

From the Frontlines to *Silent Spring*: DDT and America's War on Insects, 1941-1962¹

James Erwin Schmitt
History

In the immediate aftermath of the Second World War, Americans flocked to their local shopping centers to purchase the latest and greatest consumer goods. Thanks to higher wages, the GI Bill, and a booming job market, consumers used their new spending power to purchase a wide array of products, including televisions, washing machines, refrigerators, toaster ovens, and vacuum cleaners. Among the most desired of these postwar products was the latest in bug-killing technology, a chemical known as *dichlorodiphenyltrichloroethane* (DDT). The new “miracle pesticide,” as some called it, had proven to be an effective tool for the elimination of malaria and typhus in the European and Pacific Theaters and consumers were eager to get their hands on the insect-killing *war hero* for use in their homes and gardens. In the fall of 1945, lifted wartime restrictions on domestic DDT sales, consumers around the country rushed to their local hardware stores and supermarkets, where they shopped for a number of DDT-laden products, including bug bombs, aerosol sprays, paint, and wallpaper, which featured a myriad of designs ranging from Mickey Mouse for the children's room to floral patterns for the living room and dining room. As a 1946 article in the *Nebraska Farmer* noted, “After winning a glorious victory during World War II over the insidious insect foes of G. I. Joe, DDT has shucked its military clothes, wrapped up its world-wide service bars, and come back home to take over the No. 1 spot in America's bug battle.”²

The bug-killing fervor that thrust DDT into consumer markets in the postwar era was a continuation of attitudes that emerged early in the Second World War, prior to the existence of DDT. Throughout 1942 and early 1943, Allied forces stationed in the South Pacific fell to insect-borne illnesses at an unprecedented rate. In November 1943, American troops in New Guinea reported six hundred malaria cases for every thousand troops, and by January 1943, four divisions stationed in

The author would like to thank Dr. Marc Gallicchio, Daniel Gorman Jr. and Paige Barker for their helpful comments and suggestions that made this essay possible and Dr. Paul Rosier for his guidance in the field of environmental history.

¹ Rachel Carson, *Silent Spring* (Boston: Riverside Press, 1962).

² Keith Carter, “How About D.D.T.,” *Nebraska Farmer*, July 6, 1946, 13.

the South Pacific were hospitalized, rendering them unable to fight.³ General Douglas MacArthur, frustrated after suffering a defeat at the hands of malaria during the Bataan Campaign, became hell-bent on eliminating malaria from his ranks. In early 1943, MacArthur initiated a massive malaria prevention program, in which he created special mosquito-control units designed to burn and oil mosquito vectors, and increased the shipping priority of antimalarial medicines to his frontlines. MacArthur's efforts eventually caught the attention of Congress and Major General James Magee, who instructed the Department of War Information to begin printing propaganda that warned troops that insects were as much of a threat to the Allied forces as the Germans or Japanese.

Due to fears that civilians would spread diseases to troops stationed on the home front, Magee's war against bugs also involved convincing American citizens to kill bugs. During the peak of the Pacific malaria epidemic, the Department of War Information produced hundreds of posters, films, and advertisements that likened the annihilation of insects in homes and gardens to victory overseas. These propaganda materials featured colorful images that depicted Japanese and Nazi soldiers as insects and instructed citizens that the elimination of both pests was necessary to win the war.⁴ The messages from Magee's propaganda campaign eventually made their way into the popular press, resulting in newspapers and magazines around the country calling for the annihilation of bugs for the sake of national security. Publications such as *Better Homes and Gardens* and *Science Newsletter* ran countless stories informing citizens on the most effective strategies for eliminating "insect saboteurs" from victory gardens and warned Americans to "shoot to kill" if they saw a bug in their home.⁵ Both the propaganda from the Department of War Information and the popular press's depictions of insects as enemy forces created a sense of urgency to eliminate mosquitoes on the home front and conveyed to the general public that killing bugs was as patriotic as working in a bomber factory or buying war bonds.

When the war concluded in fall 1945, the war on bugs did not abate, but rather, intensified. However, this new phase of the war did not involve killing bugs in order to defeat Nazis or Japanese. Instead, it was a campaign against a new enemy: insects that threatened the American family. During the war, the popular press informed citizens that killing bugs was tantamount to ridding the world of

³ Mary Ellen Condon-Rall, "Malaria in the Southwest Pacific in World War II, 1940-1944," in *Science and the Pacific War: Science and Survival in the Pacific, 1939-1945*, ed. Roy M. MacLeod (Dordrecht, Netherlands: Kluwer Academic Publishers, 2000), 58.

