellate court reversed, holding that "the fact that plaintiffs' experts had to extrapolate from various studies in arriving at their opinion rather than rely on a specific epidemiological study affects the weight of the testimony and not its admissibility." *Id.* at 1013. The Illinois court determined that extrapolating data is acceptable even though the court recognized that this method in and of itself would not likely be subject to a study submitted for peer review.

In Donaldson v. Central Illinois Public Service Co., 730 N.E.2d 68 (Ill. 5th App. Ct. 2000), the court found that experts' opinions that coal tar could have caused neuroblastomas were admissible under Frye. The plaintiffs' experts argued that while they could not specifically link neuroblastoma to the carcinogens involved, they were able to point to numerous studies directly linking those same carcinogens to other forms of cancer. "Extrapolating from these studies, the experts conclude that, logically, the carcinogens could have caused the neuroblastomas at issue in this case." *Id.* at 78. The court acknowledged that the extrapolation opinions were obviously not strong opinions, but the opinions went

to weight, not admissibility.

Neither party here cites any case for the proposition that the way the Castillos' experts extrapolated from the data to reach their conclusions is or is not generally accepted. Amici argue that one cannot extrapolate from in-vitro tests to establish human teratogenicity or teratogenic threshold, citing Wade-Greaux v. Whitehall Labs., Inc., 874 F. Supp. 1441 (D.V.I. 1994). Wade-Greaux applied the Daubert⁵ test, not Frye. The testing in Wade-Greaux was admittedly not publishable or able to be subjected to peer review and was used in relation to anecdotal "testimony" and not raw scientific data. In this case, the Castillos' experts asserted they were not only using in-vitro data, they were using that in addition to other data, including data generated directly by DuPont's own scientists.⁶ The Castillos' experts relied upon commonly accepted scientific methodology and used the data generated from that methodology in a new or novel way. At least one other state, Illinois, has held that the method of extrapolation meets the Frye test. The trial court in this case was correct in admitting the experts' testimony for consideration of the jury.

⁵ Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).

⁶ The Castillos assert that since the time of trial, their experts' research has been peer-reviewed and published.

The court . . . must assure itself that the opinions are based on relevant scientific methods, processes, and data, and not upon an expert's mere speculation [I]t is important to emphasize that the weight to be given to stated scientific theories, and the resolution of legitimate but competing scientific views, are matters appropriately entrusted to the trier of fact.

Berry, 709 So. 2d at 569 n.14 (quoting McDaniel v. CSX Transp., Inc., 955 S.W. 2d 257 (Tenn. 1997)). The Castillos met their burden. The exceptions DuPont and Pine Island take with the Castillos' experts' conclusions go to the weight of that testimony, not the admissibility.

Daubert and Frye

In 1993 the United States Supreme Court decided Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), which created a new test for the admissibility of experts' testimony. Daubert is not binding on the states, however, because it interpreted a federal statute, Federal Rule of Evidence 702, as opposed to the Constitution.

Daubert involved Bendectin, an antinausea medication given to pregnant women. The Court said that where novel scientific evidence is concerned, Federal Rule of Evidence 702 essentially requires a two-part assessment of (1) the validity of the scientific knowledge in question, and (2) the "fit" between the proffered scientific evidence and the circumstances of the plaintiff's case.

The first prong of Daubert is the Frye test, which is the test followed in

Florida. See Hadden v. State, 690 So. 2d 573 (Fla. 1997). The second prong requires the court to consider everything from the methodology to the extrapolation of data, all the way to the ultimate conclusion. The Third Circuit explained that a challenge to the second prong of Daubert “is very close to a challenge to the expert’s ultimate conclusion about the particular case.” In re Paoli Railroad Yard PCB Litigation, 35 F. 3d 717, 746 (3d Cir. 1994). In this case, the Third District reviewed the experts’ method of extrapolating the data to the final conclusion, stating:

We do, however, conclude that where, as here, plaintiffs wish to establish a substance’s teratogenicity in human beings based on animal and in vitro studies, the methodology used in the studies, including the method of extrapolating from the achieved results, must be generally accepted in the relevant scientific community.

E.I. DuPont De Nemours & Co. v. Castillo, 748 So. 2d 1108, 1120 (Fla. 3d DCA 2000).

By considering the extrapolation of the data from the admittedly acceptable experiments, the Third District went beyond the requirements of Frye, which assesses only the validity of the underlying science. Frye does not require the court to assess the application of the expert’s raw data in reaching his or her conclusion. We therefore conclude that the Third District erroneously assessed the Castillos’ expert testimony under Frye by considering not just the underlying science, but the

application of the data generated from that science in reaching the expert's ultimate conclusion. At least one commentator has pointed this out, calling the Third District's analysis "essentially a Daubert analysis" because it focused on the expert's methodology and reasoning. Bert Black, Expert Evidence in the Wake of the Daubert-Jones-Kumho Tire Trilogy, SE01 ALI-ABA 125, *169 (1999).

Sufficiency of the Evidence Issue

The Third District states that without the Chaffin testimony against DuPont, "there is insufficient evidence in this record to establish that Benlate was sprayed on the farm on the dates in question." 748 So. 2d at 1113. Thus, the Third District found insufficient evidence to establish that Mrs. Castillo was sprayed with Benlate, and reversed the jury's verdict against DuPont. Contrary to the Third District's assertion, the Castillos do not have to "establish" that Benlate was sprayed, they need only present the greater weight of evidence that it was. See Fla. Std. Jury Instr. (Civil) PL 5 (defining "greater weight of the evidence" as "more persuasive and convincing force and effect of the entire evidence in the case"). By conclusively stating that the facts are insufficient to "establish" that Benlate was sprayed, the district court apparently reevaluates the evidence. It is a basic tenet of appellate review that appellate courts do not reevaluate the evidence and substitute their judgment for that of the jury. See Carter v. Brown & Williamson Tobacco

Corp., 778 So. 2d 932 (Fla. 2000) (citing Helman v. Seaboard Coast Line RR. Co., 349 So. 2d 1187, 1189 (Fla. 1977)). "[I]f there is any competent evidence to support a verdict, that verdict must be sustained regardless of the District Court's opinion as to its appropriateness." Helman, 349 So. 2d at 1189. Because we find that there is competent evidence to support a verdict against DuPont, that verdict must be sustained.

