

**Transforming Scientific Dissent into Dissidence:
Analysis of
“The Pulse of Scientific Freedom in the Age of the Biotech Industry”**

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Introduction

The title of this 4S conference panel is “Science on Stage.” My paper captures the theme in a very literal sense by focusing on an event during which four scientists actually appeared on a stage in a University of California, Berkeley auditorium. Their discussion, entitled “The Pulse of Scientific Freedom in the Age of the Biotech Industry,” attracted a live audience of nearly 500, and the event was webcast around the world in real-time. The four scientists had published research that challenged the health or environmental safety of products commercialized by the agricultural biotechnology (agbiotech) industry, and each told his story of attempts by industry and government to suppress or discredit his results.

One notable aspect of this event is that it does not match up well with classical STS notions of “science on stage.” Shapin and Schaffer (1985) describe how Robert Boyle argued for a new epistemology based on the credibility of a properly witnessed experiment. This version of science on stage established a standard for how scientists could trust one another’s results and represent their work more broadly as legitimate by accessing shared cultural expectations of status. Likewise, Latour (1999 [1983]) highlights efforts by Louis Pasteur to prove the worth of his anthrax vaccine through a public demonstration. Pasteur clearly staged the science – in the sense that he designed demonstration experiments to showcase a biological truth he had already ‘discovered’ in his laboratory – and Latour makes it clear that the particular staging is a strategic choice by Pasteur to enroll a network of actors well beyond the scientific community.

Hilgartner’s (2000) more recent book, *Science on Stage*, analyzes written materials surrounding controversial National Academy of Science reports with the explicit lens of dramaturgy.

Invoking concepts such as stage management and character presentation, he provides a language to describe scientific writing designed to persuade a public audience.

This paper explores an event, “The Pulse of Scientific Freedom in the Age of the Biotech Industry” (hereafter, the Pulse event), for which stagecraft is not only a useful metaphor for analysis, but an explicit approach. Like Boyle and Pasteur, the scientists on the Berkeley stage sought legitimacy for their research in a public venue, but they engaged a very different strategy. Although all four had produced controversial science that had been discredited among certain factions of the scientific community, they discussed their findings only briefly, presented no additional data, and negated to directly defend their methods. It was not an evening of fact-building in the traditional sense. Nor was it an evening of like-minded, marginalized scientists discussing their current work, comparing notes, and recommending important directions for future research in assessing the risks of agbiotech. Instead, by focusing on the broad notion of scientific freedom, the Pulse event argued that the political and economic momentum of the agbiotech industry had suppressed and discouraged scientific dissent. This assertion offered an alternative explanation for the harsh treatment of the four scientists’ research other than as proper rejections of illegitimate science. As a self-conscious strategy to showcase patterns of scientific suppression, the Pulse event revealed power struggles within the supposedly well-ordered knowledge state and thereby transformed scientific dissent into dissident science.

Overview

I will begin with a brief discussion of my analytical framework: defining dissident science; distinguishing the politics of science from Science Politics; reviewing a typology of boundary-work that anchors my discussion; discussing the foundation of scientific freedom; and summarizing my theoretical claims. Next, I will introduce the four scientists who took the stage. Finally, I will analyze the Pulse event with attention to how scientific dissent was transformed into dissidence.

Analytical Framework

I view dissident science as a special case of scientific dissent. Dissent simply implies a minority perspective that challenges a majority opinion. Dissent within science is expected and normal, consonant with Merton's (1973 [1942]) norm of organized skepticism, Fleck's (1979 [1935]) conflicting thought styles, and Kuhn's (1970 [1962]) paradigm struggles. Critically, scientific dissent plays the dual role of both de-legitimizing particular scientific claims by exposing a lack of consensus, and legitimizing science as an institutionalized form of truth-seeking that evolves with new information. As Gieryn (1999) notes, scientific controversies usually function to shore up the credible status of science by reinforcing the idea that scientific legitimacy is worth fighting over.

I view dissident science as a politicized version of dissent, one that combines intellectual controversy with social struggle. Brian Martin (1999) writes:

Most science studies analysts treat scientific discourse as relatively 'free' in the sense that there are influences and incentives, but no bludgeons affecting the ability of scientists to speak. The possibility of systematic squashing of speech and activity and whole areas of science in 'free' societies is given little attention. In spite of the large number of cases and considerable documentation, few social analysts of science have investigated attacks on dissident scientists.

