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Introduction by Jacob Darwin Hamblin, Oregon State University

Thirty years ago, U.S. Air Force Major William A. Buckingham, Jr., published the first comprehensive history of Operation Ranch Hand—the codename for American spraying of herbicides over South Vietnam and Laos during the Vietnam war. Buckingham’s narrative was part science, part politics, and part military operations. Even that official history acknowledged that twenty percent of South Vietnam’s forests—including some thirty-six percent of its mangrove forests—received eighteen million gallons of the best plant killers that American chemical companies could furnish. Derived from the same compounds used in commercial weed killers, these chemical agents had unimaginative names: Agent Pink, Agent Purple, Agent Blue, Agent White, Agent Green—and most infamously, Agent Orange. In the late 1960s, Agent Orange was identified by American scientists as carcinogenic, responsible for birth defects in the Vietnamese and for health problems among veterans. There was no index entry for “ecocide” in Buckingham’s tale, but he did reflect on what remained to be done at the end of combat operations: “Finally, the ecological consequences and long-range health effects of the herbicide program had to be assessed, a process which still continues.”¹ Decades later, the same statement could be made, with the environmental and health impacts of these herbicides still contested, and the U.S. government taking slow steps to compensate selected veterans and to mitigate the environmental problems in Vietnam.² And yet, the U.S. government did eventually stop using Agent Orange during the war, and subsequently promised not to be the first to use herbicides in future wars.

In *The Invention of Ecocide*, **David Zierler** asks a straightforward question: why did the campaign against herbicidal warfare succeed? His book places considerable responsibility on the scientists who invoked the notion of “ecocide”—the destruction of entire ecosystems in Vietnam. As his subtitle suggests, their efforts went further—changing the way we think about the environment. “Ecocide” implied a problem that was much bigger than particular health risks to human beings, and it may even have suggested a challenge of planetary proportions. And yet despite the employment of a word that invoked such calamity, Zierler notes, these scientists’ success may be due to their attempts to stand aloof from both the antiwar movement and the environmental movement.

Like Buckingham, Zierler published his study while employed by the United States government. However, Zierler’s book is not an “official” history, and it originated in his research as a doctoral student at Temple University, prior to his work at the United States Department of State.

¹ William A. Buckingham, Jr., *Operation Ranch Hand: The Air Force and Herbicides in Southeast Asia, 1961-1971* (Washington, D.C.: Government Printing Office, 1982). See p. 184.

² “U.S. Helps Vietnam to Eradicate Deadly Agent Orange,” BBC News Asia-Pacific, online, 17 Jun 2011. <http://www.bbc.co.uk/news/world-asia-pacific-13808753>. Accessed on February 10, 2012.

I asked **Brian Balogh** to comment on Zierler's book because his work spans the history of technology and environmental history, engaging politics throughout. Like *The Invention of Ecocide*, Balogh's book *Chain Reaction* examines the public dimensions of science—in Balogh's case, the interplay of expertise and public participation in the American debates about nuclear power. In that work, Balogh pointed out that the public dimension of science is not simply a matter of experts educating the ignorant; instead, when these experts take the public stage, they give widespread attention to legitimate differences among scientists. Balogh more recently has been exploring the environmental dimensions of these issues from the nineteenth century to the present.³

Amy M. Hay's work is complementary to Zierler's as well, because she is currently writing a history of American attitudes toward the Agent Orange controversy. I was intrigued by the connections between this project and her prior work on community activism and public health at Love Canal—not just during the controversy there, but in the decades that followed. Hay already has argued for widening our understanding of these controversies. Regarding Love Canal, she underscored how public rhetoric drew from a sense of obligation to protect homes, children, and reproduction itself, while cultivating a strong connection between environmental damage and broader issues of social justice.⁴ Aside from the obvious connection— toxic chemicals—I was particularly interested to have her comments on Zierler's thesis about how “ecocide” entered scientific and public discourse.

I also wanted to solicit comments from experts on some of the important figures in Zierler's book. **Michael Egan** has written extensively about Barry Commoner, whose own warnings about environmental peril were rivaled only by (his rival) Paul Ehrlich.⁵ In Egan's telling, Commoner's notoriety stemmed from his dissent from the mainstream, and he consistently railed against scientists who did not take their social responsibility seriously. This stands in remarkable contrast with many of the scientists in Zierler's book who characterized themselves as detached experts. Egan's current project on the global history of mercury pollution suggests a kind of ecological thinking that surely has one or two roots in the mangroves of Vietnam.

Finally, I was delighted that **J. Brooks Flippen** agreed to participate in this roundtable. Over the past decade, Flippen's *Nixon and the Environment* has become a standard work, and is an excellent entry point for those looking for an in-depth analysis of presidential policymaking on environmental issues. One of Flippen's central points was that Nixon's environmental successes were half-hearted at best, targeting a constituency that his Vietnam policies had lost him. Another of his books,

³ Brian Balogh, *Chain Reaction: Expert Debate and Public Participation in American Commercial Nuclear Power, 1945-1975* (New York: Cambridge University Press, 1991).

⁴ Amy M. Hay, “Recipe for Disaster: Motherhood and Citizenship at Love Canal,” *Journal of Women's History* 21:1 (2009), 111-134; Amy M. Hay, “A New Earthly Vision: Religious Community Activism in the Love Canal Chemical Disaster,” *Environmental History* 14:3 (2009), 502-527.

⁵ Michael Egan, *Barry Commoner and the Science of Survival: The Remaking of American Environmentalism* (Cambridge: MIT Press, 2007).

Conservative Conservationist, traces the career of Nixon's environmental guru, Russell Train, through successive presidencies, and is an instructive guide through the evolution of "the environment" in American politics in the past half-century.⁶

Before turning to the reviews, I would like to thank all the roundtable participants. Bringing one of these to fruition requires of them careful reading, insightful writing, collegiality, and considerable patience. In addition, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

⁶ J. Brooks Flippen, *Nixon and the Environment* (Albuquerque: University of New Mexico Press, 2000); J. Brooks Flippen, *Conservative Conservationist: Russell E. Train and the Emergence of American Environmentalism* (Baton Rouge: Louisiana State University Press, 2006).

Comments by Brian Balogh, University of Virginia

Did the Opposition to Defoliating South Vietnam Help Flatten the World?

In his book that explained why world was no longer round, Thomas Friedman did not skimp on the reasons that it had been flattened. There were ten of them that ranged from the collapse of the Berlin Wall to outsourcing. Technology made much of this possible, whether through “work flow software” or “uploading” -- chapters 3 and 4.⁷ Befitting Friedman’s subtitle, “a History of the Twentieth-First Century,” most of the action took place since 1989.