Donna Castillo testified that she was covered by an odorless and colorless liquid being sprayed by a tractor on the u-pick field on November 1 or 2, 1989. The evidence in support of the fact that the liquid was Benlate includes: (1) Chaffin's testimony that Pine Island purchased twelve pounds of Benlate on May 4, 1989; (2) Chaffin's testimony that Benlate could not have been used in May 1989 because the plants had been harvested in April and there were no plants upon which to spray it; (3) testimony that the next time Benlate could have been used was in the fall of 1989; (4) Chaffin's testimony that chemicals were sometimes purchased in advance of the farm's need if they could be purchased at a bargain; (5) the amount of Benlate purchased in May 1989 was the proper amount to be used on the field Mrs. Castillo walked past on November 1 or 2; (6) although the farm sometimes returned chemicals to the distributor if they were not used, there is no evidence the Benlate was returned; (7) Pine Island planted tomatoes on October 25, 1989, in the

field Mrs. Castillo passed on November 1 or 2; (8) Benlate could have been used on the tomatoes on November 1 or 2; (9) only one of the farm's tractors was equipped to spray Benlate, and that tractor fit Mrs. Castillo's description of the tractor she saw the day she was sprayed.

The dissent submits that there was no evidence whatsoever that the substance sprayed on Mrs. Castillo was Benlate. In support, the dissent states that Chaffin's testimony is direct evidence to the contrary. Although Chaffin did state at one point during the questioning that Benlate purchased in May was used in May, he also admitted that such a statement was merely speculation. In fact, Chaffin admitted that he had no recollection of what chemicals were used or when they were used in 1989.

Q. [Ferraro] With regard to spraying, you talked about different sprays and sir, you can't give this jury any accurate information with regard to what was sprayed and when at the field in 1989, can you sir?

A. [Chaffin] All that I can do is look at the records and talk about possibilities. That's all I can do. You are correct.

Furthermore, Chaffin's statement that the Benlate was used in May 1989 was contrary to his deposition testimony. Plaintiffs' counsel used the deposition testimony to impeach Chaffin's credibility. Additionally, according to Chaffin's testimony, there would likely have been no plants upon which to spray the Benlate in May 1989. The growing season was over and the plants would have been

harvested in April. The testimony upon which the dissent relies to assert that the Benlate was unequivocally used in May must be considered in light of the transcript in its entirety. Chaffin's credibility was impeached by his prior inconsistent statement, he admitted that it was mere speculation that the Benlate was used in May, and the jury heard Chaffin admit to making misleading statements. The jury certainly acted reasonably in rejecting Chaffin's unequivocal claim that Benlate was not sprayed on the field on November 1 or 2.

The dissent next argues that the evidence shows that all the chemicals purchased in May 1989 would have been returned to the distributor in June 1989, relying on the testimony of Dan Daniels, a representative of the distributor. Daniels merely stated that Pine Island returned unused and unopened chemicals at the end of the growing season in June, and Benlate was not among the chemicals returned. If the jury reasonably rejected Chaffin's testimony that Pine Island used the Benlate in May, it could have reasonably interpreted Daniels' testimony as support for the fact that the Benlate was saved for use in November, especially since no Benlate was shown to be purchased prior to the late October planting. Furthermore, Chaffin admitted that certain chemical purchases were made based on the fact that the farm could get them at bargain prices. The evidence shows that the price of Benlate was increased from the spring to the fall in 1989. He also admitted that the

farm sometimes stored chemicals for future use. So the jury could reasonably conclude that Pine Island purchased the Benlate at a bargain price in the spring, and saved it for use in the fall.

Next, the dissent once again relies on Chaffin's testimony to support the position that whatever was sprayed on the tomatoes on November 1 or 2 was not Benlate. Chaffin testified that he never used Benlate in the first week after planting tomatoes. But, again, Chaffin admitted that he could not give the jury accurate information with regard to what was sprayed and when in 1989, and Chaffin admitted, "All that I can do is look at the records and talk about possibilities. That's all I can do. You are correct."

The dissent also cites the testimony of Pine Island's spray manager and a plant pathologist, who stated that Benlate would not have been used prophylactically on November 1 or 2. However, Jack Wishart, the owner of Pine Island, testified that in the past Benlate had been used as a ground prophylactic. The plant pathologist testified that farmers usually start spraying fungicides prophylactically a week after planting if the plants need it. The plant pathologist also stated that if one plant was afflicted with a fungus, the farm might spray Benlate as a preventative.

A. [Daniels] . . . A lot of times you maybe will have one plant

with a problem and all the others wouldn't have the problem so you spray to protect those plants.

Q. [Ferraro] So you spray all the other plants to protect them even though they don't have the disease and that would be a situation that could occur with Benlate, correct?

A. If there was white mold in the field.

And the spray manager also admitted the use of fungicides on tomato plants a week or two after planting. In fact, even the district court acknowledged:

There was testimony which established that Benlate can be used prophylactically as early as the first week after planting of tomatoes. If the tomato plants were planted on the same day as the strawberries, or on the next day, such a prophylactic spraying of the tomato plants would have occurred on November 1st or 2nd.

Castillo, 748 So. 2d at 1112.

It is the trial court's duty to determine whether any of the inferences "accord with logic and reason or human experience." Voelker v. Combined Ins. Co. of America, 73 So. 2d 403, 406 (Fla. 1954). If there are no inferences, or the inferences do not accord with logic, reason, or human experience, then the plaintiff's case fails. Id. We cannot say that no reasonable person could infer from the evidence that the substance sprayed was Benlate. A jury question is presented when the evidence is susceptible to inference that would allow recovery even though there are opposing inferences that are equally reasonable. See Owens

v. Publix Supermarkets, Inc., 802 So. 2d 315, 323 (Fla. 2001) (citing Thoma v. Cracker Barrel Old Country Store, Inc., 649 So. 2d 277, 279 (Fla. 1st DCA 1995) (concluding that the fact that there might be a "plethora" of reasonable inferences other than the inferences raised by appellants creates a jury issue)). The evidence in this case is sufficient evidence upon which a reasonable person could conclude that Mrs. Castillo was sprayed with Benlate. Therefore, the trial court properly submitted this case to the jury.