⁴ Office for Emergency Management, Office of War Information, "Enemies Both! It's your Job to Help Eliminate them," 1943. The National Archives at College Park, College Park. <https://research.archives.gov/id/514207>.

⁵ "Insect Saboteurs," *The Science News-Letter*, October 9, 1943, 238.

disease, and Americans began to envision the postwar years as a future without insect-borne illness. There would be no more mosquitoes to cause malaria, or fleas to spread typhus; the United States would be a safe environment to raise a family without fear of contracting a deadly or debilitating illness. The military's adoption of a new pesticide known as DDT made this world easier for citizens to imagine. Americans began reading about DDT after the chemical halted a typhus epidemic in Naples, Italy during the winter of 1943-1944 and newspapers promised that this new pesticide would end disease once and for all. DDT, Americans were told, was highly effective at killing insects, was cheap to produce, and had the added bonus of being non-toxic to humans and their pets. The chemical appeared to be the perfect weapon for protecting the sanctity of the new suburban household.

Pesticide companies played a large role in spreading this message. Companies like DuPont and Hercules garnered enormous profits from DDT production through military contracts in 1943 and desired to continue lining their pockets through domestic sales in the postwar years. Advertisers for these companies continued pushing the wartime message that killing bugs was essential to public safety and called on citizens to conduct a "total war" on insects in their front yards and suburban homes. Pesticide marketers introduced colorful advertisements that portrayed soldiers fighting bugs on the frontlines, used the growing medium of television to depict suburban women applying DDT to cribs and screen doors, and came out with easy-to-use consumer products like DDT paint and stick-on wallpaper. The marketing campaign proved highly effective, ensuring that the sense of enmity toward bugs did not subside in the postwar years, and masking a growing number of reports from entomologists warning of DDT's potential dangers—reports that eventually made their way into Rachel Carson's *Silent Spring*. The stage was set for one of the largest ecological disasters of the twentieth century.

The purpose of this essay is to trace the origins and consequences of America's obsession with killing insects during and after the Second World War. It begins by examining the connection between the malaria epidemic in the South Pacific and the heightened sense of urgency on the home front to eliminate bugs. The essay then proceeds to detail the development of DDT, its uses during the war, and depictions of the chemical within the popular press, which sparked enormous demand for the pesticide among American citizens. This essay then turns to the postwar era, when consumers finally gained access to DDT and the battle against insects hit a deadly peak. This section covers the role of the pesticide industry in promoting the idea that insects were a danger to human safety and examines how the corporations' marketing strategies carried the wartime determination to eliminate insects into the postwar era. By examining DDT's transition from a weapon of the United States military to a consumer product in the mid-1940s, this

essay argues that the Second World War and the postwar era constituted a war against insects, in which Americans viewed killing bugs as essential to the preservation of national security and human health. These tensions between insects and humans persisted until 1962, when Rachel Carson's *Silent Spring* demonstrated to Americans citizens and public officials that insects were necessary to the balance of nature and subsequently human health.

DDT and WWII

Early in the war, American field commanders stationed throughout the South Pacific realized they had underestimated the destructive power of mosquito-borne illness. The Surgeon General's Office had urged commanders to take efforts to drain stagnant water and burn mosquito vectors, but health officials lacked the authority to enforce these measures, resulting in most commanders ignoring the requests. One stubborn South Pacific commander berated a health official and told him that malarial prevention was a distraction, and that they were there "to kill Japs, and to hell with mosquitoes."⁶ Disregarding these recommendations proved to be a deadly mistake. At the time of their surrender at Bataan on April 9, 1942, Filipino-American forces reported over 24,000 current cases of malaria, with sixty-five percent of total troops stationed in the Philippines having undergone treatment for malaria within the past four months.⁷ General Robert L. Eichelberger stationed in Buna at the time of the epidemic commented on the destructive power of malaria on Allied forces. "Disease was a surer and more deadly peril to us than enemy marksmanship," he recalled, "we had to whip the Japanese before the malarial mosquitos whipped us."⁸ Douglas MacArthur echoed these sentiments in 1942 after his troops fell to malaria at a high rate during the Bataan campaign. "Doctor," he complained to health official P.F. Russell, "this will be a long war if every division I have facing the enemy I must count on a second division in the hospital with malaria and a third division convalescing from this debilitating disease!"⁹

By the end of 1942, five times as many troops had died from malaria than at the hands of Japanese forces, leaving commanders and health officials frantically searching for an immediate solution to the mosquito problem.¹⁰ In early 1943,

⁶ P.F. Russell, Introduction to *Preventive Medicine in World War II VI*, ed. Colonel John Boyd Coates, Jr. (Washington D.C.: Office of the Surgeon General Department of the Army, 1963), 9.

