

Commentary: Ignorance as Bias: *Radiolab*, *Yellow Rain*, and “*The Fact of the Matter*”

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Abstract

In 2012 the National Public Radio show “Radiolab” released a podcast (later broadcast on air) essentially asserting that Hmong victims of a suspected chemical agent known as “yellow rain” were ignorant of their surroundings and the facts, and were merely victims of exposure, dysentery, tainted water, and other natural causes. Relying heavily on the work of Dr. Matthew Meselson, Dr. Thomas Seeley, and former CIA officer Merle Pribbenow, Radiolab asserted that Hmong victims mistook bee droppings, defecated *en masse* from flying Asian honey bees, as “yellow rain.” They brought their foregone conclusions to an interview with Eng Yang, a self-described yellow rain survivor, and his niece, memoirist Kao Kalia Yang, who served as translator. The interview went horribly wrong when their dogged belief in the “bee dung hypothesis” was met with stiff and ultimately impassioned opposition. Radiolab’s confirmation bias led them to dismiss contradictory scientific evidence and mislead their audience. While the authors remain agnostic about the potential use of yellow rain in Southeast Asia, they believe the evidence shows that further study is needed before a final conclusion can be reached.

Keywords: Hmong, Yellow Rain, Radiolab

Introduction: On September 24, 2012 the highly-acclaimed public radio program Radiolab released a podcast entitled “The Fact of the Matter.” One of its segments, “Yellow Rain,” discussed a mysterious substance considered by many to be a Soviet-made chemical agent which sickened or even killed people in Laos, Cambodia and Afghanistan in the 1970s and ‘80s. The show’s hosts, Robert Krulwich, Jad Abumrad, and producer Pat Walters, repeated theories articulated by scientist Matthew Meselson thirty years earlier. Yellow rain, said Meselson, was not a chemical agent, but a shower of feces from Asian honey bees coming out of hibernation and defecating *en masse*. The sicknesses and deaths of Hmong and other alleged victims were all caused by natural phenomena such as cholera and dysentery, not any chemical agent.

These assertions were further supported by retired CIA officer Merle Pribbenow and Meselson’s research partner, Yale entomologist Thomas Seeley. Though Radiolab mentioned an earlier test at the University of Minnesota which had found a man-made toxin in a sample provided by the State Department, Meselson asserted the lab had unwittingly contaminated it. No alternative scientific explanation or analysis was offered, giving listeners the impression that science had incontrovertibly proven yellow rain was bee dung. Then Krulwich and Abumrad interviewed Eng Yang, a Hmong man who visited villages where yellow rain attacks allegedly occurred. Translating for him was his niece, celebrated memoirist Kao Kalia Yang. After allowing him to share a few details about his experiences and recollections, Krulwich and Abumrad began asking Yang if he was sure yellow rain was a chemical agent. After all, a Harvard scientist had proven it was really bee dung. Suddenly two well-intentioned men became prosecutors cross-examining a hostile witness. “As far as I can tell,” said Robert Krulwich, “your uncle didn’t see the bee pollen fall. Your uncle didn’t see a plane. All of this is hearsay.” Kao Kalia’s emotional response to the interview was met with a curious mix of outrage, mystification, even derision by Radiolab staff in post-interview analysis. Krulwich suggested she was trying to “monopolize the story.” What was the real story? “Ronald Reagan used yellow rain as a pretense to order the manufacture of chemical weapons.”¹ In fact, Abumrad would later insist, Krulwich’s dogged questions were justified since “the truth in this situation [was] a matter of life or death.”² Though Krulwich, Abumrad, and Walters knew something had gone horribly wrong, their conclusion, at least publicly, was that in pursuing **the truth** about yellow rain, they ignored an equally if not more important truth: many Hmong people had died. And these “emotional truths,” they said, “are the most powerful.”

Shortly after the podcast was released, angry responses streamed onto the Radiolab web site. (Though over time a critical minority defended the show.) How could such a highly decorated program put itself in a position to be attacked so angrily by so many people? While most commentary focused on Radiolab’s cultural, racial, and gender insensitivity or on their dismissal of eyewitness testimony, we explore an often-missed cause of this debacle: bad science. Radiolab staff acknowledged they knew nothing about yellow rain until someone read a 1991 *New Yorker* article on the subject. We believe Radiolab researchers interviewed three congenial men with impressive credentials who sold them on the bee dung theory, leading to confirmation bias which encouraged them to dismiss contradictory evidence. Much of the debacle that ensued emanated from this cardinal error.