Both DuPont and Pine Island argue that the Castillos' direct causation case is based upon stacked inferences, which violates the rule that an inference cannot be the basis for another inference unless the first inference meets a higher standard of proof. See Voelker. But in this case, there is no stacking of inferences. Based on the direct evidence, the jury need only reach the conclusion that the substance was Benlate. The jury was given numerous facts which, when considered collectively, could reasonably support a single conclusion: that the substance sprayed was Benlate. The rule against stacking inferences does not, therefore, prevent the jury from deciding this case.

The dissent further argues that even if Mrs. Castillo was sprayed with Benlate, the jury must also infer that the exposure was a sufficient concentration to be of harm to Mrs. Castillo's fetus, thereby requiring stacked inferences. Mrs.

Castillo testified that she was wet all over after being sprayed. Using the data from Dr. Brent, DuPont's expert, the plaintiffs' expert testified that a finger-nail sized amount of benomyl would have been sufficient to cause the birth defect.

Next, the Castillos' expert testified that he performed in-vitro testing, and considered the results of other testing, to determine the lowest concentration of benomyl that would induce human cell death. This conclusion is independent of any fact or finding that Mrs. Castillo was sprayed with Benlate. In other words, if there is an inference needed to conclude that the exposure level of benomyl was sufficient to cause harm to Mrs. Castillo's fetus, it is a parallel inference, not a stacked inference. See, e.g., Belden v. Lynch, 126 So. 2d 578 (Fla. 2d DCA 1961) (concluding that the negligence of a driver who struck a parked car was not shown by piling inference upon inference in succession, but rather from what may be described as parallel inferences arising under the circumstances). The conclusion drawn from the expert's testing that a certain concentration level of benomyl causes human cell death is independent of any circumstantial or direct evidence that shows Mrs. Castillo was sprayed with Benlate. One inference need not be established before the next inference can be considered. Each fact inferred is independent of the other. Therefore, there was no stacking of inferences required before the jury could reach its verdict.

Cluster Evidence Issue

The Third District also held that the trial court erred in allowing the Castillos to refer at trial to an alleged link between Benlate and unspecified “clusters” of children born without eyes in Great Britain. The Third District held this was error and that the evidence was vague and indefinite and whatever relevance it had, it was greatly outweighed by its potential to unfairly prejudice the jury.

DuPont relies on Frazier v. Otis Elevator Co., 645 So. 2d 100, 101 (Fla. 3d DCA 1994), which holds that as a general rule “evidence of the occurrence or non-occurrence of prior accidents is admissible only if it pertains to the use of the same type of appliance or equipment under substantially similar conditions.” Frazier was remanded for a new trial because the trial court admitted evidence of other pallet jack accidents where it was not shown that the accidents involved the use of an Otis pallet jack under substantially similar conditions. Contrary to what DuPont argues here, this case does not require “virtually per se reversal.” Indeed, the Frazier court remanded and required the plaintiff to show that the accident involved the same product in substantially the same conditions.

The standard of review is abuse of discretion. See Grau v. Branham, 761 So. 2d 375 (Fla. 4th DCA 2000) (“Overall, broad discretion rests with the trial court in matters relating to the admissibility of relevant evidence, and that ruling will

not be overturned absent a clear abuse of discretion.”).

The Castillos argue that they intended to allow Mrs. Castillo to tell the jury why she thought DuPont was liable for her son’s birth defect, and that was because a reporter from London contacted her and told her he was investigating the defect in a cluster of children exposed to Benlate in London. The trial court reasoned that Mrs. Castillo could tell the jury what happened to her, how she heard about Benlate, and why she brought suit so long as the testimony was not hearsay, especially because the jury had concerns in voir dire about people suing big companies and looking for deep pockets.

In the context of how this information was presented, the trial court was within its discretion to admit references to the so-called “cluster.” The evidence was not used to argue that Benlate caused a cluster of children to suffer the same birth defect as John Castillo’s; rather, it was a part of Donna Castillo’s history, how she came to believe that DuPont caused her son’s defect, that she heard of a study in England from a reporter, got a copy, and that is why she sued DuPont. In context, and in light of the fact that DuPont implied she was suing deep pockets, it was relevant, and its probative value was not outweighed by its prejudicial effect.

For reasons expressed above, we quash the Third District’s decision.

It is so ordered.

ANSTEAD, C.J., and PARIENTE and LEWIS, JJ., concur.
PARIENTE, J., concurs with an opinion, in which ANSTEAD, C.J., concurs.
WELLS, J., dissents with an opinion, in which SHAW, Senior Justice, concurs.

NOT FINAL UNTIL TIME EXPIRES TO FILE REHEARING MOTION, AND
IF FILED, DETERMINED.

PARIENTE, J., concurring.

I concur in the majority opinion in this case. Specifically, I agree that there is sufficient evidence that Mrs. Castillo was exposed to Benlate and that this exposure caused the birth defect to her son so as to create a jury question on the issue of DuPont's liability. I disagree with the conclusion in the dissent that the jury could conclude that exposure occurred only by stacking multiple inferences and engaging in substantial speculation.

I write separately to raise a concern about the viability of and necessity for the restriction on the stacking of inferences in civil cases. This Court adopted the restriction in Voelker v. Combined Insurance Co. of America, 73 So. 2d 403 (Fla. 1954). In that case, Voelker was found dead in a canal and his car was found on the edge of the canal. Damage to the car indicated it had been sideswiped. See id. at 404-05. Voelker's body contained no signs of external injury, and in fact, his eyeglasses were still in place. See id. at 405. Suit was brought pursuant to the insurance policy provision for coverage where death results solely from bodily

injury caused by an accident while driving or riding in an automobile. Because the exact cause of Voelker's death could not be determined, the trial court granted the insurance company's motion for directed verdict, and this Court affirmed. See id. This Court discussed a variety of factual circumstances that could have caused Voelker's death, and found that attributing the death directly to the car accident was too speculative. See id. at 406-08.