⁷ James Gillespie, "Malaria and the Defense of Bataan," in *Preventive Medicine in World War II*, 503.

⁸ Robert L. Eichelberger, *Our Jungle Road to Tokyo* (New York: Viking Press, 1950), 43.

⁹ P.F. Russell, Introduction, 3.

¹⁰ Judith A. Bennett, *Natives and Exotics: World War II and Environment in the Southern Pacific* (Honolulu, University of Hawai'i Press, 2009), 50.

MacArthur, frustrated after suffering heavy malaria casualties in Bataan and Papua, took measures to ensure that he would not suffer another defeat to mosquito soldiers. MacArthur increased the shipping priority of anti-malaria supplies, ordered his commanders to drain mosquito-infested swamps, and instructed soldiers to take preventive medicines.¹¹ Army Surgeon General James C. Magee also gained traction for the war against bugs. In January 1943, the same month MacArthur began his crusade against mosquitoes, Congress gave Magee permission to create special antimalarial units for deployment overseas. These units included teams of malariaologists, entomologists, and parasitologists to research the disease on military bases, and mosquito control units, which contained a sanitary engineer, and eleven enlisted men with specialized training in malaria prevention.¹² Magee's bug-fighting initiative also included a massive educational program, designed to prevent the spread of malaria among the civilian population and soldiers returning from the Pacific. Within ration containers, manuals, and matchbooks, the Department of War Information printed hundreds of propaganda images that called mosquitoes "Public Enemy #1," while various educational films and radio broadcasts charged soldiers to take precautions against malaria by draining stagnant ponds and wearing mosquito repellent.¹³ "Don't be a dummy," a 1943 Office of War Information advertisement exclaimed, "Avoid Malaria!"¹⁴

One of the consequences of Magee's propaganda campaign and the malaria epidemic in the Pacific was a heightened sense of urgency to kill insects on the home front. As newspapers and popular magazines instructed citizens to ration gasoline and purchase war bonds, they also emulated public health propaganda, calling on Americans to destroy any insects that had the potential to harm the war effort. An article in the *Sunday Morning Star* from April 25, 1943 warned Americans that their "victory gardens are sure to be invaded by insect enemies" and that planters "must be prepared to fight" by any means necessary.¹⁵ A *Science Newsletter* article singled out the Japanese beetle and the Hessian fly, an

¹¹ Robert J.T. Joy, "Malaria in American Troops in the South and Southwest Pacific in World War II," *Medical History* 43 (1999): 199-200.

¹² Oliver R. McCoy, "War Department Provisions for Malaria Control," in *Preventive Medicine in World War II VI*, 15-16.

¹³ Public Health Service, "Criminal At Large" (United States Office of Malaria Control, 1943), MPEG video, 12:59, https://ia800502.us.archive.org/35/items/CriminalAtLarge1943/Criminal-AtLarge1943_512kb.mp4.

¹⁴ Office for Emergency Management, Office of War Information, "Don't be a dummy, Avoid Malaria!," 1943. The National Archives at College Park, College Park, <https://research.archives.gov/id/514128>.

¹⁵ "Insects Threaten Attack on Victory Garden Plants," *The Sunday Morning Star*, April 25, 1943, 12.

Arthropoda originating from Asia, as “insect saboteurs” that aided the enemy by destroying American victory gardens and agricultural fields.¹⁶ The author concluded that citizens needed to take greater efforts to annihilate the “insect enemies” or American food supplies would dwindle. Other publications used racist rhetoric to connect fighting insects and to killing enemy soldiers. A *Life* magazine author referred to the Japanese beetle as the “Jap” beetle and attempted to draw similarities between the Japanese people and the insect:

Japanese beetles, unlike the Japanese, are without guile. There are, however, many parallels between the two. Both are small but very numerous and prolific, as well as voracious, greedy, and devouring. Both have single-track minds. Both are inscrutable, the beetles particularly.¹⁷

The solution to the bug problem, all the authors agreed, was to purchase and stockpile large quantities of pesticides to fight against the insect invaders. As the author of a victory garden manual published in the *New York Times* bluntly remarked, it would be a mistake “not to have a private drug store in your garage, stocked with Bordeaux mixture, lead arsenate, rotenone, pyrethrum, tobacco dust, tobacco juice, fine Sulphur, and Mex.”¹⁸

While popular publications assisted the military in spreading the message to eliminate insects for the war effort and national security, pesticide companies also joined in on the bug-killing fervor. In 1943, several chemical companies launched publicity campaigns designed to profit off the urgency to eliminate pests on the home front and ensure that Americans picked their products over those of their competitors. FLIT, a trademark of Standard Oil, created a number of different advertisements that attempted to push citizens to purchase their products by demonstrating how their pesticides were saving lives overseas. For example, a FLIT advertisement from 1943 reads, “Our soldiers are sure glad to get FLIT... They’re real weapons of war on many insect infected battle-fronts.”¹⁹ The ad drives home this insect-killing message with an image depicting a soldier writing a letter behind a barricade made out of boxes labeled FLIT, which separates him from

¹⁶ “Insect Saboteurs,” *The Science News-Letter*, October 9, 1943, 238.