After providing information we consider essential in creating a broader context, and considering the scientific method and the degree to which it was upheld in this particular story, we believe we will have supported our thesis, which is that open consultation of all scientific evidence suggests the need for continued investigation of yellow rain, rather than a conclusion that claims of chemical attacks have been “discredited.”³

As early as 1976, a year after the Secret War had ended and tens of thousands were fleeing the country, stories began emerging from the jungles of Laos—and later Cambodia (1978) and Afghanistan (1979)—of a chemical agent sprayed or dropped from planes or helicopters (most often identified as yellow in color) that smelled like gunpowder and left a sticky residue on leaves, rocks, and rooftops. Those who inhaled or ingested it in significant amounts reportedly suffered from rashes, heavy bleeding of the nose and gums, blindness, tremors, seizures, other neurological symptoms, and even death.

In 1981, the U.S. government sent a sample taken from an alleged attack site in Cambodia to a University of Minnesota lab, which found three separate forms of trichothecene mycotoxins. None of the substances were found in a control sample away from the attack site. U.S. intelligence learned that consumption of trichothecene-contaminated grain had long been a serious public health problem in the Soviet Union. Since it had invested substantially in research on the poison, the US concluded that Soviet scientists had found a way to weaponize trichothecenes. In September 1981, secretary of state Alexander Haig accused the Soviet Union of producing and supplying its allies with a dangerous chemical toxin. But in early 1982, a British scientist examined his own sample of yellow rain and noted it consisted mostly of pollen. His findings were confirmed by the U.S. Army Chemical and Research Center, which had its own collection of samples. At first it was suggested that the pollen served as a sort of “carrier” for the toxin, but Matthew Meselson, a professor of biochemistry from Harvard University, was

unconvinced. Using samples obtained by ABC News and U.S., Canadian, and Australian sources, engaging in further studies, attending conferences, and consulting with Thomas Seeley, a Yale entomologist, and Joan Nowicke, a pollen expert at the Smithsonian Institution, Meselson announced a stunning conclusion. “Yellow rain” was not a deadly man-made toxin; it was bee dung. Seeley, in fact, “recalled a phenomenon he had observed in which tens of thousands of Southeast Asian honey-bees, flying high above the ground, defecated *en masse* to create showers of pollen-rich feces.” In addition, Meselson and Seeley found medical personnel who examined purported victims of yellow rain and found no evidence of an attack. Most disconcerting, the sample tested at the University of Minnesota was tested a few years later and no trace of mycotoxins was found. Yet a number of questions and inconsistencies lingered. The bees in question, for example, were indigenous to Laos and Cambodia but not Afghanistan. It was also difficult to determine which samples came from actual attack sites and which were provided by individuals eager to please or make a buck.⁴

This is not the entirety of scientific evidence related to yellow rain, but it is sufficient to begin our story. A few statements of disclosure before we proceed: first, both authors are agnostic about yellow rain and have no desire to promote one theory over another. Second, Dr. Hillmer’s perspective on this story is far from objective or removed, which will be explained shortly. Third, we will focus on the **science** employed by Radiolab in this episode. We believe everyone involved in this story is an honorable person of good intent, though we clearly believe that grave mistakes were made and subsequently denied.

We begin by identifying the **frame** Radiolab utilized in their podcast and continued to employ afterward. A frame is the way narrators establish the perspective from which their work will be understood. Once set, the audience will follow the argument, accept its assumptions as legitimate, and be led to a specific conclusion. Radiolab’s frame established that scientists have proven that yellow rain is bee dung. As WNYC’s Senior Vice President of Programming Dean Cappello stated, this assertion came not only from Pribbenow, Meselson, and Seeley’s testimony, but from Pat Walters spending “several months reviewing nearly 20 years’ worth of academic papers and media reports on Yellow Rain.”⁵ Hmong listeners noted that Radiolab did not translate Eng Yang’s audible comment that the Hmong harvested honey and knew what bee dung looked like.” Cappello replied, “numerous other lines of evidence. . . contradicted his claims.”⁶ Dr. Thomas Seeley further suggested the unreliability of Eng Yang’s testimony and the scientific authority of the bee dung hypothesis by asserting, “You have to look at the body of evidence, not individual opinion.”⁷ In establishing this frame, Radiolab fueled the