Like Martin, I see value in distinguishing "systematic" suppression of research and scientific discourse from the more typical policing of the boundaries of legitimate science. For my purposes, however, dissidence is not a category 'out there' in scientific controversies that STS researchers can measure, as if it were an indicator of a certain quality of suppression or politicization. Instead, dissidence is constructed and/or resisted by dissenting scientists, their promoters, and their critics. In the 'stage metaphor', it is a role to be performed. As such, it stretches the analysis of scientific controversy to recognize when and how actors politicize dissent.

With regard to the politicization of science, I distinguish the politics of science from Science Politics. The politics of science, well described by Collins and Pinch (1994), Pinch (1979) and Latour (1986 [1979]), foreground the struggle within the scientific community to negotiate accepted belief. Emerging from an internalist perspective, the politics of science rightly call attention to the complicated rhetorical strategies and credibility contests used by scientists to win support for their views. In contrast, Science Politics focuses on the political context in which science operates to understand why some truths are produced and not others. Robert Proctor's (1995) *Cancer Wars* and Sheldon Krimsky's (2003) *Science in the Private Interest* provide two examples of this externalist approach. The analyses of scientific controversy need not fall squarely in one camp or another (see Martin 1991; Gieryn 1999), but the terms help locate particular claims about how science is politicized without completely dissolving the distinction.

In my analysis of the Pulse event, I follow Thomas Gieryn's (1999) cartographic approach to understand scientific controversy. In *Cultural Boundaries of Science*, he argues for the need to move beyond studies of "science in the making" (Latour 1987) to *science as it is consumed* (Gieryn 1999, ix). He views science as a domain of credibility kept sacred by continual and dynamic boundary-work, and shows how participants struggle for legitimacy by rhetorically drawing boundaries of expulsion, expansion, and protection of autonomy (p. 15-17). Table 1 explores this typology.

Table 1: Categories of boundary-work (adapted from Gieryn 1999)

| <i>Genres of boundary-work</i> | <i>What does the boundary separate?</i> | <i>What is sought by scientists?</i> | <i>Broader social effects</i> |
|--------------------------------|--|---|--|
| Expulsion | “Real science” FROM “pseudoscience, amateur science, deviant or fraudulent science, bad science, junk science, [and] popular science” | The umbrella of scientific legitimacy | 1) Scientists learn the boundaries of legitimate inquiry and explanation 2) The public witnesses science’s ability to police its own conduct and content |
| Expansion | Proper domains of scientific authority FROM areas of concern better informed by other ways of knowing (e.g., religion, folk knowledge) | To extend science’s jurisdictional influence and control | Non-scientific ways of knowing become <i>collectively</i> less credible, increasing science’s momentum to expand into yet more jurisdictions |
| Protection of autonomy | Scientists FROM “outside powers” that seek to exploit scientific authority | a) Freedom to determine research direction and priorities b) Authority to police the boundaries of science c) Immunity from responsibility for downstream (technological) consequences of science | 1) Scientific freedom is preserved, protecting from ‘improper corruption’ 2) Public accountability through media and/or government is more difficult 3) Internal conflicts of interest of scientists become harder to police |

In my analysis below, I will explore how this typology both succeeds and fails to describe the boundary-work done during the Pulse event.

Michael Polanyi’s (2000 [1962]) classic essay on “The Republic of Science” theoretically locates the justification for scientific freedom. Arguing against the centralized control of scientific pursuit, he describes the intellectual efficiency attainable by a community of individuals mutually adjusting their research priorities according to the emerging discoveries

around them. In his somewhat idealistic view, “universities provide an intimate communion for the formation of scientific opinion, free from corrupting intrusions and distractions” (p. 15). Polanyi also clarifies the ‘essential tension’ in science that stems from this freedom, which establishes scientific dissent as a necessary outcome. He writes, “Both the criteria of plausibility and of scientific value tend to enforce conformity, while the value attached to originality encourages dissent.” (p. 6). This ‘essential tension’ both celebrates and endangers dissent. Polanyi notes that the action of scientific authority may “sometimes be mistaken, and as a result unorthodox work of high originality and merit may be discouraged or altogether suppressed for a time. But these risks have to be taken” (p. 8).