¹⁷ Anthony Standen, “Japanese Beetle,” *Life*, July 17, 1944, 39.

¹⁸ L.H. Robbins, “Joe and Jane Novice: Are Sophomores Now,” *New York Times*, March 21, 1943, 14.

¹⁹ FLIT, “Honest, mom,” advertisement, May 7, 1943 in Georges Teyssot, ed., *The American Lawn* (New York: Princeton Architectural Press, 1999), 140.

mosquitoes with Japanese flags on their wings. “Honest, Mom,” the ad concludes, “If the FLIT hadn’t come we would have been eaten alive!”²⁰

FLIT also employed the expertise of rising cartoonist Theodor “Dr. Seuss” Geisel to help sell their products to civilians. Although Geisel had begun working for FLIT during the 1920s, his “Quick, Henry, The Flit!” and “Swat the Fly!” campaigns, which became popular slogans during the 1940s, evolved to include war-related imagery, with his cartoons depicting soldiers fighting insects in tanks or squashing bugs under their military boots. Geisel’s 1943 cartoons contributed greatly to spreading the message that bugs were bad and that destroying them with pesticides was essential to victory on the frontlines and at home. As one historian has noted, through Geisel’s cartoons “the public grew comfortable with the myth that pesticides were absolutely necessary” for an Allied victory.²¹

Citizens reacted to these calls to arms by purchasing large quantities of insecticides and taking greater measures to eliminate bugs from their homes and gardens. Arsenic, the consumers’ preferred choice due to its lethal potency, left the shelves at an unprecedented rate. In 1943, the War Production Board recorded the domestic sale of 51,235 short tons of arsenic, marking an over twenty percent increase from the previous year’s sale of just over 40,000 short tons.²² Arsenic based pesticides such as Paris Green reported the domestic sale of 2,265 short tons, while the Shepherd Chemical Company recorded a sale of 45,352 short tons of their lead arsenate insecticides, a record-breaking number for the Cincinnati based company.²³ When domestic arsenic sales outstripped production in early 1944, Americans had to adopt other strategies to destroy insects. Nebraska farmer Dena Thiesen Schmidt recalled the frustrations she felt after “army bugs” invaded her fields when her family was unable to acquire enough arsenic to eliminate the invaders. “We did everything we could think of,” she noted. “We made noises at the end of the field. We set up smoke pots. We tried everything to try to get rid of those army bugs.”²⁴ For Thiesen and the estimated twenty million victory gardeners on the home front, killing insects, even without pesticides, became vital to their participation in the war effort.²⁵

²⁰ FLIT, “Honest, mom,” 140.

²¹ Will Allen, *The War on Bugs* (White River Junction, VT: Chelsea Green Publishing, 2007), 114.

²² Allan Matthews and Louise R. Bryson, “Arsenic,” in *Minerals Yearbook, 1945*, ed. E. W. Pehrson and H.D. (Washington, D.C.: Government Printing Office, 1947), 753.

²³ Allan, “Arsenic,” 753.

²⁴ Transcript, Dena Schmidt, “Fighting Pests,” interview by Bill Ganzel, *Living History Farm*: http://www.livinghistoryfarm.org/farminginthe40s/pests_01.html.

²⁵ Joy Aschenbach, “Victory Gardens that Sprouted in Wartime Still Feed the Body and Soul,” *Los Angeles Times*, October 4, 1992.

While the war on bugs was underway on American soil, back in the Pacific military planners hit a significant roadblock regarding the supply of preventive medicine and pesticides for the troops. Prior to the war, the United States had relied on Japanese supplies of *chrysanthemum cinerariifolium* flowers to produce an early insecticide known as pyrethrum. After the attacks on Pearl Harbor, these supplies dwindled as the Japanese cut off exports to the United States, which left the War Department reliant on smaller pyrethrum reserves from Kenya.²⁶ Quinine, one of the oldest antimalarial compounds, was also hard to secure. In spring 1942, Japanese forces annexed the East Indies, including the island of Java, where the United States acquired the bulk of its quinine supplies. The War Department, however, had anticipated the quinine shortage before the war and stockpiled supplies of a preventive medicine known as Atabrine, which German troops first employed during the First World War.²⁷

Despite larger supplies, Atabrine did not provide an immediate remedy to the mosquito problem. Like the commanders in the Pacific who ignored public health officials early in the war, many soldiers ignored orders to take the medication because of its adverse side effects. Troops reported that after taking their 100mg tablet, they experienced diarrhea, vomiting, cramps, and yellowing of the eyes and skin, which made them “appear Japanese.”²⁸ Instead of dealing with these debilitating effects, troops often hid the tablets under their mattresses, leaving soldiers susceptible to malaria despite the control efforts.²⁹ With Atabrine’s effectiveness still questionable and other preventive medicines and pesticides held hostage by the Japanese, the U.S. military looked for a better solution to the bug problem.