David Zierler reminds us of an earlier history that challenged an international system built upon nation-states. He documents the potent amalgam that synthesized environmental concerns, international law, and the tradition of scientific inquiry and skepticism in the early nineteen-seventies targeting American excess in Vietnam. This recipe, which the opponents of “ecocide” concocted as they went along, nourished the growing perception that such matters as the interdependence of man and nature and the transnational nature of environmental degradation did not fit neatly into the prevailing Cold War paradigm.

The Invention of Ecocide helps us understand the recent trend towards globalization by telling the story of those scientists who challenged their own country’s military and political leaders and their conception of its self-interest. Though informed by the growing environmental movement and an even more powerful antiwar movement in the nineteen-sixties, Zierler’s protagonists claimed independence from both. Science was the source of their authority, they insisted, and many of them husbanded this supposedly apolitical perspective, wielding it as their most effective tool.

The scientists opposed the use of the herbicide Agent Orange in a massive program to defoliate Vietnam, labeled Operation Ranch Hand. Ironically, some of these critics had developed the very same chemical compounds during World War II. Yale professor Arthur Galston, for instance, coined the term ecocide in 1970. Yet Galston’s dissertation research contributed to the development of herbicides during World War II (see p. 17). Zierler recounts how the growing conflict in Vietnam provided the perfect testing grounds for John F. Kennedy’s strategy of “flexible response.” It deployed the relatively cheap herbicide developed by Galston’s former colleagues. Spraying from the air was authorized on a limited basis in the fall of 1961. The purpose was to defoliate portions of the jungle that provided cover for the enemy and to deny the enemy access to crops that sustained troops in the field.

The limited operation soon grew to Texas-sized proportions under President Lyndon B. Johnson. As the number of American troops and combat missions soared,

⁷ Thomas L. Friedman, *The World is Flat: A Brief History of the Twenty-First Century* (New York: Picador/Farrar, Strauss and Giroux, 2007).

the supporting role provided by Ranch Hand skyrocketed as well. Fifteen of the twenty million gallons of herbicide sprayed on South Vietnam during Operation Ranch Hand were unleashed between 1966 and 1969. Unable to distinguish between enemy and civilian targets, sometimes intentionally spraying civilian occupied lands to drive residents into enclaves protected from the enemy, American planes rained defoliant on five million acres that covered approximately twelve percent of South Vietnam.

With the increased reach of the operation came intensified criticism. Bert Pfeiffer, professor of wildlife biology at the University of Montana and a former Marine who served during World War II, brought the matter up before the American Association for the Advancement of Science (AAAS) in 1966. Earlier that year, 29 scientists at Boston area universities petitioned the White House, calling for an end to the use of herbicides in Vietnam. In September, Galston formally registered his criticism with the White House. Insisting that he and his plant physiologist colleagues did not presume to offer the president “political or military advice,” they did insist on distilling lessons grounded in their expertise. “It is safe to say,” they wrote Johnson, “that massive use of chemical herbicides can upset the ecology of an entire region, and... such an upset would be catastrophic.” (p. 103)

Zierler chronicles the Nixon administration’s responses, beginning with denial and ending with eventual capitulation. The Defense Department finally authorized an independent study of the effects of the massive defoliation program. The turning point in the battle came in 1970 with the acknowledgement by the government that officials had been aware since 1966 of a study suggesting that there might be significant human health risks associated with Agent Orange. While the Nixon administration did not endorse such findings, the revelation led to the first independent study of the impact of Operation Ranch Hand.

Matthew Meselson, a Harvard biochemist and senior statesman of science (though no specialist on tropical ecology) was appointed to lead an AAAS Herbicide Assessment Commission. Meselson had criticized Operation Ranch Hand since he joined the Boston scientists’ in their letter to Johnson in 1966. The key findings of the Commission were reported at the 1970 Annual Meeting of the AAAS and publicized in the journal *Science*. The Commission concluded that one fifth to one half of South Vietnam’s mangrove forests had been “utterly destroyed;” that due to the destruction of up to one half of the hardwood forests north and west of Saigon, massive invasions of bamboo threatened to take over the area for decades; and that the food denial program was a “near total failure,” denying food to civilians rather than the enemy (p. 132)

By the time the report was issued, Operation Ranch Hand, along with U.S. combat missions, were being scaled back. Zierler concludes his account by chronicling the efforts of scientists like Galston to establish a permanent ban on the use of herbicides under the auspices of the Geneva Protocols of 1925. They did not obtain a legally air tight guarantee, yet they did garner a commitment from the Ford

administration by the end of 1974 to renounce the first use of chemical herbicides (with some exceptions) as “a matter of national policy” (p. 166)

Reading *The Invention of Ecocide* was a bit like being trapped inside the film *Apocalypse Now*. The narrative lurches from location to location without warning. It often devotes more effort to foreshadowing than illuminating the topic at hand. Occasionally, I was sorely tempted to reach for a little defoliant myself, to clear the massive underbrush of detail that often obscured some of the larger themes.

In the final analysis, however, the tough slog was worth it. Zierler demonstrates that the scientist/critics operated on a conceptual plane that helped shift the way Americans viewed their place in the world. The scientists framed the use of herbicides in the longer history of nuclear catastrophe, just as Rachel Carson had. Indeed, the critics of Operation Ranch Hand feared that the use of herbicides in war was even more threatening to international stability than weapons of mass destruction because defoliants were cheap and technically within the reach of all nations.

The scientists refused to draw a distinction between humans and nature, arguing that depriving man of his natural habitat and source of food inevitably impinged upon basic human rights. Of equal significance, the exposure of these scientist/critics to the environmental movement – although many of them eschewed the label environmentalist – illustrated the conceit of national boundaries. The kind of devastation that they documented, like nuclear ruin, could not be contained to individual nations.

Finally, the critics drew upon the framework of international law to make their case, forcing a Nixon administration eager to demonstrate its commitment to eliminating chemical and biological weapons, to acknowledge the role of herbicides in this mix. Originally framed within the New Left’s critique of the United States’ behavior as a nation-state, the critics of “ecocide” ultimately moved beyond that framework to glean the global implications of scientific breakthroughs, especially their dark side.

Long before the triumph of neocapitalism, the advent of outsourcing, or the contributions of Twitter to the Arab Spring, American scientists were questioning the degree to which nation-states that nurtured science could be trusted to regulate the application of these scientific breakthroughs. The answers that Zierler offers to these questions contend with Friedman’s top ten reasons to explain why the world is flat.