Can we understand the Pulse event as simply a backstage view of the downside of the ‘essential tension’? Are these scientists complaining about something that has nothing to do with academic freedom and everything to do with maintaining standards of scientific excellence? We cannot dismiss this possibility outright, but to accept it at face-value would be nothing more than playing audience to mainstream boundary-work. The sociological value of paying attention to scientific dissent does not depend upon the dissenters being ‘right’.

As an argument against the corruption of science by political and economic interests, the Pulse event echoed Polanyi’s call for scientific freedom, but the event as a performance operated on a different conceptual plane. The scientists certainly referenced boundaries of autonomy and boundaries of exclusion as they seek legitimacy and space for their own work, but their boundary-work was thicker and multi-dimensional in ways that stretch both Gieryn and Martin’s frameworks. My first claim is that understanding the Pulse event requires a synthetic analysis of the politics of science and Science Politics. The politics of credibility-building that occur within the scientific community completely engage the societal-level politics of science consumption

and invocation. Second, I suggest that protecting scientific freedom in the context of an academic-industrial complex such as agbiotech requires a new framing of scientific autonomy. Specifically, I interpret the Pulse performance as advocating a spatially dynamic boundary between scientists, research institutions, and the public. Together, these two claims reveal how and why the Pulse event transformed scientific dissent into dissident science.

Setting the Stage – the actors

Ignacio Chapela – actor, producer, casting director

In 1998, as an untenured professor of microbial ecology at the University of California, Berkeley (UCB), Ignacio Chapela found himself in the unusual position of being asked to chair the College of Natural Resources' (CNR) Faculty Executive Committee. Within a month of his appointment, he rebuked CNR administrators and refused to rubberstamp the infamous “Novartis Agreement,” a \$25 million funding agreement between a subsidiary of Novartis (a transnational biotechnology corporation now named Syngenta) and the department of Plant and Microbial Biology (PMB), also within CNR. As a former Novartis employee with strong opinions about what Novartis sought in the alliance, Chapela quickly became the most prominent critic of the Novartis Agreement among CNR faculty (Washburn 2000).

Three years later, Chapela again found himself in the midst of controversy. He and his graduate student, David Quist, published an article in *Nature* that announced the contamination of Mexican maize landraces by transgenic DNA (Quist and Chapela 2001). Within days factions of the scientific community denounced the results and charged Chapela with technical incompetence and politically motivated science (Agbioworld 2002). *Nature* responded by publishing two harsh critiques of the article (Kaplinsky, Braun et al. 2002; Metz and Fütterer 2002) and an unprecedented editorial note that withdrew support from the original publication

without formally calling for a retraction by the authors ("Editorial note" 2002). In response, two groups from UCB published critiques in *Nature* of the unfolding controversy: the first, challenging *Nature's* editorial note as an affront to the peer review process and a disturbing precedent for discrediting politically-relevant science (Suarez, Benard et al. 2002); the second, exposing the conflicts of interest held by the authors of the scientific critiques – both lead authors and several co-authors had received funding from the Novartis Agreement (mentioned above) – and challenging *Nature's* failure to disclose its own conflict of interest due to its reliance on corporate sponsorship by biotechnology companies (Worthy, Strohman and Billings 2002).

Throughout these controversies, Chapela has maintained strong links to social movements: he serves on the board of directors of the Pesticide Action Network – North America; he spoke at the NGO-led Sacramento Mobilization at the U.S. Department of Agriculture ministerial meeting on agricultural technology in June 2003; and he campaigned publicly in favor of the recent Mendocino County ballot initiative to ban GM crops.

Chapela's tenure application, submitted in November 2000, progressed in the shadow of the Novartis and *Nature* controversies. Although he had the support of his department chair, his dean, and a near-unanimous faculty vote from his department, his case moved slowly through the evaluation process. In June 2003, with a contract due to expire without notice of extension, Chapela staged "transparent office hours," outside the UCB administration building, to protest the lack of transparency of his tenure review. Although he was given a contract extension on the first morning of this unusual action, the Chancellor denied his tenure in November 2003, three full years after his initial application. He immediately appealed to UCB's Academic Senate Committee on Privilege and Tenure, whose preliminary investigation released in June 2004

demonstrated clear conflict of interest by one of the key members of the tenure review committee (Dalton 2004).