To the relief of scientists working in the military’s Office of Scientific Research and Development, who frantically tested every chemical they could find in order to discover a suitable alternative to quinine and pyrethrum, a group of Swiss chemists soon found a solution to the military’s bug problem. In late 1939, scientists working for J.R. Geigy S.A. of Basel, Switzerland began experimenting with a number of chemicals to combat nuisance moth populations that were destroying Swiss wool supplies. During these tests, Geigy staff chemist Paul Müller stumbled upon a chemical first discovered by a German student during the late nineteenth century known as dichlorodiphenyltrichloroethane (DDT). While the student never synthesized the chemical or mentioned its insect-killing

²⁶ Edmund P. Russell III, “The Strange Career of DDT: Experts, Federal Capacity, and Environmentalism World War II,” *Technology and Culture* 40 (1999): 6.

²⁷ James Phinney Baxter, *Scientists Against Time* (Cambridge, M.A.: The MIT Press, 1968), 307.

²⁸ Robert G. Thobaben, ed., *For Comrade and Country: Oral Histories of World War II Veterans* (Jefferson, N.C.: MacFarland, 2003), 115.

²⁹ Thobaben, *For Comrade and Country*, 115.

properties, Müller felt optimistic about the chemical and began testing the compound in September of 1939. His tests provided clear evidence that DDT was a powerful insecticide. Müller found the substance had “extraordinary contact-killing power, as well as long duration in the out-of-doors, where the compound was exposed to weathering.”³⁰ Geigy began synthesizing DDT in October of 1939 and the company provided the pesticide to local farmers to destroy moths and another nuisance bug, the Colorado potato beetle, which had been wreaking havoc on Swiss food supplies.³¹

For the next two years, DDT remained in Switzerland fighting moths and the Colorado potato beetle, but, on October 16, 1942, Geigy scientists recognized the US’s dire need for a pyrethrum alternative and sent a six-pound DDT sample to a USDA lab in Orlando, Florida. Entomologists at the USDA lab began testing DDT as soon as the samples arrived.³² The tests, historian Edmund Russel noted, “made DDT look ‘magical’.”³³ One scientist reported that after applying DDT powder to a pond, ducks in the region carried enough DDT on their bodies to kill mosquito larvae in adjacent ponds. Other tests provided clear evidence that DDT was superior to pyrethrum. After spraying a liquid variant on lab walls, scientists determined that the compound not only lasted four times longer than pyrethrum—killing mosquito larvae for up to four months—but it also killed a wide variety of insects including moths, lice, bedbugs, flies, and cockroaches.³⁴ Additionally, after the Orlando scientists determined DDT’s chemical composition, they discovered that the materials needed to mass produce DDT were readily available within the United States, which would lessen the military’s dependence on uncertain foreign chemical supplies.³⁵

There remained, however, the question of the chemical’s safety. Through their rigorous testing, the Orlando scientists uncovered a number of contradictory outcomes and had yet to determine if DDT was safe for human use. One early test found that large quantities of DDT produced “nervousness, convulsions, or death” among guinea pigs and rabbits, while a later test indicated that the chemical had no apparent effects on primates.³⁶ Orlando scientists remained optimistic. Throughout

³⁰ John H. Perkins, “Reshaping Technology in Wartime: The Effect of Military Goals on Entomological Research and Insect-Control Practices,” *Technology and Culture* 19 (1978): 170.

³¹ Paul H. Müller, “Dichloro-diphenyl-trichloroethane and Newer Insecticides” (Nobel Lecture, the Nobel Foundation, Stockholm, Sweden, December 11, 1948). Accessed October 16, 2015, http://www.nobelprize.org/nobel_prizes/medicine/laureates/1948/muller-lecture.pdf.

³² Müller, “Dichloro-diphenyltrichloroethane.”

³³ Russell, “The Strange Career of DDT,” 6.

³⁴ *Ibid.*, 6.

³⁵ *Ibid.*, 7.