Comments by Amy M. Hay, University of Texas—Pan American

When Jacob Hamblin contacted me to participate in this roundtable review of David Zierler's *The Invention of Ecocide*, I must admit to complementary sources of pleasure. One was the opportunity to be a part of an extended group of individuals engaged in discussion of a timely (to my mind at least), intellectual work, albeit with the limitations and advantages of the conversation being in print versus in a seminar room (or better yet around a comfortable table with appropriate refreshments). I was also pleased to make Dr. Hamblin's acquaintance, and flattered to be asked to write about a work I was familiar with in the dissertation stage, as it directly pertains to my own interest in Agent Orange and citizen protest. Finally, I welcomed the chance to discuss David Zierler's work, *The Invention of Ecocide: Agent Orange, Vietnam, and the Scientists Who Changed the Way We Think About the Environment*. In reviewing *The Invention of Ecocide*, my observations fall into three major parts: the development of the concept of ecocide; scientists as activists and their influence on foreign policy; and scientific uncertainty. In the process I hope to show the important contributions Zierler's work makes and suggest some alternative readings that might more fully illuminate the importance the natural environment, the practice of science, and public policy. So let me begin . . .

Zierler's examination of American scientists' important role in creating a new environmental ethos in connection with scientific technology and war comes at a particularly timely moment, as the aftereffects of technological warfare confront us at every turn. Vietnam veterans have won recognition of multiple conditions possibly caused by exposure to Agent Orange by 2011, although the Veterans' Administration's decision remains controversial.⁸ The major argument *The Invention of Ecocide* makes explains scientists' influence in ending herbicide defoliation as an instrument of war. Their efforts, according to Zierler, came at a crucial moment of "political transformations . . . the demise of interventionist anticommunism as the dominant expression of U.S. foreign policy; and rising concerns that humankind's environmental impact was global in scope and a threat to international peace and even human survival" (pp. 1-2). Crucial to the story is the emergence of a new concept, the idea that the natural environment could be targeted and suffer during war as much as human populations or foreign governments, that just as a race of human beings could be eradicated, so too could a natural ecosystem. In telling the story of Agent Orange and American scientists' growing opposition to its use, Zierler offers a reinterpretation of the war itself and

⁸ Recognition that Agent Orange exposure may have caused some veterans' illnesses came as early as 1994, with the publication of the National Institute of Medicine's report, *Veterans and Agent Orange: Health Effects of Herbicides Used in Vietnam* (Washington DC: National Academy Press, 1994); for some more recent coverage on veterans and Agent Orange, see Jason Grotto and Tim Jones, "Agent Orange: A Lethal Legacy," Five-Part Series, *Chicago Tribune*, December 4, 2009 – December 17, 2009; Jason Grotto and Tim Jones, "Senator Challenges VAs Coverage of 3 New Illnesses Linked to Agent Orange," *Chicago Tribune*, June 8, 2010

contributes to a new, exciting area of study: scientific influence and the effects of war on the environment in the post-1945 period.

The Invention of Ecocide continues previous scholarship on chemical warfare even as it expands that scholarship by considering such warfare within an environmental context. As Zierler acknowledges in his introduction, his work begins where Edmund Russell's 2001 work, *War and Nature*, leaves off, with the 1962 publication of *Silent Spring*. Given its subject, the use of chemical herbicides, *The Invention of Ecocide* addresses the theme of human attempts to control the environment during wartime even more explicitly than Russell. Both books also discuss the institutions involved with chemical warfare, with Russell focusing on the Chemical Warfare Service (CWS) and Zierler with the American Association for the Advancement of Science (AAAS). The purpose of these institutions appear diametrically opposed, though, as the CWS promoted the use of chemicals in war, while the AAAS supported scientific efforts to investigate the effects of chemicals on the environment during the war. Zierler's account makes an important contribution in its discussion of the emergence of a new environmental concept, the application of genocide to the natural environment. He identifies important intellectual developments made by the work of Rachel Carson and Paul Ehrlich in helping promote a new *ecological* awareness of nature, and perhaps could have elaborated even more with the inclusion of Aldo Leopold and his *Sand County Almanac* which proposed a new "land ethic." It would be another group of scientists, however, that created and disseminated the idea that the natural environment could be declared an enemy combatant.

Zierler rightly notes the challenges in narrating the story of a rather disparate group of scientists, often united only in their rejection of being called environmentalists. In Zierler's account, Arthur Galston, a plant biologist at Yale University, first advanced the idea of "ecocide" at a 1970 conference, "War Crimes and the American Conscience." Galston recounted the historical origins of the idea, invoking the Nuremberg trials and the declaration that the horrific crimes carried out by the Third Reich against the world's Jews qualified as genocide – an attempt to wipe out a specific group of people. If such a crime could be perpetuated against humankind, Galston reasoned, then an attempt to destroy a natural environment qualified as equally disturbing. Such an atrocity required a similar concept – ecocide, or an attempt to wipe out a specific environment (pp. 15-19). The slowness of Americans to fully embrace the idea of war crimes, which the concepts of both genocide and ecocide fell under, as well as the politicized use of the idea of ecocide by North Vietnamese communists, make this concept a difficult one to communicate, both in 1970 and Zierler's narrative of its genesis. The concept of ecocide has applications beyond just the environmental, as the 1970 publication of *Ecocide in Indochina: The Ecology of War* demonstrated the potential legal significance of the concept. For some American scientists, however, the idea of ecocide allowed them to address defoliation activities as a matter for scientists, as experts trained to assess the effects of chemical herbicides on natural flora and fauna. It allowed an assessment of Operation Ranch Hand, the U.S. Air Force unit in charge of defoliation, outside the

purview of military leadership. The need to maintain scientific objectivity made it important to frame defoliation activities and the herbicides' effects on the natural environment within the realm of scientific judgment, an evaluation which should be made by trained individuals. In telling this part of the invention of ecocide, Zierler captures the personalities and the contributions of these "life" scientists – all male, all from university settings – men like E.W. "Bert" Pfeiffer at the University of Montana, Arthur Galston and his student Arthur Westing at Yale, Barry Commoner at Washington University, and Harvard biochemist Matthew Meselson. *The Invention of Ecocide* also rightly identifies this loose confederation of scientists as effective political actors, especially Meselson who had previous policy experience in advising the Kennedy administration on nuclear and biological weapons. As the leader of the AAAS' Herbicide Assessment Committee (HAC), Meselson ensured his team members' neutrality in their interactions with South Vietnamese officials and scientists, military personnel, and avowed opponents of the war. One interesting trajectory involves the shift in focus from the passionate activism of Pfeiffer, who had connections to Society for the Social Responsibility of Science (SSRS), to the reasoned analysis done by Galston and Meselson, who focused their energies more directly through their roles as scientists.