Tyrone Hayes

Tyrone Hayes is Associate Professor of developmental endocrinology in the Department of Integrative Biology, UCB. In 1998, he joined a private research consulting group, Ecorisk, which was regularly hired by Syngenta. In this role, Hayes discovered that extremely low levels of atrazine, an herbicide manufactured by Syngenta, caused malformations in frog sex organs. According to Hayes, Syngenta responded by halting the funding of his Ecorisk study, refusing him the right to publish his findings, and offering him financial support in return for keeping the results secret. As he attempted to continue his work outside of his consulting role and engage the Environmental Protection Agency (EPA) in revoking its approval of atrazine, Hayes ran into a web of conflict of interest almost too thick to imagine. Ronald Kendall, an environmental toxicology professor at Texas Tech University, simultaneously led an academic research institute that specialized in atrazine, served as the director of Ecorisk, sat on the EPA boards reviewing atrazine, advised the EPA on atrazine's re-approval, and edited the journal that published research that contradicted Hayes' findings. Hayes was shut out of the EPA review process and endured coordinated efforts to discredit his findings (Blumestyk 2003; Pierce 2004).

John Losey

John Losey and colleagues from Cornell published the infamous monarch butterfly study in *Nature* in 1999 (Losey, Raynor and Carter 1999). His experiment showed that *Bt* corn pollen could be lethal to monarch butterflies under laboratory conditions, although his article included a

clear disclaimer that this finding did not prove that *Bt* corn was killing monarchs in the fields. Losey was criticized by Cornell faculty outside the entomology department and attacked by the Biotechnology Industry Organization (BIO), an industry association of the major global biotechnology companies. Pierce (2004) reports that BIO supplied misinformation to the popular media as part of their strategy to undermine the significance of the study. Losey was initially reluctant to participate in the Pulse event, but after receiving tenure in November 2003 he agreed to appear on the panel.

Arpad Pusztai

Arpad Pusztai was a world-renowned lectin specialist at the Scottish Rowett Institute. In 1998, he appeared on British television to discuss preliminary results from his study of the effects of genetically-modified potatoes on rats. He reported changes in the size and weight of vital organs and weakened immunity in rats fed potatoes genetically modified to contain a specific lectin – research that he eventually published in *The Lancet* (Ewen and Pusztai 1999). During the interview, Pusztai stated that the lack of adequate safety testing of transgenic foods concerned him. Within two days, his employer suspended him, seized his data, disbanded his research team, and invoked a clause of his contract that required seven months of professional silence with the threat of losing his pension (Rowell 2003).

The Pulse of Scientific Freedom in the Age of the Biotech Industry

Countering the boundary-work of expulsion

Chapela, Hayes, Losey and Pusztai told versions of the preceding narratives at the Pulse event, and the Pulse website ("The Pulse of Scientific Freedom in the Age of the Biotech

Industry" 2003) directed visitors to detailed stories of the scientists' struggles against suppression. The mix of attacks and critiques levied against the panelists aimed to discredit their science by professionally isolating the scientists and marginalizing both their methods and domains of inquiry. As a strategic response, gathering these biographies on a single stage resisted that expulsion boundary-work: the four-part performance of their stories offered an alternative hypothesis to "marginal science justifiably excluded," namely that powerful social forces had interfered with the normal practice of science, nearly producing scientific martyrs. In other words, rhetorically undermining the motives of attempted boundary-work is a form of boundary-work in itself.

Michael Pollan, a recent addition to UCB's journalism faculty and a well-known New York Times Magazine science journalist, introduced the Pulse event. He framed the panel as a signal of a much deeper problem in contemporary science. He said, "What you see before you here tonight are some pretty rare birds, exceptional scientists willing to speak out, willing to go public. What we don't know is how many others have been silenced or intimidated into simply not asking troublesome questions, not designing controversial experiments...My fear...based on my own experience as a journalist...is that the population of such scientists is large and growing." This 'tip-of-the-iceberg' rhetoric not only countered the exclusion boundary-work that attempted to marginalize these dissenting scientists, but also glorified them as elite scientists possessing great courage.