The Voelker decision could have rested on the proposition that there was insufficient evidence from which the jury could have inferred the cause of death, under the competent, substantial evidence test generally applicable to review of civil jury verdicts. Three years before Voelker, this Court had stated:

This Court has repeatedly pronounced, as has almost every court in the English speaking world, the rule that it will not substitute its judgment for that of a jury when the jury has resolved the conflicts in the evidence and has determined the issues of fact. An exception to this rule exists only in a case wherein there is no competent substantial evidence which sustains the jury's verdict or, stated in another form, when the verdict is against the manifest weight of the evidence.

Glass v. Parrish, 51 So. 2d 717, 721 (Fla. 1951). Although the Court acknowledged that when proof of a fact rests entirely on circumstantial evidence, the rule in civil cases "differs from and is less stringent than the rule which governs in criminal cases," the Court in Voelker appropriated the prohibition on the stacking of inferences from the criminal law. See 73 So. 2d at 406. The Court held that the

practice of establishing an ultimate fact through multiple inferences "should not ordinarily be indulged unless the first inference meets a test which may be analogized to the criminal rule concerning circumstantial evidence, i.e., in the ordinary case, only if the prior or basic inference is established to the exclusion of any other reasonable theory should another be drawn from it." Id. at 407.

Accordingly, Voelker curtailed multiple inferences in civil cases by mandating that where more than one inference is required in order to prove the ultimate fact, the first inference must meet a higher standard of proof than the preponderance of the evidence standard customarily used in circumstantial evidence cases. See Michael Foster, A Review and Reconsideration of Florida's Rule Against Basing an Inference on an Inference in Civil Cases, 23 Stetson L. Rev. 743, 752 (1994). Under this rationale, the first inference must meet a standard of proof closer to what is required in a criminal case. See id.

Although it is clear that courts have continued to apply the restriction on stacked inferences in civil cases, at least one appellate judge in this State had assumed that the "impermissible inference on an inference rationale . . . was abandoned twenty years ago." Owens v. Publix Supermarkets, Inc., 729 So. 2d 449, 450 (Fla. 5th DCA 1999) (Sharp, J., dissenting), quashed, 802 So. 2d 315 (Fla. 2001). Although no decision of this Court has disapproved the Voelker

rationale, the rule has had its critics, both at the time of Voelker and since. See Voelker, 73 So. 2d at 407 (noting that the rule "has been justly and appropriately criticized by Professor Wigmore," citing to 1 John Henry Wigmore, Evidence in Trials at Common Law § 41, at 434-41 (3d. ed. 1940)); N.L.R.B. v. Camco, Inc., 340 F.2d 803, 811 (5th Cir. 1965) ("The so-called rule against pyramiding inferences, if there really is such a 'rule' and if it is anything more than an empty pejorative, is simply legalese fustian to cover a clumsy exclusion of evidence having little or no probative value.").

The rule has also been justly criticized for the difficulty of its application. See Foster, supra, at 788 (describing the rule as "an anachronism, a judicial exercise that often defies understanding rather than serving as an aid to lucid analysis by courts at either the trial or appellate level"). Confusion marks its application in this case. Under this set of circumstances, the dissent concludes that DuPont's liability relies on impermissibly stacked inferences, while the majority views the necessary inferences as parallel inferences not subject to the Voelker restriction.

In my view, this confusion stems from adapting a rule crafted for the stricter criminal standard of proof to the more lenient preponderance of the evidence standard used in civil cases. The rule assumes "that all inferences must be

considered serially, ranked in order of primacy and importance, then weighed against an initial standard of proof not ordinarily applicable to civil cases." Foster, supra, at 783. Evaluation of evidence under this standard puts proof in a straitjacket. As stated by Wigmore,

single inferences, though weak when taken individually, may be substantial and powerful when added together [T]he probative strength of an underlying inference is a factor that affects the strength of the final factum probandum, but . . . no mechanical rule can be laid down concerning how strong any underlying inference must be. The question is not whether any given inference in a chain is too weak but is always whether, in view of all patterns of corroborating and contradicting evidence at all levels of all inferential chains, the final factum probandum has been shown to the degree of likelihood required by the applicable standard of persuasion

1A John Henry Wigmore, Evidence in Trials at Common Law, § 41, at 1138 (Peter Tillers rev. 1983)), quoted in Benson v. State, 526 So. 2d 948, 954 (Fla. 2d DCA 1988). The constitutionally required reasonable-doubt standard supports and perhaps requires the use of the inference-on-inference rule in criminal cases. Its use in civil cases is on far less secure constitutional footing. See Foster, supra, at 783 & 783 n.329 (questioning whether use of rule denies plaintiffs their state constitutional rights to the full access of courts and right to trial by jury).

In my view, it is time to reevaluate the efficacy of the rule as a tool for the evaluation of the sufficiency of circumstantial evidence in civil cases. Based on my

conclusion that the rule against stacked inferences is neither required nor useful in civil cases, I would use this opportunity to recede from the rule. I would hold that henceforth, courts reviewing the sufficiency of evidence to support verdicts relying wholly on circumstantial evidence in civil cases in this State should employ the competent, substantial evidence test set out in Glass and consistently applied in cases in which the proof is not wholly circumstantial. See, e.g., Jackson County Hosp. Corp. v. Aldrich, 835 So. 2d 318, 327 (Fla. 1st DCA 2002) (concluding that jury's finding that physician acted with reckless disregard is "clearly not supported by competent, substantial evidence"); Balkaran v. Gootoff, 789 So. 2d 399, 400 (Fla. 4th DCA 2001) (finding competent, substantial evidence to support the jury's verdict in a personal injury suit arising from an automobile accident); Century 21 Lehigh Realty, Inc. v. Turrill, 750 So. 2d 126, 127 (Fla. 2d DCA 2000) (concluding that claimant did not submit competent, substantial evidence to support jury's award in fraud claim). The uniform application of this standard to all jury verdicts in civil cases will allow courts to evaluate the evidence supporting these verdicts in a more holistic manner, rather than be forced into the strict linear approach required by the prohibition against stacking or pyramiding of inferences that governs the review of verdicts of guilt under the stricter standard of proof in criminal cases.