Zierler's strengths appear when he discusses what the definition of a new ecological crime means to warfare and diplomacy. Here Zierler skillfully focuses his discussion on the interface between American political leaders, the diplomacy practiced, and the use of chemical defoliants to achieve a larger military goal. This is not surprising given his current position as a State Department historian. Zierler provides a clear, concise narrative with thoughtful, well-informed explanations of the policy decisions made under the administrations of John F. Kennedy, Lyndon B. Johnson, and Richard M. Nixon regarding Vietnam and the broader Cold War. He offers support for previous historical interpretations supporting Kennedy's cautious, reasoned approach to the conflict; Johnson's neglect of the war, its escalation, and his administration's eventual downfall; and Nixon's attempts to control the war in the midst of his political turmoil. Johnson's acceleration of chemical spraying led growing numbers of scientists to question the effect of chemical herbicides on the South Vietnamese countryside. One of the first was Bert Pfeiffer, a zoologist at the University of Montana, who pushed the AAAS to denounce the use of defoliants, or at the very least investigate the possibility of environmental harm. Arthur Galston quickly joined Pfeiffer in calling for scientific evaluation of chemical defoliation operations in South Vietnam. These two scientists, along with Barry Commoner continued to pressure the AAAS to, if not condemnation of chemical defoliation, at least support an evaluation of defoliation's environmental effects.

The last chapter of *The Invention of Ecocide* makes the best case for the influence of scientists in redefining the use of herbicide defoliants and helping end their use in Vietnam. President Richard Nixon provided the opportunity with his desire to ratify the 1925 Geneva Protocol and "showcase American global leadership to stop the proliferation of chemical and biological weapons" (p. 138). Ratification meant that the Senate Committee on Foreign Relations (SCFR) would hold hearings, which in

turn provided a public forum for the “AAAS-affiliated scientists” to speak out against herbicidal warfare. These scientists focused on condemning the destructive nature of defoliation in South Vietnam, and challenged the idea it was “nonlethal.” Their public arguments were aided by Matthew Meselson’s extensive political connections. Meselson had already established important relationships with key Washington players like Senator William Fullbright when he testified about the dangers of Chemical and Biological Warfare (CBW). It was in his testimony before the SCFR that Meselson linked CBW broadly construed with the supposedly nonlethal use of chemical defoliants in Vietnam. Meselson emphasized tolerance of such chemical weapons weakened the ability of the Geneva Protocol to regulate chemical weapons of an even more deadly nature.

This position was challenged by the Nixon’s administration refusal to include chemical defoliants or riot-control chemicals (tear gas) as part of the Geneva Protocol’s prohibited chemicals. This counter-argument proved difficult to sustain, especially as other nations continued to criticize U.S. defoliation policy. Scientists fighting U.S. herbicide policy found their greatest success when they characterized the natural environment as akin to civilian noncombatants. As such, the natural environment should be protected rather than destroyed. The AAAS Herbicide Assessment Committee’s study showing the significant ecological effects of herbicides on the South Vietnamese natural environment strengthened scientists’ claims of environmental devastation. Allied with legislators opposed to the war, the scientists challenged the Nixon administration’s interpretation of the Geneva Protocol. Seeking to blunt the growing opposition, the administration announced it would begin phasing out herbicide spraying missions in Vietnam late in 1970. The dissenting American scientists and their effective rebuttal of the benefits of chemical herbicides clearly used Nixon’s ambitions, but it also remains unclear how much direct influence their scientific protests had. The dissenting American scientists and their effective rebuttal of the benefits of chemical herbicides clearly used Nixon’s ambitions, although whether the scientists’ influence was causal or coincidental in ending herbicidal warfare appears unclear.

The omission of a major group of actors from the book’s narrative offers evidence for an alternate reading of American scientists’ Agent Orange activism and influence on national policy. In 1968, Dr. Fred Tschirley led an assessment team sponsored by the State Department, and whose cautious, more ambivalent results encouraged the AAAS to sponsor their own Herbicide Assessment Committee. The HAC’s overall assessment of the herbicide damage challenged the work done by Tschirley, who Zierler acknowledges enjoyed a reputation as a respectable scientist, independent of military influence. Tschirley, an assistant chief of the US Department of Agriculture’s Crops Research division and later a professor at the University of Nebraska, appears to firmly fall into the camp of a group of individuals self-identified as the “weed scientists” – male scientists primarily located within industry, government, and land-grant academic institutions that firmly proclaimed the safety of the phenoxy herbicides with respect to animals and humans and offered strong criticism of those scientists expressing concerns. These weed scientists extolled the virtues of

chemical herbicides even as they defended them from charges of toxicity and potential harm. The weed scientists conducted their own program supporting the use of the herbicides as both safe and patriotic, even after the 1970 admission of Dow Chemical president Julius Johnson that the 2,4,5-T phenoxy herbicide component of Agent Orange had significant amounts of a known and dangerous contaminant, most commonly called dioxin.⁹ The weed scientists questioned the motivations of scientists who expressed concerns about the potential harmful effects of defoliants on animals and human beings, and mostly ignored the issue of possibly permanent ecological harm. Their challenges, though, show the contested nature of the science of herbicides and that there was not necessarily the degree of scientific unity that *The Invention of Ecocide* suggests. The ability of the South Vietnamese ecosystem to rejuvenate itself lends credence to their claims.

Scientific judgment forms the fundamental basis by which the AAAS-affiliated scientists Zierler studies challenged U.S. foreign policy. Considerations of scientific uncertainty, alternative forms of defoliation (fire, Rome plow), the political partisanship of the scientists themselves (in both camps), and the failure of the Nixon administration to ban domestic use of Agent Orange herbicides all combine to undermine a linear relationship between scientific protest and foreign policy decisions. The transformation in understanding the environment, however, can be measured by the acceptance of the concept of ecocide. In 1972, Jack Fishleder wrote a review of *Ecocide in Indochina*, a collection of essays edited by Barry Weisberg that appeared in *The American Biology Teacher*. Fishleder acknowledged the contested opinions of the Vietnam war, but also that biologists understood the natural world and relationships within it differently. He defined ecocide and cautioned that readers might feel “guilty and angry.” Fishleder ended by noting that the book’s importance would last beyond its call to conscience, as it “will still be of great value in helping us to assess the effect of an ecocidal war.”¹⁰ This acceptance and acknowledgement suggests the real power and influence some American scientists had in redefining the war in Vietnam by inventing ecocide.