As mentioned above, Ignacio Chapela organized the Pulse event. Because of his extended tenure review process, he had not admitted graduate students for several years and his lab had dwindled down to a single student. Most of his energy was focused on managing the demands of his controversial tenure case, and participating in conferences and events that dealt with the

politics and ethics of biotechnology. Upon hearing of Arpad Pusztai's planned visit to the U.S., he conceived the idea of holding a public event to discuss the pattern of suppression among scientists who had challenged agbiotech. Although Chapela is a bench scientist, he has significant experience in the worlds of politics and the arts. Shunning the familiar pattern of debates between agbiotech promoters and critics, he envisioned the Pulse event as explicitly theatrical. It was important to him that there not be too many people on stage and that the stage have a "living room" feel as if it were a television talk show. He rented comfortable furniture, a rug, and flower arrangements to adorn the stage. In contrast with this homey, intimate presentation, Chapela also arranged for a complex internet component – a website was created to advertise the event and provide a simultaneous webcast to groups around the world, questions for the panel would be accepted via email, and John Losey would participate from his Cornell office via webcam, with his image projected on a large screen on stage. Finally, it is worth mentioning that Chapela put significant energy into obtaining sponsorship for the event. Sponsors included: The Knight Center for Science and Environmental Journalism at UCB, UCB's Bancroft Library Oral History of Biotechnology Project, Chapela's department (Environmental Science, Policy and Management), UCB's Center for Sustainable Resource Development, the Berkeley Art Museum's Gene(sis) Project, the Council for Responsible Genetics, and The Jenifer Altman Foundation.

Together, these aspects of staging accomplished a great deal to counter the boundary-work that had sought to exclude the participants and their research from mainstream science. The relaxed, conversational atmosphere lent credibility to the notion that these were four thoughtful and collegial scientists, not inherently argumentative, hasty, and spiteful as was implied in many of their discreditation campaigns. The list of sponsors lent legitimacy to the discussion, placing it

within reach of a great diversity of intellectual and social interests. The hi-tech aspects played a dual role of extending access to the conversation (in the tradition of a social movement broadcasting its message as widely as possible) and also countering the oft-repeated accusation that biotech critics are dismissible Luddites who fear and oppose technology.

Integrating the politics of science and Science Politics

A curious theme of the evening surrounded the naiveté of the panelists. Pusztai, Losey, and Hayes presented themselves as conventional, unsuspecting scientists who were blindsided by attacks on their research and their professional credibility. Pusztai commented, “I’m a very polite and humble person and I couldn’t really understand how this happened ‘till somebody explained to me that what I put my foot in was a multi-billion dollar business...How does a straightforward, simple scientist, get into this field of major international controversy?” This raises the question of whether one can perform the role of an unwilling dissident. On one hand, naiveté lends credibility in the scientific community because it mirrors the objective, disinterested ideal. In this sense, reluctance to get political—or at least performing reluctance—is a powerful rhetorical device to engage in Science Politics. On the other hand, one could not help but hear a deep frustration of these panelists that their ‘innocence’ had been lost and they would never be able to return to doing science in quite the same way. Although they had gained tremendous notoriety, they appeared to take little joy in becoming the “rare birds” who spoke out against the industry. Pusztai’s story, in particular, is one of professional agony, personal frustration, and stress-induced health problems (Pusztai 2003).

Pollan began his introductory remarks by noting that the larger American political context had become increasingly intolerant of diversity and dissent: a miniseries mildly critical

of Ronald Reagan was cancelled by the CBS network, a presidential candidate who joked of the need for “regime change” was all but charged with treason by the White House, and the Dixie Chicks (a band) were excoriated for criticizing President Bush. By rhetorically linking the dissenting scientists with unreasonably punished political dissent, Pollan guided the audience both to sympathize with the panelists and to view their scientific controversies in a broader political context. In great theatrical style, Pollan introduced the panelists as the “Dixie Chicks of the Life Sciences,” lending them an additional degree of ‘hip’ credibility and squarely connecting the American values of freedom, expression, and democracy.

Pollan’s discussion of science journalism further integrated the politics of science with Science Politics. Suggesting that his field was where political journalism was pre-Watergate, he alluded to the “authority problem,” namely that science journalists rely upon prestigious scientific institutions to tell them what is news. This spoils the way science is supposed to work. Unlike political controversy, which breeds journalistic inquiry and analysis, scientific controversy leaves journalists “completely flummoxed” and they “fall silent and decide to concentrate instead on the latest diet.” This creates a context wherein actors with an economic or political interest in a particular scientific outcome merely need to “muddy the waters” to discredit a piece of research. The media silence – and therefore public inattention – exerts no pressure for more science to be done. The politics of science thus join Science Politics.