ANSTEAD, C.J., concurs.

WELLS, J., dissenting.

I dissent because I conclude that there is no express conflict between the decision of the First District in Berry v. CSX Transportation, Inc., 709 So. 2d 552 (Fla. 1st DCA 1998), and the Third District's decision in this case on the Frye issue.⁷ The majority points to no specific conflict between the cases. I recognize that in United States Sugar Corp. v. Henson, 823 So. 2d 104 (Fla. 2002), this Court said, "To the extent that the decision in E.I. DuPont holds that both the basis for the expert's opinions, and the opinions and deductions themselves, must be generally accepted as a predicate to admissibility, it is explicitly disapproved." Id. at 110. However, in that opinion there is no analysis as to any specific holding in this case being in conflict with Berry or any other case.

However, even if there is a basis to reach this case as to conflict on the Frye issue, I dissent from the majority using that conflict as a vehicle to reach the issue of sufficiency of the evidence as to the defendant DuPont. The majority reaches this issue not because there is a legal principle about which the district court erred. Rather, the majority reaches this issue to substitute its view of the record evidence for the view of the district court. That is an unusual reason for this Court to reach

⁷ Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

a nonconflict issue.

Moreover, after searching the trial record, I cannot identify support in the record for the very evidence which the majority asserts the district court erred in failing to consider in ruling upon the sufficiency of the evidence issue.

The Third District's opinion states:

Our analysis will address each defendant's legal arguments individually, but will begin by reviewing the material facts presented by plaintiffs. According to Donna Castillo's trial testimony, she passed by the "u-pick" farm in question on either November 1st or 2nd, 1989, as she walked with her young daughter Adriana, while pregnant with John. As she walked, she observed a tractor that she described as "bucking and jerking" and spraying "tons" of mist into the air. As the mist drifted over her (she indicated that it was a windy day), it completely drenched her. She returned to her home and did not shower that night. She was in her seventh week of pregnancy at the time.

The plaintiffs established that Pine Island purchased its chemicals from two suppliers: Helena Chemicals and S & M Chemicals. The evidence showed that in 1989, Pine Island purchased Benlate from Helena Chemicals on four occasions: March 20--thirty-six pounds; April 29--twenty-four pounds; May 4--twelve pounds; and December 19--sixty pounds. Because S & M's records were destroyed by Hurricane Andrew in 1992, there was no evidence of purchases from S & M for 1989. Pine Island's general Manager, Lynn Chaffin, testified that S & M was not a major provider of chemicals for his employer because their prices were too high. He likened S & M to a convenience store like "Quick Mart" where only small purchases were made. He further testified that when purchased chemicals were not used it was the company's practice to return them for credit. This practice was confirmed by Dan Daniels, branch manager for Helena Chemicals.[n. 3]

[n. 3] Daniels elaborated and stated that this was “everybody[’s]” practice. He testified that in June of 1989, Pine Island returned unused Potassium Nitrate, Bucktril, Agri-Dex, and Dual. There was no return of any unused Benlate.

Additional evidence elicited during the plaintiff’s case indicated that Pine Island’s strawberry and tomato plants arrived from California on October 25, and that the strawberries were planted that day. The tomatoes were planted at some time after that date. There was testimony which established that Benlate can be used prophylactically as early as the first week after planting of tomatoes. If the tomato plants were planted on the same day as the strawberries, or on the next day, such a prophylactic spraying of the tomato plants would have occurred on November 1st or 2nd.[n. 4]

[n. 4] There was also a considerable amount of evidence that tomato plants are not sprayed until the first bloom—four to six weeks after planting.

.....

MOTIONS FOR DIRECTED VERDICT

I. Pine Island Farms, Inc.

There is one additional fact presented against Pine Island, which is significant to our analysis of its claims on this issue. In May of 1993, a British reporter, John Ashton, was conducting an investigation into the relationship between Benlate and children born with microphthalmia in Great Britain. He initially called Mrs. Castillo and asked her if she had ever been exposed to Benlate. More specifically, he asked her if she lived on a farm or near farmland. Castillo said she was unaware of any exposure but told Ashton that she lived near a “u-pick” field and advised him of its location. Later that month, Ashton called Chaffin and asked him if Pine Island had sprayed Benlate on the field in question in November of 1989. Ashton testified in deposition published to the jury at trial that Chaffin then told him that Pine Island

had sprayed Benlate in November of 1989. Although Chaffin testified at trial that he did not remember any such conversation, his telephone records confirmed an eight minute telephone call originating in London, England in May of 1993. Regardless of the confirmation, Ashton's testimony established prima facie evidence of a party admission which was admissible against Pine Island under section 90.803(18)(d), Florida Statutes (1995).

Pine Island argues that its motion for directed verdict should have been granted because plaintiffs presented insufficient evidence to establish that Mrs. Castillo was sprayed with Benlate, and/or that, even if they did, plaintiffs' scientific evidence did not satisfy the Frye [n. 5] test for admissibility and should never have been admitted into evidence. In the absence of such evidence Pine Island claims its motion should have been granted.

[n. 5] Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

As concerns the sufficiency argument, Pine Island posits that in order to conclude that Mrs. Castillo was sprayed with Benlate, the jury would have to stack inferences that Pine Island was in possession of Benlate on November 1 and 2, 1989, that Pine Island was growing tomatoes on the field in question on those two dates, and that Pine Island sprayed Benlate on the days in question. Pine Island argues that such stacking of inferences is impermissible. See Voelker v. Combined Ins. Co. of America, 73 So. 2d 403 (Fla. 1954); Asplundh Tree Experts, Inc. v. Mason, 693 So. 2d 44 (Fla. 1st DCA), review denied, 699 So. 2d 1374 (Fla. 1997); Reaves v. Armstrong World Indus., Inc., 569 So. 2d 1307 (Fla. 4th DCA 1990). This argument, however, ignores the fact that Chaffin's admission to Ashton was not an inference but direct evidence that Benlate was sprayed on the field in November of 1989. Indeed, it is the only direct evidence presented by plaintiffs that Benlate was, in fact, used during the time in question. This evidence was critical, and when considered in conjunction with the testimony of Mrs. Castillo and the other circumstantial evidence presented, constituted sufficient evidence to deny Pine Island's motion for directed verdict on the sufficiency argument.