³⁶ *Ibid.*, 7.

the three-month test period, researchers working closely with the chemical displayed no adverse side effects and through their experiments with a powder variant, the scientists determined that little DDT absorbed into human skin. The tests provided no clear indication that the pesticide was entirely harmless, but with no alternative to pyrethrum, the Orlando lab believed DDT was the best solution for the military. H.O. Calvery of the FDA summarized these feelings after he recommended that the military adopt DDT in May of 1943. "The hazards," Calvery argued, "must be weighed against the great advantages of the materials."³⁷ By December of 1943, the War Production Board felt convinced about DDT's wartime use and ordered the domestic production of the chemical, providing four companies with permits to expand their facilities to include DDT.³⁸

The timing of the military's adoption of DDT proved fortuitous for Allied forces. As the War Production Board finalized their plans for DDT production, a massive typhus outbreak in Naples, Italy, during the winter of 1943 threatened to wipe out the city's entire population. When Allied forces pushed the Nazis out of the city, the Germans destroyed buildings, water and sewer systems, and food supplies as they retreated from the region. The Nazis' destruction forced the Neapolitans to live in overcrowded, louse-infested bomb shelters, which served as the perfect vector for typhus to spread among the occupants. As the winter progressed, conditions grew steadily worse, and the typhus mortality rate rose to over seven hundred recorded deaths in the first week of January 1944 alone.³⁹ General Dwight D. Eisenhower, commander of the Allied forces in North Africa and Italy, recognized that typhus posed a significant threat to his operations and cabled Washington with a request for "seventeen tons of [DDT] concentrate."⁴⁰ By December 21, 1943, only two weeks after his cable, Eisenhower had received his supplies and the Allies began the largest delousing program in recorded history. Between December 21, 1943 and January 31, 1944, the Typhus Control Commission applied DDT powder to the clothing of over 1,300,000 citizens at two delousing stations in Naples.⁴¹ The results were astonishing. Within three weeks of

³⁷ H.O. Calvery quoted in *Ibid.*, 7.

³⁸ Baxter, *Scientists Against Time*, 369.

³⁹ F.L. Soper et al. "Typhus Fever in Italy, 1943-1945, and its Control with Louse Powder," *The American Journal of Hygiene* 45 (1947): 307-12.

⁴⁰ Stanhope Bayne-Jones memorandum of January 13, 1944, quoting secret radiogram no. W 9560/252555 of 8 January 1944, folder "DDT Supply," box 41, USATC, quoted in Darwin H. Stapleton, "A Lost Chapter in Early History of DDT: The Development of Anti-Typhus Technologies by the Rockefeller Foundation's Louse Laboratory, 1942-1944," *Technology and Culture* 46 (2005): 513.

⁴¹ O.T. Zimmerman and Irvin Lavine, *DDT, Killer of Killers* (Rochester, N.H.: The Record Press, 1946), 2.

the delousing program's creation, the Allies had complete control over the typhus epidemic and reduced the number of recorded cases to only ten per day. The delousing program marked the first time that a typhus epidemic had been checked during the winter, all thanks to the new "miracle pesticide," DDT.

With the typhus epidemic averted in the European Theater and DDT's value for military strategy proven, scientists began devising ways in which the insecticide could assist MacArthur in the Pacific. Unlike in Naples, where the army was mostly stationary and could use DDT powder on the clothing of civilians and soldiers, MacArthur's forces in the Pacific had much more ground to cover due to his island-hopping strategy. While powder could help, the Pacific troops needed a more effective solution that could eliminate mosquito threats over larger areas quickly. As one Orlando researcher put it, powder was ill suited for the "highly mobile type of warfare" in the Pacific, so the present situation called for the development of new technology.⁴² Orlando researchers had previously worked on a number of technologies that would allow for mosquito control through aerial bombardment with pyrethrum, but the lab abandoned these projects because the "gallonage [of pesticides] required was so great" that it made "aerial application impractical."⁴³ DDT solved this issue. It was readily available, effective, and cost efficient, allowing scientists to expand the aerial program following the Naples epidemic. Orlando engineer Chet Husman and pilot Olin Longcoy came up with a number of modifications for the disbursement of DDT from military planes including the "Flying Flit Gun," a mountable pesticide nozzle that could fit on most military aircraft.⁴⁴ When the flying flit gun made its debut in the Pacific Theater, troops used the device liberally. From early spring 1945 until the end of the war, MacArthur's forces attached the sprayer to their Avenger torpedo bombers and sprayed the entire islands of Saipan, Peleliu, Iwo Jima, and several others in parts of the Philippines and Okinawa, eliminating entire mosquito populations.⁴⁵ With the ability to annihilate mosquitoes, flies, ticks, and other insects that posed a threat to armed forces, MacArthur's strategy of island hopping became a bug-free affair. By the summer of 1945, malaria rates in the South Pacific had fallen

⁴² Bureau of Entomology and Plant Quarantine, "Insecticides and Insect Repellents Developed for the Armed Forces at Orlando, Florida Laboratory," *Rockefeller Foundation*, (1945): 22.