⁹ Johnson’s testimony was made during testimony before Congress on 2,4,5-T, “Statement of Dr. Julius E. Johnson, Vice President, Dow Chemical Company, April 7 and 15, 1970,” *Hearings Before the Subcommittee on Energy, Natural Resources, and the Environment of the Committee on Commerce; United States Senate, Ninety-First Congress, Second Session on Effects of 2,4,5-T on Man and the Environment, April 7 and 15, 1970* (Washington, D.C., 1970). Zierler mostly omits discussion of these hearings, sponsored by Philip Hart (D-NY) and where many of the scientists (Arthur Westing for example) he examines also testified.

¹⁰ Jack Fishleder, “Review: *Ecocide in Indochina: The Ecology of War*,” *The American Biology Teacher*, February 1972.

Comments by Michael Egan, McMaster University

Addressing an audience at Brown University on the first Earth Day, the biologist Barry Commoner struck out against the Vietnam War, which he was wont to do. The herbicide attacks on Vietnamese forests and agricultural fields constituted, he charged, “the first ecological warfare conducted by the U.S. since the attacks on American Indians.”¹¹ Elsewhere, he adopted the term ecocide, coined by the botanist Arthur W. Galston. Ecocide, its invention, and the scientist movement that raised strenuous concern—ethically and biologically—about the use of chemical warfare in Vietnam is the focus of David Zierler’s book, *The Invention of Ecocide: Agent Orange, Vietnam, and the Scientists Who Changed the Way We Think About the Environment*. It fills an important hole in the existing historiography, while also building valuable connections to related historical work on war and environment and on environment and science policy.

The Invention of Ecocide evokes interesting ideas about place, as a staple of environmental history, but especially from a geography of science perspective. Throughout the book, there is an interesting relationship between “place”—in terms of where environmental impact from the dissemination of herbicides occurs—and “place”—in terms of the site in which scientific and moral debate about that practice happens. For the most part, the scientists were not on the ground in Vietnam, their work on developing the chemicals long finished. But the disputes and protests that Zierler follows happened in the United States, bringing together interesting features of globalization and the geography of science, where the study site and the reporting site are two wildly different places. It poses an interesting challenge for students of this history to accurately situate the production and consumption of knowledge.

My primary interest in Zierler’s impressive work concentrates on the relationships he builds between science, scientists, policy, the public, and the environment. These are wonderfully complex interactions, not easily parsed. If I have a minor criticism of the book, it hinges on this interesting juxtaposition between the methods of producing and consuming knowledge. It seems that science is invoked more than it is practiced in Zierler’s account, but this invites further inquiry into scientists, their social responsibility, and their various uses of cultural and political authority. While Zierler provides strong explanation of Agent Orange and its effects (this is not only a very sophisticated study, but also an exceptionally accessible one), the debate itself seems more moral and rhetorical than based on scientific findings and results. I would have liked to have seen this unpackaged further, with discussion of the book’s main protagonists more clearly articulating their view on scientists and their social responsibility. Galston and others remain aloof—above the fray—which marks an interesting difference between them and the scientist leaders of the new environmental movement, such as Commoner, Paul Ehrlich, Kenneth Watt, and others who became more actively engaged in inciting the movements for peace and

¹¹ Barry Commoner, “Untitled Talk,” Brown University, 22 April 1970 (Barry Commoner Papers, Library of Congress, Box 131), 17.

the environment. This is an interesting and important distinction, especially in light of Zierler's subtitle, which asserts that Galston and others were instrumental in shaping public ideas about the environment.

To this end, I'm not sure how useful "scientist" is as an umbrella term for Zierler's actors. I don't know who fits this definition and who is part of the "group" under study or the extent to which they are formally or informally linked to each other. For instance, it's not especially clear whether Commoner or Ehrlich, both scientists and strong critics of the American herbicide policy in Vietnam, are among the characters that frame Zierler's book, or whether they are peripheral figures or brokers. While both were instrumental in raising public awareness for the environmental implications of the Vietnam War, neither conducted any substantive scientific research on herbicides in war. Similarly, Zierler naturally invokes Rachel Carson's influence, but Vietnam was (understandably and tragically) not on her radar. Galston did work on herbicides; so did Matthew Meselson; and so did Bert Pfeiffer (these are the three main protagonists; few other members of Zierler's group receive much attention). But in bolstering their influence, Zierler seems to lean heavily on Commoner and others and their efforts to fit the herbicidal assault on Vietnam into a much bigger framework. Further, Zierler stresses that a unifying feature of his scientists is their reluctance to be affiliated with the environmental movement. Their rationale was sound—and consistent with their desire to serve as experts rather than activists—but Zierler could dig deeper here and examine the roots of environmentalist agendas against the War in Vietnam and the relationship between the peace and environmental movements more generally. Indeed, the distinctions are always muddy; one of Galston's first publications on herbicidal warfare in Vietnam was published in Commoner's popular science journal, *Scientist & Citizen* (by 1967, well on its way to becoming *Environment*), which published rigorous scientific work but stressed accessibility for a lay audience.¹² And this tension between activist and expert is one that historians should examine further; it is wonderfully complex and deserving of further attention.

This discussion of scientists and science in politics is not so much a criticism of Zierler's work, but rather an observation that making connections between the histories of science and the environment remains challenging, and historians might collaboratively participate in a more sustained project to more accurately articulate the finer details of the relationships between science and society in the post-World War II world. Science and politics are inextricably linked; but how they interact varies. Science can be a form of knowledge creation, tasked with constructing a body of information in light of a new problem or question. It can also be a form of institutional authority and evoked as such. Along similar lines, "science" can be a ruthlessly effective rhetorical tool. Breaking down what constitutes a "scientist" provokes similarly diverse definitions and directions. All of which appear in Zierler's work in one capacity or another. Whether it is a new etymology historians need or

¹² Arthur W. Galston, "Changing the Environment: Herbicides in Vietnam, II," *Scientist & Citizen* (August-September 1967), 123-129.

more perspective for unraveling this puzzle (or both) deserves further consideration. *The Invention of Ecocide* remains a welcome addition to this conversation and a valuable addition to the histories of scientific policy and the environment.