Pine Island's Frye argument, like DuPont's, is more compelling and is addressed below.

II. E.I. DuPont De Nemours & Company, Inc.

Like Pine Island, DuPont argues that its motion for directed verdict should have been granted. In support of that argument it has presented several grounds in this appeal. First, DuPont argues that plaintiffs failed to prove that Benlate is defective, as they failed to in any way negate the conclusions of the EPA that Benlate does not pose an "unreasonable" risk to human health. Next, that plaintiffs' exposure theory was based on an unlawful misuse of Benlate inconsistent with a product defect. Benlate's packaging specifically warns (in three places) against using the product in circumstances that could result in drift. We do not address these arguments here because we find each of DuPont's final two arguments dispositive.

DuPont suggests that plaintiffs failed to prove that Mrs. Castillo was exposed to Benlate in their case against DuPont. It argues that the statement of Lynn Chaffin, although admissible against Pine Island as a party admission under section 90.803(18)(d), was inadmissible hearsay as against DuPont. Indeed, prior to trial, the trial court granted DuPont's motion in limine to preclude the use of Chaffin's hearsay testimony against DuPont. This ruling was eminently correct and fatal to the plaintiffs' case against DuPont. As we observed in our discussion of Pine Island's motion for directed verdict, Chaffin's admission is critical to the resolution of this issue. Without his admission, there is insufficient evidence in this record to establish that Benlate was sprayed on the farm on the dates in question. Having correctly granted DuPont's motion in limine, the trial judge was then obligated to decide DuPont's motion for directed verdict without considering Pine Island's admission. In that light, there is insufficient evidence, as against DuPont, to establish that Mrs. Castillo was sprayed with Benlate.

E.I. DuPont De Nemours & Co., Inc. v. Castillo, 748 So. 2d 1108, 1111-13 (Fla. 3d DCA 2000) (emphasis added). My detailed examination of the trial transcript

causes me to conclude that the district court was correct.

I have searched for each of the majority's nine bases in the evidence, and this is what I have found.

1. "Chaffin's testimony that Pine Island purchased twelve pounds of Benlate on May 4, 1989." Majority op. at 27. The record does support that twelve pounds of Benlate was purchased on May 4, 1989, and that Mrs. Castillo walked by the field on November 1 or 2, 1989.

2. "Chaffin's testimony that Benlate could not have been used in May 1989 because the plants had been harvested in April and there were no plants upon which to spray it." Majority op. at 27. The record testimony does not support this statement. At page 1081 of the trial transcript in this case, Chaffin testified that the farm's growing season started in September and ended in either May or June of the following year; at page 1083, Chaffin testified that the Benlate purchased on May 4 would have been enough to spray twelve to twenty-four acres. The following testimony of Chaffin is found at page 1085.

Q. Sir, as you sit here in this courtroom with this jury, can you tell them that the Benlate that you purchased in May of 1989 was used at the farm?

A. Yes.

Q. In any of its fields?

A. Yes, It was used in May of 1989.

At page 1302, Chaffin testified:

Q. Okay. What did you do with the Benlate that you purchased on May 4th, 1989?

A. Sprayed it on tomatoes.

Q. When is Benlate sprayed on tomatoes?

A. Well, when you observe a problem on the plant canopy, on the foliage.

Q. What type of problems are we talking about?

A. White mold, gray mold, target spot.

Q. When do those problems occur on tomato plants?

A. When you have a lot of foliage on the plant.

Q. In April and May, are we talking about rainy season, the rainy months?

A. Well, it gets a lot rainier, just like the last several days the thunderstorms popping up all over Dade County. It is very common this time of year, yes, and that is true late April and early May.

Q. You still had plants, you still have tomato fruits and you're still harvesting, correct?

A. Yes, yes.

3. “[T]estimony that the next time Benlate could have been used was in the fall of 1989.” Majority op. at 27. The record does not support this statement. At page 1068, Chaffin testified, “We used no Benlate in the fall of 1989.” Chaffin testified at page 1338:

Q. In October of 1989, did Pine Island Farms have any Benlate in their care, custody and control?

A. No.

Q. On hand?

A. No.

4. “Chaffin’s testimony that chemicals were sometimes purchased in

advance of the farm's need if they could be purchased at a bargain." Majority op. at 27. First, I do not understand how this point is support for Benlate being sprayed on November 1 or 2, 1989. However, the record does not support this statement, and the direct evidence on Pine Island's storage of chemicals between growing seasons was directly contrary. Dan Daniels testified that he worked for Helena Chemicals and sold chemicals to Pine Island for eighteen years. At pages 3608 through 3609 of the transcript, Daniels' testimony was:

Q. [Gaebe] Do you have the list that reflects what chemicals they did return?

A. [Daniels] Yes. In June—on June 9th there was potassium nitrate, Bucktril, Agri-Dex, Dual. And on this list that's all I see.

.....

Q. Go ahead, Mr. Daniels. Was it Pine Island's policy to return all unused chemicals to Helena that they haven't used?

A. They normally do that, yes, sir, as does everybody.

Q. To your knowledge, in how many years have you been working with Pine Island?

A. 18 with Helena.

Q. Did they ever buy a chemical from Helena in May that they did not intend to use, to your knowledge, before the end of that farming season?

A. No sir.

Q. You indicated that the next purchase of Benlate would have been in 1989. After May 4th would have been December 19, 1989, correct?

A. December 19th.

5. "[T]he amount of Benlate purchased in May 1989 was the proper amount to be used on the field Mrs. Castillo walked past on November 1 or 2." Majority

op. at 27. I do not know how this assertion, even if correct, in the face of the direct testimony to which I have made specific record references above, has any probative value. However, again the record does not support this statement. At page 1083, the amount purchased was testified to be approximately twelve pounds, which was enough to cover from twelve to twenty-four acres. The field in question had a ten-acre lease, but only seven and one-half acres were farmed or in “net plastic.” Trial transcript at 5248, 5288.