⁴³ Fred C. Bishopp, "Present Position of DDT in Control of Insects of Medical Importance," *American Journal of Public Health* 36 (1946): 599.

⁴⁴ Gordon M. Patterson, *The Mosquito Crusades: A History of the American Anti-Mosquito Movement from the Reed Commission to the First Earth Day* (New Brunswick: Rutgers University Press, 2009), 160-161.

⁴⁵ Anthony Standen, "DDT: It will not rid the world of insect pests but it is still a wonder bug killer," *Life*, July 8, 1946, 50; "Flying Flit-Gun Strafes Insects with DDT," *Popular Science*, May 1945, 155.

significantly since the 1943 epidemic, with only twenty-five cases per one thousand troops for the remainder of the war.⁴⁶

Back on the home front, despite attempts to keep DDT's existence a military secret, news outlets eventually caught wind of the pesticide's wartime accomplishments through various leaks, and reviews for the chemical flooded into articles around the country.⁴⁷ *Reader's Digest* informed its readership that the army's new miracle pesticide achieved "total victory on the insect front" in Naples and the South Pacific.⁴⁸ An article in *Life* magazine extolled the benefits of DDT in the Pacific Theater, arguing that the military's use of the chemical in the Philippines proved the insecticide "could easily convert a verminous hellhole of an island into a health resort."⁴⁸ The same author contended that DDT was so effective in North Africa that the Africans had "their first itchless night's sleep in centuries."⁴⁹ A number of authors drew parallels between DDT and the great medical achievements of the twentieth century. *Better Homes and Gardens* argued that the "deadly new bug killer" was "as potent against insects as the sulfas and penicillin are against disease."⁵⁰ Similarly, an editorial in the *Chicago Tribune* contended that DDT "gives every evidence of being as miraculous a substance as the sulfa drugs or penicillin. It is harmless to humans and warmblooded animals, yet fatal to a wide variety of insects."⁵¹

With such rave reviews in the popular press, a number of articles speculated about the application of the chemical in postwar America. The author of an article in *Popular Science* from May 1945 said DDT might become the greatest consumer product to emerge from the war. "Picture an American home a few years after the war," the author told his readers, "flies, mosquitoes, moths, and other insects die as fast as they sneak in." This "sweet dream," as the author described the imagined world without bugs, would soon be a reality, once "Mr. and Mrs. Postwar America and their family" got their hands on DDT.⁵² Another article predicted that DDT would "send malaria mosquitoes, typhus lice and other disease-carrying insects to join the dodo and the dinosaur in the limbo of extinct species, thereby ending these

⁴⁶ Oliver R. McCoy, "War Department Provisions for Malaria Control," 16.

⁴⁷ For information on DDT leaks to the press see Edmund Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (Cambridge: Cambridge University Press, 2001), 126.

⁴⁸ "Coming: Freedom From Insect Pests," *Reader's Digest*, May 1944, 44.

⁴⁹ Standen, "DDT," 52.

⁵⁰ "DDT... A Deadly New Bug Killer," *Better Homes and Gardens*, May 1944, 19.

⁵¹ Editorial, *Chicago Tribune*, April 1944, 135.

⁵² Arthur Bartlett, "Chemical Marvels Take: From DDT and Other War Developments, Homes Get Promise of Such," *Popular Science*, May 1945, 150.

particular plagues for all time.”⁵³ *Popular Mechanics* felt optimistic that DDT would bring about a bug-free world, but believed the postwar years would be “Our Next World War,” in which a “long and bitter battle to crush creeping, wriggling, flying, burrowing billions” would emerge.⁵⁴ However, the article reassured readers that chemical companies would make new bug-killing technologies like the aerosol “bomb” widely available to consumers after the war to aid in this struggle. Even federal entomologists noted in 1944 that DDT had received such “wide publicity in popular press, over the radio, and on the screen” that the public had expectations that the chemical would completely annihilate pests in their “houses, gardens, and orchards.”⁵⁵

The pesticide companies could not have been happier about the praise for their product. At a meeting for the National Association of Insecticide and Disinfectant Manufacturers, one pesticide company executive enthusiastically shouted “Bugs! Bugs! Bugs! All through the war, bugs and how to kill them received a billion dollars’ worth of publicity— every dollar of it a mightily valuable sales asset to the insecticide industry.”⁵⁶ A Hercules representative offered a similar remark when he informed the crowd of the greater demands the war created for pesticides among civilians. “It is only within the past war years that the American people have become insecticide conscious,” he noted, “and this has been largely due to insistence by the Army and Navy that our troops should not fall prey to typhus, malaria, and other insect-borne diseases.”⁵⁷ For these pesticide executives, there was no need to engage in massive publicity campaigns during the war. The media had already created demand for their product, and all these companies had to do was sit back, wait out the war, and prepare for the inevitable postwar pesticide boom.