common perception that the disastrous interview resulted only from their impassioned search for the truth, and not by overdeveloped confidence in a less than ironclad hypothesis. In defending the interview, Jad Abumrad averred, “I don’t feel like an outcry of emotion should necessarily divert a line of questioning which is valid.”⁸ This aspect of the frame took on an oddly self-congratulatory tone when Cappello asked Kao Kalia Yang to meet privately with Abumrad and himself. “Your uncle’s personal story. . .has prompted many of my colleagues to express the desire to seek out more information about the history of the Hmong. And ultimately, provoking that curiosity is at the heart of what we do.”⁹ Radiolab now remains mum against critics. When asked via e-mail to explain his decision to exclude contradictory scientific evidence, Abumrad replied simply. “I’m not going to get into a conversation about this story. Thank you.”¹⁰

This frame extended beyond Radiolab itself and was articulated by Kelly McBride, senior faculty on ethics in reporting at the Poynter Institute. Speaking at the Third Coast International Audio Festival, with Abumrad present, McBride weighed in on the controversy. Since public outrage wasn’t caused by factual inaccuracy, “Ethically, [Radioabl didn’t deceive anybody. They didn’t get anything horribly wrong and cause damage by getting it wrong. They just framed their story in a way that discounted somebody else’s story, and that was hurtful.”¹¹ Are these assertions accurate? Is this frame credible? We argue they are not.

Now for some backstory. On April 24, 2012, Paul Hillmer received an e-mail from Radiolab producer Pat Walters asking for help finding Hmong people willing to tell their story about a personal encounter with yellow rain. He agreed in part because he enjoyed the show, but mostly because Walters was sent to him by Dr. Rebecca Katz, who had completed a dissertation at Princeton in 2005 and co-authored an article with her dissertation advisor in 2007 casting serious doubt on the bee dung theory. Surely, he thought, if they’ve spoken with Rebecca Katz, this piece will cover all the bases. So he connected Walters with his friend Kao Kalia Yang, a decision he now regrets. This involvement makes him a far less than objective source, and we welcome the reader’s full skepticism as we make our case.

Dr. Rebecca Katz inherited several boxes of records from an associate at the Defense Intelligence Agency concerning yellow rain. She went on to file numerous Freedom of Information Act requests and helped declassify over 8500 pages of documents. Her chief aim was not so much to determine the chemical composition of yellow rain, but to find the best explanation for what caused deaths and sickness amongst alleged yellow rain victims. She determined that maladies suffered by self-

described victims—like the rash seen on this baby—could not be explained by naturally- occurring means. Katz and Singer’s article summarized many of the dissertation’s findings and made all of the



Photo courtesy Rebecca Katz

documents she declassified available electronically. Key findings include: 1) Many “yellow rain” samples were not really yellow rain. The most legitimate samples were collected prior to 1983, before the public hunt for a Soviet chemical tainted the process; 2) Between 1979 and 1982, “clinical complaints and findings among self-described victims and detailed refugee accounts of attacks were sufficiently similar in Laos, Cambodia, and Afghanistan to suggest a key common factor, most plausibly a Soviet link;” 3) Epidemiological evidence was “consistent with mass simultaneous poisoning and not any natural disease.” 4) Seventy-five per cent of alleged attacks coincided with witnesses “seeing or hearing a helicopter or airplane, followed by seeing or smelling a gas or powder fall to the ground;” 5) Between 1979 and 1982, refugee reports of attacks were consistent with other intelligence data, including known battles and flight paths of aircraft, more than 60 percent of the time; 6) If tricothecenes are not stored properly they degrade over time, meaning it is quite possible that a sample tested at the University of Minnesota could test positive and then later test negative.¹² While there are other findings, we hope these data sufficiently demonstrate that Katz’s work posed a serious scientific challenge to the bee dung theory.