Picking up where the book leaves off, a subsequent chapter might be on the global proliferation of ecocide and its invention over the past forty years. Zierler briefly examines the tensions surrounding the politics of the Vietnam War at the 1972 UN Conference on the Human Environment in Stockholm; Swedish prime minister Olof Palme was especially vocal in his opposition to the war. In his opening remarks, Palme—a longtime and outspoken critic of the Vietnam War—made it clear that the conflict was a most acceptable topic for conversation during the conference. “The immense destruction brought about by indiscriminate bombing, by large-scale use of bulldozers and herbicides,” he extolled, “is an outrage sometimes described as ecocide.”¹³ But Stockholm served as a catalyst for ecocide’s spread beyond the confines of the Vietnam conflict and beyond strictly chemical applications. Indeed, war writ large was painted in a decidedly ecocidal manner in many of the proceedings; bombs and chemicals served the same violent purpose but also yielded similar immediate and long-term results. Palme was followed by the only other head-of-state present at the Stockholm conference, Indira Gandhi, who contributed to a shifting interpretation of ecocide and how it might shape the popular imagination about power, environment, and conflict. Gandhi warned against “diabolical weapons which not only kill but maim and deform the living and yet to be born, which poison the land, leaving long trails of ugliness, barrenness and hopeless desolation.”¹⁴ But ecocide took on a much broader interpretation over the course of the Stockholm conference. In addition to linking herbicide use to malaria and dengue fever epidemics prompted by wet bomb craters—an evolving feature of the definition of ecocide far beyond the pall of what Galston had conceived when he coined the term—there also emerged a growing rhetoric that explicitly indicated that violence against the land was effectively violence against people (slight perversion of his idea, but somewhere Karl Wittfogel is likely smiling). Furthermore—and perhaps more significantly—Stockholm became a springboard for the globalization of the idea of ecocide. Accusations of ecocide against the Portuguese in both Angola and Mozambique (using the traditional interpretation of ecocide as the military use of herbicides) prompted a maelstrom of other such claims. And much more recently, at the Copenhagen climate talks at the end of 2010, Bolivian president Evo Morales charged that the world’s governments were committing ecocide if they failed to adequately act against climate change. It also opens doors to a broader array of environmental issues falling under the rubric of ecocide. The growing reality of environmental refugees, for example, comes to mind, and it brings to light disturbingly close parallels between ecocide and genocide. Perhaps such proliferation waters down the term’s usefulness, but I think it also

¹³ Jon Tinker, “Indochina: Ecology Which Stockholm Forgot,” *New Scientist* (22 June 1972), 694-695. Quotation is from page 694.

¹⁴ Tinker, 694.

provides a fascinating lens through which we might investigate the emergence of what Sverker Sörlin has recently called “enviroming,” the expansion of a social environmental awareness.¹⁵ This is a critical expansion of the term and idea that Zierler investigates in his book. It is beyond the book’s purview—which takes as its main point of focus not ecocide but the use of chemical warfare in Vietnam and its opposition—but it does suggest ample opportunity for further study and investigation.

¹⁵ Sverker Sörlin, “The Contemporaneity of Environmental History: Negotiating Scholarship, Useful History, and the New Human Condition,” *Journal of Contemporary History* 46 (2011), 610-630.

Comments by J. Brooks Flippen, Southeastern Oklahoma State University

David Zierler has done yeoman's work with this book exploring Agent Orange and the use of herbicides in the Vietnam War. As Zierler acknowledges in his introduction, the sad story unfolds much as the simultaneous battle over DDT. The ultimate recognition of environmental calamity came only after grand claims of benefit and widespread use. In this case Operation Ranch Hand, the government's use of chemicals as defoliants, promised to protect American troops and contain communism. The administrations of John Kennedy and Lyndon Johnson escalated the use and it was not until after 1970 that the world came to recognize the disastrous ecological implications, termed "ecocide" by the scientist Arthur Galston. In Zierler's telling, it is the scientists such as Galston who are the protagonists, driving a scientific campaign to discredit Agent Orange and its chemical cousins that helped transform Americans' conceptions of international security from interventionist anticommunism to ecological survival. Nixon's détente policies, which included ratification of the Geneva Protocol of 1925 banning the use of chemical or biological weapons in warfare, offered the scientists the opportunity they needed. The scientists argued that harm to plants meant harm to people, an ecological argument that would prohibit Agent Orange if the treaty were ratified. The scientists' testimony engendered political controversy, leading ultimately not only to the cancellation of the offending herbicides but a new international environmental ethic.

While Zierler is correct in saying that the scientists' efforts hardly produced the modern environmental movement, his work certainly expands the historiography of environmental diplomacy, to date sadly neglected. Concern for nature is inherently transnational, and it is for this reason that Zierler's contributions are so welcomed. Zierler acknowledges that science has not yet reached a consensus on the human impact of Agent Orange, but his story is compelling in its condemnation and, for me at least, hits close to home. A colleague at my university, a veteran of that horrible war, traces his blood disorder to his service and has finally won the long battle for health care through the Agent Orange Act of 1991. His struggles have brought alive the sordid tale Zierler so aptly weaves.

It is a bit ironic that Zierler paints his scientists as both harbingers of a new international zeitgeist and yet relatively disinterested in swaying public opinion at large. Galston and his colleagues focused more on solidifying scientific consensus and convincing policy makers of the data-driven reality than allying with activists, many disdained as "simplistic entrapments of agitation" (p.18) For the scientists, true to both their profession and their generation, doing so would put the proverbial cart before the horse. In a sense Zierler's work reminds me of a recent book by historian Paul Milazzo, *Unlikely Environmentalists*, which argued that much of early water pollution legislation was born of jurisdictional disputes in Congress and petty personal politics, not clean water activists. Here Zierler also finds another unlikely seed of environmental transformation, a relatively narrow half-century-old treaty.

Zierler's work is another reminder that the environmental movement has many fathers.

When it came to environmental policy, Nixon's motivations were two-fold. Initially, he sought to win a new political constituency with an expansive legislative agenda unveiled in February, 1970. Nixon cared little about pesticides or any other aspect of environmental protection other than the votes it might win him. When, however, after 1971, Nixon concluded his efforts unsuccessful and ill-advised economically, he grew much less patient with many of his earlier environmental initiatives. While at the outset of his administration Nixon listened to science advisor Lee Dubridge, who makes a brief appearance in Zierler's book, by the battle for ratification of the Geneva Protocol he had come to view all scientists as pointy-headed members of the eastern liberal establishment. Galston may not have coordinated directly with the new countercultural activists but Nixon saw them as a monolith politically and reacted as such. By the end of Nixon administration, scientists were relegated to the new Council on Environmental Quality and the Environmental Protection Agency, the former's annual reports edited by Nixon's political advisors and the latter's regulatory efforts dismissed with budget cuts. While this devolution in domestic policy does not directly relate to Zierler's tale of international relations, one is left to wonder to what extent they coincided in Nixon's mind.