6. “[A]lthough the farm sometimes returned chemicals to the distributor if they were not used, there is no evidence the Benlate was returned.” Majority op. at 27-28. The direct testimony to which I have referred above demonstrates that this assertion is not probative of anything in this case. The direct evidence was that the Benlate purchased on May 4, 1989, was used in May or June of 1989. The direct evidence was that all unused chemicals are normally returned to the distributor. The direct evidence was that no Benlate was stored in the fall of 1989. The direct evidence was that the next purchase by the farm after May 4 was December 19. At page 2866, Jack Wishart testified it was the farm’s policy to return unused chemicals.

7. “Pine Island planted tomatoes on October 25, 1989, in the field Mrs. Castillo passed on November 1 or 2.” Majority op. at 28.

8. “Benlate could have been used on the tomatoes on November 1 or 2.”

Majority op. at 28. I agree that there is record support for number 7, that the farm planted tomatoes on October 25, 1989, or a day or so later in the field which Mrs. Castillo passed on November 1 or 2. Obviously, the statement “could have been used” in the majority’s number 8 is not probative of anything. Below I set out what the record actually shows in respect to the tomatoes and Benlate. When questioned by Pine Island’s counsel Gaebe and DuPont’s counsel Clement L. Glynn, Pine Island field manager Chaffin testified:

Q. [Gaebe] In the first week after planting tomatoes, have you ever used or sprayed Benlate?

A. [Chaffin] Never.

...

Q. [Glynn] Is the Benlate product sold as a prophylactic product or is it sold for a different purpose?

A. [Daniels] Well, the label indicates it is not a prophylactic material.

Q. I am going to show you a part of the bottom, it says “Begin application when disease first appears.”

A. Correct.

Q. And that is consistent with what you have said that it is not used prophylactically. It is rather used to treat a disease, a visible disease?

A. That’s correct.

Q. So if you thought a disease might occur but you didn’t see it, you wouldn’t apply Benlate?

A. That’s correct.

Q. You would apply other types of fungicides?

A. Yes, right.

Trial transcript at 1333, 1368–69.

The testimony of Eddie Sanders, Pine Island's spray manager, was:

Q. [Ferraro] Sir, let me ask you about some specific fungicides that you sprayed—I'm going to ask you if you have ever sprayed these fungicides and when. And some may be other than fungicides. How about Bravo?

A. [Sanders] That is a fungicide.

.....

Q. Let me ask you a question about fungicides. Sir, isn't it true that fungicides are sprayed within a week or two of planting when you are talking about tomatoes?

A. If we set plants out, maybe ten days or two weeks, then we generally spray fungicides. . . .

.....

Q. Have you ever seen a situation though out there where newly planted stake tomatoes are sprayed with a fungicide right after they were put into the ground?

A. No, not right after. Maybe a week or two later.

.....

Q. [Gaebe] What kind, Mr Sanders, of fungicides would be applied to a tomato within a week or two after the planting of the transplanted tomato? What fungicides would be used?

A. [Sanders] You could use a combination of copper and Manzate or you could use Bravo.

Q. Now—

A. Or you could use all three of them together. It all depends.

Q. Now, do you ever recall using Benlate on tomatoes in the first four or five weeks after the planting of tomatoes?

A. No sir. That would be a waste.

Q. When, as far as you can recall, was it the practice of the farm to apply Benlate to tomatoes?

A. You apply Benlate when the thing[s] come on the heavy blossom we call it, when it blooms. When it starts blooming and getting all fruit, that's when you apply Benlate.

Q. When does that occur after the planting? In other words,

after you plant the tomatoes, when would that first occur?

A. Well, it all depends on how old the tomato is when you set it out. Sometimes they might be 30 days old, or 35, but as it grow along, you know, you get what we call a set in hand, that's the first set. I would say they would be like 50 days old, and as time go[es] by, then you get more flowers as it grow[s] older.

Q. So that we understand it, the plant could take 50 days to get to that full set before Pine Island Farms would spray the fungicide, Benlate, on a tomato; is that correct?

A. That is correct.

Trial transcript at 3393, 3396, 3474-76.

Plant Pathologist Robert McMillan from the University of Florida testified:

Q. [Ferraro]. Sir, what is your understanding as to when fungicides are first used with regard to tomatoes with reference to planting, the point of planting?

.....

A. [McMillan] Okay. In transplants that can usually be, depending on diseases that may be a problem, usually they don't spray anything for about two weeks after they put them in the ground until they have become established.

.....

Q. Right. Sir, with regard to the use of fungicides during the first week after transplanting, is that generally the practice, not just at Homestead, but in the United States of America?

A. Again, it depends on the fungicide.

.....

Q. [Gaebe] . . . As far as Benlate is concerned, after the tomato is transplanted into the ground you previously indicated in response to Mr. Ferraro's questions that sometimes a fungicide would be used in South Florida in the first one or two weeks; correct?

A. [McMillan] Yes, that's correct.

Q. Is that Benlate?

A. No.

Q. Okay. What fungicides are used by South Florida farmers

in the first week or two or three after the tomato is transplanted into the ground?

A. These are what we class as Mancozebs or Chlorathalonil and that's Bravo and Manzate 200 or Manzate D or Diothane M45 or whatever.

.....

Q. How long is that process from the time the tomato transplant is planted into the ground until the flowering occurs that would require or need the use of Benlate? In other words, what period of time are we talking about?

A. You understand the tomato plant is usually a 120-day crop. So, you would expect to use Benlate probably around 30 days, something like that, after planting, after transplanting.

Q. Okay. That would be the earliest that Benlate would be used in South Florida on a tomato plant?

A. Yes. In general. That's correct.

.....

A. Yes. I would say more like probably 30 to 40, 40 some days before the first application of Benlate.

.....

Q. The fungicides that Mr. Ferraro asked you about that are used prophylactically are the Coppers, the Manebs, the Manzates, and the Bravo?