The photo above was taken at a 2006 conference in London sponsored by the Center for Contemporary Conflict, the U.S. Naval Postgraduate School, and King’s College. Note that for a high-level discussion on yellow rain, both Matthew Meselson (center left) and Rebecca Katz (center right) have a seat at the table. One might ask why Radiolab didn’t take the same approach. First, we must acknowledge that owing to her role as a consultant for the State Department, Rebecca Katz could not speak publicly about this issue. But Radiolab had her dissertation and co-authored article, and Dr. Singer was available. So why didn’t Radiolab say anything about this research? Was Katz’s approach somehow less scientific or less credible than Meselson’s? Dr. Mary Ann Yang, a research biologist, weighs in.

Let’s start with something simple, something students learn in freshman biology: the scientific method. This method, which can be practiced by everyone, not just PhDs, follows these simple steps: observation, hypothesis, testing, analysis, conclusion, and then, if necessary, more critical thinking to find a more testable hypothesis. During Minnesota’s cold winters, for example, you might wake up one day, try to go to work, but the car won’t start. Its failure to start is your observation. Your hypothesis? A drained battery. (A hypothesis is always a statement, not a question.) So you test your hypothesis by jumping the battery. If it starts, your hypothesis has been borne out by the evidence. If your car still doesn’t start, your hypothesis has not been supported and you have to use critical thinking to establish a new one: the battery can no longer hold a charge. You keep this process going until you find a solution or run out of ideas and call AAA. The scientific method is something we all practice regularly.

Radiolab offered its audience two different hypotheses. The first started with Hmong people who saw planes flying overhead, showering down some kind of substance. They subsequently suffered severe sickness. That was the observation: a correlation, but nothing direct or conclusive. Hmong

victims hypothesized that yellow rain was a toxin causing severe sickness. (Obviously there were other bodies of evidence that led to this conclusion.) Next came the test of a sample at the University of Minnesota to see if this hypothesis held up. They confirmed the presence of mycotoxins; therefore we can draw the conclusion. In scientific terms we always say that we failed to reject the hypothesis, which means we have no grounds to say that the hypothesis was wrong. But science can never fully prove something with only one proven hypothesis, so they amass more critical reflection on this hypothesis and others. They can come up with other possible hypotheses. If mycotoxins are present, is the level of mycotoxin detected sufficient to cause such severe symptoms? Do those sicknesses correlate with mycotoxins? Other tests could be devised to support or challenge the original hypothesis. (For example, Dr. Katz used her training as an epidemiologist to carefully study the symptoms of alleged victims and conclude they were not all caused by natural agents.) That’s the scientific method. In this case a biologist can say there are grounds for Radiolab to present this piece of evidence that has been scientifically tested. Of course, it’s not quite that simple, since Matthew Meselson said the sample must have been contaminated by the researchers at the University of Minnesota. Radiolab trusted his analysis, but that observation is only an untested hypothesis. Yet, as Dr. Katz demonstrated, more can be said about that sample than was shared by Radiolab.

The second hypothesis, presented by Matthew Meselson and Thomas Seeley, started with the observation in 1982 that scientists found samples of yellow rain that contained bee pollen. This was then independently confirmed by the US Army. So they came up with their hypothesis that yellow rain is nothing but bee dung and that Hmong people mistook bee dung for a chemical agent. That hypothesis really shines through throughout the podcast. It emerged as Meselson was talking with Thomas Seeley, who told him Asian honey bees coming out of hibernation defecate *en masse* in a way that looks like yellow rain. So they went to Thailand to test this statement and saw this “yellow rain effect.” But they also started with the assumption that Hmong people didn’t know what they saw. They did no independent work to verify or negate that assumption. So their observation does not test the hypothesis that yellow rain is bee dung. It simply proves that Asian honey bees defecate *en masse* as Seeley said they would.

The second hypothesis forwarded by Meselson and Seeley was not fully tested. The only verified part of the hypothesis is the observation of the bees. But that phenomenon’s clear connection to what the Hmong experienced as yellow rain was never scientifically linked or proven. Yes, there is bee pollen in at least some samples of what may or may not be yellow rain. But nothing was tested to

exclude the presence of mycotoxins, and assumptions that Hmong people mistook bee dung for a chemical agent are only supported by anecdotal evidence. Meselson also seems to have excluded evidence of severe sickness that was correlated with yellow rain on the basis of his assumption that Hmong people did not understand what they experienced.