As Zierler correctly points out, Nixon's second motivation for his environmentalism was détente, and here Nixon still held high hopes until his consumption in Watergate. I wonder, however, if Zierler might somewhat overstate the significance of the Geneva Protocol to Nixon strategy. Détente to Nixon meant the Soviet Union and, as Zierler acknowledges, in this regard the administration had multiple options. Certainly the growing controversy over Agent Orange meant to Nixon that his initial hopes to mute criticism of his Vietnam policies in Western Europe with his environmental diplomacy was a lost cause, to put it mildly, but CEQ chairman and later EPA administrator Russell Train was already leading dozens of exchanges of personnel and equipment with the Soviets running the gamut from the protection of swans to the urban environment. Zierler makes a strong case noting the primacy of the Agent Orange issue and the Geneva Protocol, but it is worth reiterating again that in terms of Nixon's environmental diplomacy and détente with the Soviet Union, they were only a part.

While Zierler mentions the 1972 United Nations Stockholm Conference in passing, it is, perhaps, an example. Zierler notes that Train, who led the American delegation, received instructions to avoid the Agent Orange issue and was irate when Swedish prime minister Olaf Palme raised it in his opening remarks. Most of Train's correspondence with the White House, however, including conversations with John Ehrlichman during the conference and a meeting prior to departure with Nixon never mentioned the issue, despite the fact that EPA administrator William Ruckelshaus announced his final decision on DDT at the conference itself. The Agent Orange issue is barely mentioned in both Nixon's and Train's personal papers, the conversation dominated by other issues the conference broached: ocean-

dumping, whaling, endangered species, and the creation of an Environmental Secretariat at the UN. Any of these, to Nixon, offered both openings to the Soviets and a shield from the environmental complaints he increasingly heard at home. For Train personally, one of the most important issues at Stockholm was the creation of the World Heritage Trust, a proposal that he had championed for years.

I also found Zierler's discussion of the Agent Orange issue as a potential war crime instructive. The movement involved Americans and Vietnamese, as well as activists throughout the world. Nixon's White House papers are rife with complaints that environmentalists were on the extreme side of the political spectrum, against all things American. Nixon saw the war crimes movement and the Agent Orange protesters fodder for his case, useful in painting all environmental activists as extreme and thus weakening their domestic initiatives. In fact, today Train suggests that the "alternative" conference of street protests at Stockholm actually served Nixon's post-1971 political objectives in that it allowed him to paint his domestic environmental critics as extremists uninterested in quiet, logical debate.

Nixon, however, is just part of Zierler's well-researched and detailed monograph. Zierler has added greatly not only to the Nixon literature but to the origins of the environmental movement at large. I applaud Zierler's efforts and I am sure that he will prove a leader in the history of American environmental diplomacy.

**Author's Response by David Zierler,
Office of the Historian, United States Department of State**

Author's views do not necessarily reflect those of the U.S. government

First I must thank Jake Hamblin for assembling this first-rate group of scholars to critique my work, each from a uniquely suited vantage point of environmental policy and/or a focus on history and chemicals. I met Professor Hamblin in 2007 at a “boutique” conference co-hosted by the German Historical Institute and Georgetown University, “Environmental History and the Cold War.” When the conference was announced I was in the very early stages of my dissertation, and I was thrilled to learn of others working in this largely uncharted dual field, whose founding scholar and conference co-chair, Professor John R. McNeill, first recognized the logic uniting the sub-disciplines of environmental and international history. The proceedings of this conference were published by Cambridge University Press as an edited anthology, and since then the field has been building an impressive historiographical base, which, taken as a whole, examines the myriad ways in which environmental change and security issues move across national boundaries and international policies.

I would like to issue a few general responses that speak to all four reviews. I am of course flattered and heartened by the generally positive tone throughout, particularly the recognition of the originality of my work. This means a lot coming from this group of scholars who together are probably more familiar with the themes and literature on this relatively narrow subject than anyone else. I take no issue with how each reviewer summarizes my argument and narrative progression, and I can offer a broad defense meant to cover any critique centering on the reviewer's desire that I should have delved deeper into this or that topic. As a practical matter, judging from the massive amount of documentation that I had collected by the end of the research phase of this project, I easily could have produced a 500-page book with the aim of laying claim to the definitive history of Agent Orange. This would have led me down any number of tangential paths, most of which I only touch upon briefly in the narrative, if at all. But instead I made a calculated decision to keep the narrative as tightly focused as possible, for a reason that was risky academically but tremendously satisfying when looking from a less detached perspective. As Professor Flippen's anecdote attests, many Americans either know someone directly or know of someone whose life has been (allegedly) grievously harmed by exposure to Agent Orange. For me, that person is my best friend's father-in-law, a Vietnam veteran who died after a protracted battle with a number of cancers and other illnesses he attributed to his exposure in Vietnam to sprayed areas. Instead of writing the above-mentioned definitive tome, I thought of this man, his family, and countless others in a similar situation, and decided instead to complete a book that could answer the following question as efficiently and accessibly as possible: what accounts for the rise and fall of herbicidal warfare in Vietnam? For those in the Agent Orange “community,” a loosely defined yet highly

active group of people who gather via online listservs and annual meetings, I have found that not only is the answer poorly understood, but the question is rarely raised. In some regards this makes sense: these people are concerned about Veterans' benefits and environmental remediation in Vietnam – both current public policy issues that have become alienated from their historical roots. It is for these people that I hoped to create a book that would have relatively little to say about the impossible science of statistics between Agent Orange exposure and health causalities, or the precise amount of environmental destruction that took place as a result of the spraying – but much to say about the events and decisions that led to the authorization and ultimate termination of the largest chemical warfare operation in history. *The Invention of Ecocide* tries to do this and no more. So while it is to some extent a “cop-out” to defend any of the critiques in this roundtable and elsewhere without addressing each one more directly, I hope as a general matter this explanation of purpose illustrates the difference between thoughtless oversight and calculated focus. Certainly each of these critiques is legitimate and exemplifies the important exegetical role of quality book reviews. My only regret is that I did not flesh this out more directly in the book itself.

Now, on to the specifics of the reviews. To Brian Balogh, I can say I'm honored to join the ranks of writers who have poked holes (unwittingly, in my case, or not) in any number of Thomas Friedman's prognostications on *How The World Really Works*. When Friedman leaves his Middle East conflict comfort zone of expertise, it is time to look for international analysis elsewhere. As Balogh suggests, the timing of Friedman's own “A-ha!” moment need not coincide with the actual tectonic shift of global events. As for the mention of *Apocalypse Now*, I can't but help to take what is meant as a criticism as a compliment. As a general matter, I would say any book dealing with Vietnam needs, at some level, to “feel” like its subject matter, and *Apocalypse Now* evokes the era better than anything else. More to the point, my subject matter proved inherently weird and jaunty. It was neither traditional diplomatic history where one can follow government policy in the archives nor traditional environmental history where one can measure the dialectic relationship between humans and nature – but a somewhat chaotic amalgam of both against the backdrop of arguably the greatest social upheavals of the twentieth century. I would be taking too much credit to say the choppiness of my narrative was always by design, but I do think it is an example of a historian's effort to follow the sources where they take him, no matter the jigs and jags along the way.