A. Yes.

Q. Okay. Benlate is not used prophylactically after the plant is put in the ground; correct?

A. We don't like to use it that way, that's correct, because of the chance of resistance being built up against the pesticide.

Trial transcript at 3539–41, 3557–60, 3566.

Dan Daniels, who as stated earlier worked for distributor Helena Chemical, testified:

Q. [Ferraro] . . . Have you known farmers—and let's talk in the late '80s, like '89, '90, '88—to use Benlate a preventative type of

fungicide?

A. [Daniels] In late November, December and January, they will put it on at first bloom and then again ten to 14 days later.

Q. Have you ever known farmers to use Benlate as a preventative fungicide or as a treatment fungicide before first bloom in the late '80's?

A. There would be no reason to.

Q. . . . Sir, do you know of any other fungicide that cannot be used as a preventative type of fungicide besides Benlate?

A. For tomatoes and strawberries?

Q. For tomatoes, sir.

A. They use Manex and copper together for bacteria and Alternaria.

Q. Those are as preventative products?

A. Preventative and somewhat curative because a lot of times they will spray even after they have the problem.

Trial transcript at 3613.

9. “[O]nly one of the farm’s tractors was equipped to spray Benlate, and that tractor fit Mrs. Castillo’s description of the tractor she saw [on] the day she was sprayed.” Majority op. at 28. I do not know how this is probative that Benlate was sprayed on November 1 or 2, 1989. In fact, the record shows that the farm had two tractors, and both were red. Trial transcript at 1211-12. The same tractor sprayed many chemicals and other clear liquids that formed into an odorless and colorless mist, including water. Trial transcript at 66-67, 1340-44.

Following these nine bases for not accepting the district court’s analysis of the record, the majority refers to my dissent and makes a statement which

obviously conflicts with its statement in number 2 above. The majority states, without page references to the deposition or the trial transcript, “Chaffin’s statement that Benlate was used in May 1989 was contrary to his deposition testimony.” Majority op. at 29. I do not know to what the majority is referring and cannot locate any such testimony in the deposition or, more importantly, in the trial transcript. Moreover, I conclude that the majority completely fails, in responding to my dissent, to respect or observe the most fundamental rule of civil litigation, which is that it is the plaintiff that has the burden to present some competent evidence in the trial record upon which a jury could conclude, as to the defendant DuPont, that Benlate was used on November 1 or 2, 1989. The essential point is that if there had been conflicting testimony, the jury could have disregarded Lynn Chaffin’s direct testimony, but there was not. I must respond that the house of cards which the majority constructs on pages 30-32 serves only to demonstrate that this case is built not upon competent evidence but, rather, upon sheer speculation and innuendo.

Next, it is plain from this record evidence that the majority’s generic reference to the use of “fungicides” is meaningless in respect to the essential question of whether the mist allegedly sprayed on Mrs. Castillo contained Benlate. The record is undisputed that the “fungicides” which would have been used on

these tomatoes on November 1 or 2, 1989, if any was used, would have been a prophylactic fungicide such as Manzate. I say if any was used because the only direct evidence of what was sprayed in Pine Island's field on November 1 or 2, 1989, was that it was "odorless and colorless." The majority's inference that the fungicides used prophylactically would have included Benlate is also undisputably refuted by the record evidence.

The void of evidence in respect to Benlate usage on November 1 or 2, 1989, has to then be followed by another factually devoid inference that the Benlate which Pine Island is assumed to have possessed was in the sprayed mist and that the Benlate got on Mrs. Castillo's skin in such quantity and remained there for sufficient duration that it would support the theory of plaintiffs' expert as to the causal relationship between Benlate and the damage to the fetus. This is necessary because it was the opinion of plaintiffs' expert that the concentration of Benlate, the length of time of the exposure, and the amount of skin exposed would all make a difference in determining whether the alleged exposure to Benlate caused the plaintiff child's birth defects. The majority attempts to excuse this lack of record evidence by reference to a highly speculative and contradictory statement, which the majority says was made by a plaintiff's expert, that a "Fingernail sized amount of Benomyl would have been sufficient to cause the birth defect." Majority op. at

34. When the trial record is read, this assertion only underscores just how speculative and devoid of evidentiary support this claim was.

What is plain is that the plaintiffs did not present evidence of crucial facts that were necessary to establish a prima facie case against the defendant DuPont.⁸ As tragic as the birth defects suffered by this child are, our law requires a competent evidentiary basis for responsibility. I have to conclude that an objective reading of the record in this case does not provide that competent evidentiary basis. Our law requires us to give even a large, multinational corporation such as DuPont a fair and objective review of the record. The district court fulfilled its obligation in this regard.

The majority apparently recognizes this Court's long-standing rule against stacking inferences upon inferences in order to establish a basis for liability. See Nielsen v. City of Sarasota, 117 So. 2d 731, 733 (Fla. 1960); Voelker v. Combined Ins. Co. of America., 73 So. 2d 403, 406 (Fla. 1954). The majority, however, fails to recognize that there is simply no factual basis in this case to establish that the

⁸ I have serious reservations about the sufficiency of the evidence against Pine Island Farm based solely on the admission of Chaffin through the testimony of the reporter Ashton that Benlate was used in November 1989. I have a question as to whether that can then support the inference that Benlate was used on November 1 or 2. But I defer to the district court on that issue.

mist sprayed on November 1 or 2, 1989, contained Benlate. Therefore, there is really not even a basis upon which to draw an initial inference.

This record presents precisely the situation in which a trial court has a responsibility to grant a directed verdict. As the First District Court of Appeal stated in R. Hughes, Inc. v. Mitchell, 617 So. 2d 767, 770 (Fla. 1st DCA 1993): “A contrary result would effectively sanction a jury verdict based upon nothing more than rank speculation.” Thus, if there existed a valid jurisdictional basis to review the district court’s decision below, I would approve the result reached by the district court.

SHAW, Senior Justice, concurs.

Application for Review of the Decision of the District Court of Appeal - Direct Conflict

Third District - Case Nos. 3D96-2486 & 3D96-2489

(Dade County)

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