So let us consider the scientific method again, and compare that to the evidence promoted by Radiolab. The bee dung hypothesis is based not only on observable data, but also on assumptions and conclusions drawn from those assumptions. But what can occur when one makes assumptions, excludes evidence, and as a result, picks and chooses data to fit one’s expectation? Harvard business professor Chris Argyris describes a “ladder of inference” that we all tend to use to our detriment, which applies to what Meselson and Seeley did in this study. There are, says Argyris, a set of six rungs on a metaphorical ladder we climb to get from what we see to what we believe and what we do about it. The rungs of the ladder are:

- LEVEL 6: Actions
- LEVEL 5: Beliefs ^ (Conclusions motivating our understanding/behavior)
- LEVEL 4: Conclusions ^ (What we decide our assumptions mean)
- LEVEL 3: Assumptions ^ (The meaning we convey to the data we select)
- LEVEL 2: Selected Data ^ (The information we choose over that which we ignore)
- LEVEL 1: Observable Data ^ (What we see, information we collect)

Climbing the ladder causes serious error because of two “recursive loops” which “trickle down” the ladder of inference. The first loop goes from beliefs down to selected data. Our beliefs lead us to choices about which data we select. If one already believes someone or something is untrustworthy, one will look for the data to prove that assumption and ignore the data that don’t. The second loop goes from actions down to observable data. The actions one takes against perceived problems can often create the very situations and behaviors that will reinforce the inaccurate perception, creating more observable data that reinforces the erroneous assumption.

Instead of moving up the ladder of inference, one should develop a habit of moving downward. Two simple rules help one do this successfully. First, one must question assumptions and conclusions, seeking to identify data that was avoided or ignored. Second, one should seek contrary data, even if, to start with, one has to make it up and then test it. In summary, starting with observable data is not only good but necessary. But one must avoid recursive loops where actions taken are based only on one’s own assumptions and selected data.¹³

The bee dung hypothesis as presented in the Radiolab piece does not really employ the scientific method. It did, however, lead to, or reinforce their pre-existing beliefs, which is not part of the scientific method. They seem to have never followed Argyris’ two rules necessary to avoid arriving at a bad conclusion. Radiolab didn’t seem to look for alternative data or explanations that might have challenged their original assumptions. In any case, as a program that is purportedly about science, there no reason for Radiolab to have excluded the evidence provided by Rebecca Katz or to have simply trusted Meselson’s disqualification of the tests conducted at the University of Minnesota, which found toxins in the sample they were provided.

Finally, let’s take a look at comments from some of those whose views were excluded from Radiolab’s episode. But before we proceed, a couple of caveats: first, everyone interviewed for this paper spoke of Dr. Matthew Meselson with respect, and we wish to do the same. He is a world-class, Lasker Prize-winning biologist. Second, we are focusing here on information that Radiolab excluded from their podcast, not because we believe it should replace their content but because at least some of it should have been placed alongside it.

Dr. Chester Mirocha is the unnamed scientist in Radiolab’s story who, according to Matthew Meselson, allowed an alleged yellow rain sample to become contaminated. Owing to the means through which the material came into his possession, Mirocha freely admits “we had no way of doing a controlled experiment at the time. . . . But whatever came into my laboratory, I am confident that we found what we said we found.” Those findings were indeed accepted for publication in the peer-reviewed *American Journal of Microbiology*. Mirocha not only deems the bee feces hypothesis untenable, but goes so far as to allege that as a signatory to the 1972 Biological Weapons Convention, Meselson has a motive to prove there was no chemical weapons use by the USSR. While *en masse* bee defecation may be news to urbanized Westerners, Mirocha scoffs at the notion that the Hmong and others knew nothing about it. “Treating it like some great discovery,” he says, “is rather silly.” Finally, Mirocha notes that in 1992 Meselson erroneously posited that an anthrax outbreak in the Soviet Union (Sverdlovsk) was naturally generated and then later conceded that deaths not only had been caused by an anthrax production plant, but that the plant existed in direct violation of the Biological Weapons Convention.¹⁴

Dr. Katz makes the following observation: “[T]he bee feces theory is at some levels just really ridiculous, mostly because it didn’t address all of the evidence. . . . [T]hey proved 100% that there is a naturally-occurring phenomenon of Asian honey bees that defecate *en masse* in certain parts of the

world, and that it falls in a way that looks like yellow rain. But that has. . . nothing to do with any accounts of morbidity and mortality. It doesn't account for anything that happened in Afghanistan, where those bees are not known to live. It doesn't account for any of the corroboration and triangulation of military overflights and intelligence data [I declassified].”¹⁵