Michael Egan is exactly right to highlight the problematic terminology of the term science as I invoke it in the book. Given the remaining controversies – likely never to be conclusively resolved – regarding the ecological and human health effects of Agent Orange, as a first matter this topic challenges traditional notions of “capital S” Science as some unimpeachable purveyor of objective truth. Add to this Arthur Galston's thoughtful desire to remain both above the fray of the environmental movement, and his interest in ethics (which is as much about philosophy as biology), and there is indeed a problem with terminology. But just because there is a problem, this does not mean that it needs to be overly problematized, despite

scholars' near-innate need to do so. Ultimately I see no better alternative to the term "scientists" to describe the group of people who formed the key group to protest herbicidal warfare in Vietnam. In the end it was scientific organizations that brought them together and scientific hypothesizing which formed the basis of their fears over the danger not only of Agent Orange but of unchecked military defoliation wherever forests and wars intersected. Egan is also right that Commoner felt free to denounce herbicidal warfare without having conducted any scientific investigations of his own, but ultimately his voice is important because he was a scientist. Parsing these details out more than I had perhaps would have sacrificed narrative flow for terminological precision. As Egan concedes, this subject matter is a starting off point, and I would be happy if subsequent histories of this period took these distinctions as a more central focus, for it is certainly true that more scholarly work can and should be done on scientific policy and environmental issues, as well as on the expanding and evolving conceptualization of "ecocide."

J. Brooks Flippen is the authority on environmental policy in the Nixon era, so it is a relief that my analysis passes muster as far as he is concerned. I do want to engage him here on the supposed significance of the Geneva Protocol as it related to the herbicide controversy, because I think our views are more similar than Professor Flippen suggests. To recap briefly: In early 1969 the Nixon administration resubmitted to the Senate the Geneva Protocol of 1925 banning chemical and biological warfare. The treaty had been originally rejected by an isolationist Congress and had lain dormant until President Truman took it off the books entirely. With an eye toward a dramatic opening move toward détente, or relaxation of tensions with the Soviet Union, Nixon hoped the passing the Geneva Protocol would complement his more well-known nuclear arms reduction initiative so that together these three forms of "weapons of mass destruction" (to use a contemporary term), would significantly decrease the threats of Cold War military confrontation. The Geneva Protocol figures centrally in my narrative, not because the Nixon administration viewed it through the lens of the Vietnam War, as Flippen seems to indicate – quite the opposite. In fact, there is no evidence that anyone in the Nixon administration ever thought much about the apparent problems in trying to limit chemical and biological warfare while U.S. forces were drenching the South Vietnamese countryside in chemical defoliants. At this point Arthur Galston and his colleagues seized on this oversight, which proved to be the perfect legislative opening by which the "ecocide" of Vietnam managed to derail a critical component of Nixon's Cold War policy. I would argue that Flippen's characterization of the Agent Orange issue was "only a part" actually overstates the case. Had anyone in the Nixon administration grasped growing potency of both antiwar sentiment and rising environmental awareness, I doubt Agent Orange and the Geneva Protocol would ever have been linked.

Finally, I must commend Amy Hay for her thorough and incisive review, which clearly benefits from her own work-in-progress on defoliants. As all of those who have gone through the entire book production process can attest, a significant amount of time can elapse between writing and responding to reviews – in this case,

almost three years. Such was Hay's meticulousness that I found myself re-learning some of my own themes and arguments. It is the kind of review that well serves a grad student cramming before the comprehensive exams. And it is a testament to Hay's close reading that she raises a question over one of the trickiest sections of the narrative, in which she wonders if the scientists' legislative activism was coincidental or causally connected to the Nixon administration's decision to terminate herbicidal warfare in Vietnam. The terminology itself is instructive, for the confusion surrounding Agent Orange and causality is no longer one solely for epidemiologists to consider. On the question of the scientists' success, the best answer I can offer is the somewhat blurry one in the book, which is that their involvement was neither completely causal nor coincidental. It is worth revisiting briefly the fact that the scientists were motivated to end herbicidal warfare in Vietnam immediately because they feared its potential ecological and human health effects, but they also grasped that this achievement would mean little if they did not secure some kind of binding legal mechanism that would prevent this effective and cheap method of war from proliferating globally. It was the latter point that animated their testimony on the Geneva Protocol before the Senate Foreign Relations Committee, which took place when the herbicide program in Vietnam was almost completely phased out. But to characterize this disconnect as coincidental would be too extreme; the tipping point that finally convinced the Nixon administration to end the program once and for all were reports coming out about the possibly carcinogenic and teratogenic (birth-defect causing) effects of 2,4,5-T, one of the main chemical compounds that comprised Agent Orange. These reports would never have come out without the dogged work and political connection of Matthew Meselson. Further, before readers might dismiss the scientists' efforts because the actual termination of herbicidal warfare rested on human health fears as opposed to environmental issues, it is important to remember that the scientists were always careful to avoid drawing clear lines between the two. This connectivity is the essence of ecology, and the primary reason that the scientists believed they were carrying on with the work that Rachel Carson most definitely would have, had she lived to see both the horrors of the Vietnam War and the social transformations it engendered in the United States.

About the Contributors

Brian Balogh earned his Ph.D. in history at the Johns Hopkins University in 1988. He was an assistant professor in the Department of History at Harvard University from 1987–1991 and has been a member of the University of Virginia’s Department of History since that time. He helped found the Committee on the History of the Environment, Science and Technology at UVa and he is the Compton Professor at UVa’s Miller Center where he directs the National Fellowship Program. He is also co-host of the public radio show *Backstory with the American History Guys*. Balogh has written about the use of scientific expertise in *Chain Reaction: Expert Debate and Public Participation in Commercial Nuclear Power, 1945 – 1975* (New York: Cambridge University Press, 1991) and American attitudes towards “big government,” in *A Government out of Sight: The Mystery of National Authority in Nineteenth-Century America* (New York: Cambridge University Press, 2009). Before starting graduate school Balogh worked for City Council President Carol Bellamy and ran some welfare programs in New York City.

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David Zierler conducts research at the Office of the Historian, United States Department of State. He earned his Ph.D. in 2008 from Temple University. His current research for the Department of State focuses on the Soviet intervention in Afghanistan, and he also is writing a history of public opinion amidst national security crises.

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