Re-envisioning the protection of scientific autonomy, society, and scientific freedom

On the surface, much of the discourse within the Pulse event engaged in boundary-work to protect scientific autonomy – striving for scientific freedom in the Polanyian sense. Mark Dowie, an environmental and technology journalist who served as the moderator, implied that

the problem was too much corporate influence on science. He commented that the panelists were not present because their science was challenged, which is “the nature of science.” Instead, they “challenged the catechism of a very powerful industry, the handmaiden of industrial agriculture, and the darling of venture capital, biotechnology, the next big thing.” He emphasized that it was the economic effect of their research that was crucial in understanding the suppression of their research.

Curiously, however, the scientific autonomy trope quickly became problematic. The biographical accounts of suppression were not simple tales of corporate lackeys taking aim at university scientists. Some of those doing the silencing and intimidating were squarely within the ‘respected’ scientific community: members of governmental agencies, public and private research institutions, and university faculty. To defend scientific autonomy as a protection from unwelcome influence in these cases requires a determination of who exactly was unwelcome, and who deserved autonomy. Did the Pulse event go no further than pining for the supposed glory days of science, when scientists could simply be trusted because they were pursuing knowledge instead of profit?

Chapela did not explicitly renounce the quest for a return to a traditional, idealistic science, but his speech to the audience framed a more complex relationship among scientific autonomy, the public, and scientific freedom. Distinguishing himself from the other three panelists’ purported naiveté, Chapela commented:

I feel that I am different. I was not naïve when I got into this. I was kind of prepared. I’m an academic mutt: I’ve worked for industry, I’ve worked for international organizations, I’ve worked for NGOs, I’ve worked for indigenous communities in different parts especially in Latin America. And it was with that background that I ended up in this place that is called the Department of Environmental Science, Policy and Management. The guys recruited me and hired me, and I was really elated, because this is a place where people are actually proposing that you can do science, and you can do serious thinking about that higher level of problems – that politics are part of science, that policy is something we can think rationally about. Little did I know.

In a subsequent interview with Chapela, he even explained to me that he made strategic decisions about the content of the *Nature* manuscript to steer the criticism he would receive, fully anticipating that he and his research would be attacked (Chapela 2003).

Chapela presented a historical and political perspective to contextualize his own suppression. During his remarks, he announced the denial of his tenure, holding up a news article from the following day's *Nature* magazine (Dalton 2003). The article, which was passed out as a flyer to the Pulse audience, was titled, "Berkeley accused of biotech bias as ecologist is denied tenure." The report connected the Novartis Agreement controversy and the Mexican maize controversy to the tenure denial, and quoted Professor Wayne Getz accusing the tenure review process as having been "hijacked." Getz, who served as one of five members of the confidential ad-hoc expert committee that reviewed Chapela's tenure case, broke confidentiality to accuse the administration of watching over a corrupt process. He noted that the ad-hoc committee had unanimously recommended tenure, but that the chairperson had subsequently resigned under mysterious circumstances and that somehow the decision was overturned at a higher level.

Despite putting his tenure denial in the center of the stage, Chapela insisted on de-personalizing the issue, instead focusing on two themes: the loss of biology as a broad field of inquiry and the withering of the public university as a space of intellectual "commons." Invoking the metaphor of a ship to represent the public university, Chapela engaged an institutional approach and broadened the conversation to the spatiality of science:

That ship of truth-seeking...is being looted and pirated left and right, and we're watching it and seeing it be done. And the question is, "Is this a ship that went adrift and now it's caught in the hands of the pirates?...Is it just broken down?"...I would claim that it's not really that. I would claim that this is a ship that has been purposefully and consciously captained and steered into the shoals where it can be pirated...We have been too much of a willing crew. I think it's really easy to go after Novartis and Monsanto, and we should go after them because they deserve it. But there is a cultural opportunity that we give them, that we make possible for them. It's not Monsanto, not Novartis that took my tenure away. It's us. There's something intrinsic in the institution.