Dr. Burton Singer, Katz's dissertation advisor at Princeton, was previously the chair of the Department of Epidemiology and Public Health at Yale. According to Singer, both he and Katz wanted Meselson to serve on her dissertation committee. But it was quickly apparent that Meselson was interested in defending his own ideas, not assessing new evidence. According to Singer, when Meselson was not invited to serve on the committee, he contacted the President of Princeton and the Dean of the Woodrow Wilson School complaining that Katz's committee lacked proper supervision. “I think everything points toward the release of some kind of chemical weapon,” says Singer. “We made our case as strongly as we could, and I am sure Matt was outraged by the whole thing, because this flies in the face of everything he's been saying, but the thing that I found striking is that he's never refuted it. . . There's a very substantial set of medical records that we were poring through, and he could have taken the same data set we did and gone through his own analysis . . . [and] published a refutation of what we said. It would be fine if he thinks he's got the goods, but it never happened.” Singer made all of these points and more in a phone conversation with someone from Radiolab, but no one followed up and none of his comments were included in the podcast.¹⁶

General Michael Meese is the son of Ronald Reagan's attorney-general Edwin Meese. In 1980 he was serving as an intern at the State Department's Bureau of Political and Military Affairs when the first reports of yellow rain attacks began to emerge. (One might assume, of course, that as the son of a prominent Republican, he might wish to defend the Reagan legacy, but again, the work of Chris Argyris suggests we should not use that assumption alone to disqualify his opinion.) According to Meese, President Jimmy Carter took reports of yellow rain attacks very seriously, especially since the Soviet Union was in the midst of its invasion of Afghanistan and Carter was eager to capitalize on any information that might be used to unite the international community against them. During that time Meese cataloged 114 eyewitness accounts and newspaper articles alleging yellow rain use. Meese reminds us that charges of Soviet chemical weapons use in Laos began not with Ronald Reagan and Alexander Haig but with Jimmy Carter and Zbigniew Brzezinski in August 1980.¹⁷ In fact, US pressure led to a United Nations resolution against the use of chemical and bacteriological weapons (UN Resolution 35/144, passed on December 12, 1980). While he acknowledges that scientific analysis must

be the ultimate arbiter of truth regarding yellow rain, Meese’s time collecting evidence and later serving on Katz’s dissertation committee have convinced him that some form of chemical or biological agent was used against the Hmong and other victims.¹⁸

Here is an excerpt from one of the many reports Meese compiled:

“A former [Lao] People’s Liberation Army [LPLA] officer said that he flew L-19 and T-41 aircraft on missions in the Lao People’s Democratic Republic which were specifically intended to dispense toxic chemical agents on Hmong villagers in the Phou Bia area. . . Before flying L-19 airstrike missions with a full-load of rockets. . .he was often warned by an LPLA commander to fly at above normal altitudes. . .[O]therwise, it could be hazardous to the pilot. . . There were two types of rockets. The first. . .were to be fired at targets away from the combined LPLA and PAVN [People’s Army of Vietnam] troops. . .to prevent the friendly troops from being exposed to the poison smoke.”¹⁹

These are not all but certainly constitute a critical mass of information we feel should have compelled Radiolab to create a more balanced piece about yellow rain. And if they had conducted their research more objectively and taken alternative evidence seriously, they would not have put themselves in the position to question Eng Yang so dismissively or to receive so much harsh criticism from so many listeners.

Conclusion: A popular and highly regarded radio program disseminates a podcast that angers and offends even people who know nothing about the Hmong or yellow rain, after choosing to exclude scientific evidence that legitimately challenges the assumptions undergirding the entire story. How should they have responded? Here are the most obvious answers we can imagine, listed roughly in descending order of journalistic credibility:

- 1) Silence your critics by releasing the science that refutes them and exculpates you;
- 2) Admit your mistake, release a retraction and/or clarification and move on;
- 3) Insist that you are correct but admit that other theories about yellow rain exist;
- 4) Assert that your show is not about truth, evidence, science, or objectivity, thereby at least re-contextualizing your message if not vindicating your position;
- 5) Do nothing, and hope the issue goes away

As we hope we have conveyed, our goal is not to disparage the individuals whose work we critique, nor to insist that yellow rain was a Soviet-produced chemical toxin. Our goal is to share scientific evidence and perspectives omitted from the yellow rain podcast and ask **why** they were omitted. Since Radiolab is unwilling to explain their scientific and editorial choices and we find their frame suspect, we can only speculate regarding their motives, which would be unproductive.