This passage and Chapela's subsequent call for a public "rudder" for this "ship" captured the complexity of the boundary-work of the Pulse event, and suggested how this group of dissenters could advocate for scientific autonomy while operating at the fringe of science. Chapela made it clear that the cause of the loss of scientific freedom was not simply improper external intervention by Novartis and Monsanto. He argued instead that we—the professors, the students, and the public—had neglected our duty to hold science accountable. Although he defended scientific freedom, it was not in the Polanyian sense at all. He underscored the importance of the boundary that preserves the autonomy of scientists from the pirates – protecting against the corporate bias that privatized knowledge and narrowed the scope of biology – but his vision for the construction and maintenance of that boundary depended upon *reducing* the autonomy of science in relation to the public. 'Free speech' and 'expert speech' became entwined in a manner that refused a distinction between the 'Republic' and the 'Republic of Science'. In other words, as a dissenter, Chapela did not simply want to re-draw the boundaries of science to include himself; he strove to entirely re-map the relationship that characterized science and society. From this vantage point, Chapela transformed his dissent into dissidence – a social struggle to democratize science in the face of powerful economic and political interests that favor a privatized science – to advocate for a form of (re)public science.

Conclusion

I have not attempted to collect data to measure the impact of the Pulse event, either at a political or intellectual level, but *Nature's* treatment of the story was instructive. Two weeks after the event, *Nature* published a short piece entitled, "Scientists attack industrial influence" (Knight 2003). The article characterized the event as a "rally," using that word—and no other—three times in just over 200 words. This angered Chapela and others who had helped with the

event, including myself. Although the audience showed tremendous support for the panelists, the event lacked the character of a rally: the discussion lasted nearly two hours, no signs or slogans were used, and there was no identifiable target or action that attendees were asked to take.

Chapela contacted Jonathan Knight, the author of the article, to question his use of the descriptor. Knight responded that he had not, in fact, used the word “rally” in his submission to his editor (Chapela 2004). I verified this in an interview with Knight, who admitted that he was shocked at the word choice and knew instantly that it would upset readers who supported Chapela or attended the Pulse event. Knight explained that the short turnaround time of publication prevented the standard practice of an author seeing a copy of the edited article before publication, and he hypothesized that his editor had simply made a misinformed choice. He emphatically defended the integrity of *Nature*'s news division and said that he could not imagine that his editor was pressured (Knight 2004). Upon my request, Knight put me in touch with the responsible editor, who has ignored my requests for an interview or email exchange.

Part of me wonders whether the same intellectual and political stance within *Nature* that resulted in the unprecedented withdrawal of support of the Mexican maize publication also caused this word change. Without a doubt, classifying the Pulse event as a “rally” did tremendous discursive work to disrupt the event's intended message. By characterizing it as an offshoot of activism, *Nature* echoed the boundary-work that excluded these scientists as if they were doing politics instead of research. Secondly, it denied the complexity of the Pulse event's attempt to re-define the relationship between scientific freedom and the public. Although the panelists demonstrated some important differences in their willingness and ability to be Political, they all embraced the notion of a dissident component to resisting the technoscientific project of

agbiotech. They appeared to aim for a hybrid status in which they claim the identity of dissidents, as the loyal opposition, without losing their identity as scientists.

On the other hand, perhaps the “rally” characterization signals a true weak point in the strategy of framing scientific dissent as dissident. First, by emulating a social movement, the strategy becomes vulnerable to criticism that the goal of science has strayed too far from the ideals of value-freedom, objectivity, and empirical precision. Second, the political move to define who deserves scientific freedom from which vested interests quickly becomes complex and messy. As Chapela knows too well, his opponents have been quick to suggest that he operates no more autonomously than the university professors who participated in the Novartis Agreement: a response in *Nature* pointed to his membership on the board of directors of the Pesticide Action Network as evidence of asymmetrical condemnation of conflict of interest (Kaplinsky 2002). Third, the polarization of science communicated by the performance of dissidence may play into public pre-conceptions of partisanship. This undermines the ability of dissenters to prevent the closure of controversy because it communicates that the battleground is ethics and politics instead of ‘truth’.

The Pulse event performed a unique intervention in a field of scientific controversy. Even as it gives a window into the complex boundary-work around dissenting science, it also signals new rhetorical strategies to define science-society relations: the performance of dissident science, the dialectic of the politics of science and Science Politics, and the call for a (re)public science with new boundaries of autonomy. Chapela has built a small social movement around his tenure case and continues to perform the role of dissident scientist. Whether or not he is successful, in a narrow or broad sense, this transformation of dissent into dissidence marks an important moment

in understanding the social management of scientific dissent, at a time when the stakes have never been higher.

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