Radiolab created a frame based on incomplete science and faulty assumptions that persuaded its audience that in the pursuit of truth, the only choice was between a Harvard biologist and a Hmong victim. The comments below strongly suggest this is so. Even listeners who condemned Radiolab for its insensitivity often qualified their criticism by stating that the show had revealed empirical truth:

- “I . . . was deeply uncomfortable, but was led to the conclusion that the research pointed to the bees.”
- “It doesn't diminish the pain of losing loved ones in war, but the truth, the scientific Truth, with a capital-T, shall prevail.”
- “Terrible things happening to the Hmong doesn't give them the right to paint over potential historical inaccuracy.”
- “That the Yellow Rain was not chemical weapons does not demean the Hmong's suffering. It merely corrects what did actually happen.”
- “Robert did what journalists do, he pursued the truth.”
- “Being right does not equal the right to be insensitive.”
- “Robert pursued an angle of questions focused on how one identifies objective truth. Mr. Yang and his niece Ms. Yang were seeking a platform to air their rich historical story.”

We have chosen to focus not on issues of injustice, racism, ethnic or gender bias, or power, which are absolutely valid but obscure a flaw all too often excluded from the debate. The artificial dichotomy Radiolab created between a Harvard biologist and a Hmong man was effective, as the comments above suggest. This is not only unjust, it is not scientifically justified.

References

- ¹ The entire episode (though amended after the fact) is available at: <http://www.radiolab.org/story/239549-yellow-rain/>.
- ² See <http://www.radiolab.org/story/240029-yellow-rain/>, (accessed April 14, 2014).
- ³ See “The Yellow Rain Affair: Lessons from a **Discredited** (emphasis ours) Allegation,” a chapter Dr. Meselson contributed to *Terrorism, War, or Disease? Unraveling the Use of Biological Weapons*, edited by Anne L. Clunan, Peter R. Lavoy, Susan B. Martin (Stanford University Press, 2008). Dr. Meselson was kind enough to send Hillmer this article prior to publication.
- ⁴ See Paul Hillmer, *A People's History of the Hmong* (St. Paul, MN: Minnesota Historical Society Press, 2010), 228-232.
- ⁵ <http://www.current.org/2012/10/radiolab-producers-release-yellow-rain-email/> (accessed April 14, 2014).
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- ⁷ Olivia LaVecchia, “Behind Laos' Yellow Rain and Tears,” *City Pages*, November 14, 2012.
- ⁸ <http://www.current.org/2012/10/search-for-truth-results-in-radiolab-apology/>, (accessed April 14, 2014).
- ⁹ E-mail from Cappello to Kao Kalia Yang, October 7, 2012.
- ¹⁰ E-mail from Abumrad to Hillmer, October 12, 2013.
- ¹¹ <http://www.current.org/2012/10/search-for-truth-results-in-radiolab-apology/> (accessed April 14, 2014).
- ¹² Rebecca Katz and Burton Singer, “Can an attribution assessment be made for Yellow Rain? Systematic reanalysis in a chemical-and-biological-weapons use investigation.” *Politics and the Life Sciences* 26:1 (August 24, 2007), 24–42.
- ¹³ <http://www.youtube.com/watch?v=K9nFhs5W8o8>, accessed March 13, 2014.
- ¹⁴ Interview with Chester Mirocha (February 21, 2014).
- ¹⁵ Interview with Rebecca Katz (February 5, 2008).
- ¹⁶ Interview with Burton Singer (February 10, 2014).
- ¹⁷ Graham Hovey, “U.S. Report Calls Use of Soviet Poison Gas in Afghanistan Likely.” *New York Times*, August 8, 1980.
- ¹⁸ Interview with Michael Meese (February 13, 2014).
- ¹⁹ From “Reports of the Use of Chemical Weapons in Afghanistan, Laos, and Kampuchea,” a report compiled by Michael Meese and kindly supplied to the authors.