The Post-War Era

When the war with Japan began to wind down in early August 1945, Americans gave DDT a hero’s welcome as it returned from overseas.⁵⁸ Newspapers around the country hailed the new pesticide as the “killer of killers,” “the atomic bomb of the

⁵³ “DDT can Wipe out Plagues,” *Science News-Letter*, July 8, 1945, 147.

⁵⁴ “Our Next World War Against Insects,” *Popular Mechanics*, April 1944, 66-67.

⁵⁵ R.C. Roark and N.E. McIndoo, *Digest of the Literature on DDT through April 30, 1944* (Washington D.C.: United States Bureau of Entomology and Plant Quarantine, 1944), 4.

⁵⁶ Preliminary Draft, Second Meeting of the OSRD Insect Control Committee, 27 Jan. 1945, 3-5, quoted in Russell, *War and Nature*, 155.

⁵⁷ *Ibid.*, 155.

⁵⁸ James C. Whorton, *Before Silent Spring: Pesticides and Public Health in Pre-DDT America* (Princeton: Princeton University Press, 1979), 249.

insect world,” and “the greatest contribution to the future health of the world” to emerge from the war.⁵⁹ *Time* praised the miracle chemical as one of the most important scientific discoveries in human history and placed images of MacArthur’s aerial pesticide sprayers alongside photographs of mushroom clouds from the first atomic bomb explosion in the New Mexico desert, demonstrating how equally significant the two innovations were for the Allied victory.⁶⁰ The atomic bomb and DDT were the two technological icons of the Second World War, but, unlike nuclear weaponry, DDT was slated for domestic sales.

When DDT became available to Americans in early August 1945, consumers throughout the country rallied around the new pesticide. Citizens who had been “pawing the ground in eagerness” for DDT since its debut in Naples purchased the pesticide in large quantities.⁶¹ By the end of 1945, DDT sales skyrocketed with chemical companies such as Merck reported over \$61.1 million in domestic sales and over thirty million pounds of DDT sold to consumers and farmers between August and December.⁶² Demand for the product was so great that stores had difficulty keeping it in stock. Americans, a *Collier’s Weekly* article noted, are “raiding the stores for every can that shows its top above the counter.”⁶³ Residents of Swarthmore, Pennsylvania became so desperate to get their hands on DDT that they purchased counterfeit products from a local chemist, who produced the chemical in his cellar and sold the pesticide for \$1 per pint to his neighbors. While some Americans bought the chemical from stores or illegal vendors, others sought to usher in the new age of insect warfare ceremonially. After local officials of Mackinac Island, Michigan sprayed the entire town with DDT, residents burned their old flytraps in a massive public bonfire to celebrate the extinction of pesky summertime flies.⁶⁴ Within a few short months after its release, DDT had grabbed ahold of American consumers and the pesticide companies were going to make sure it stayed that way.

The initial marketing strategy among pesticide companies was simply to continue using war imagery to sell the insecticide. The majority of DDT advertisements that followed the pesticide’s civilian release referenced its effectiveness during the war. This strategy ensured that consumers understood that

⁵⁹ Zimmerman, *DDT, Killer of Killers*; C.H. Curran, “DDT— The Atomic Bomb of the Insect World,” *Natural History*, November 1945, 401; James Simmons, “How Magic is DDT?,” *Saturday Evening Post*, January 6, 1945, 18.

⁶⁰ “Science: War on Insects,” *Time*, August 27, 1945, 65.

⁶¹ Sidney Margolius, “DDT is No Cure All,” *Collier’s Weekly*, November 17, 1945, 27.

⁶² Perkins, “Reshaping Technology in Wartime,” n.45; Center for Integrated Pest Management, “Pesticide Usage in the United States,” *CIPM Technical Bulletin* 105 (2003): 43.

⁶³ Margolius, “DDT is No Cure All,” 27.

⁶⁴ “Science: War on Insects,” 65.

the product they were purchasing was the same chemical that helped win the fight against wartime disease and the Axis Powers. Advertisements for products like Industrial Management Corporation's new DDT aerosol bug bomb, known as INSECT-O-BLITZ, a name used to emphasize the effectiveness of the product, told consumers that the product "kills moths, all mosquitoes, all gnats and other disease bearing flying insects THE U.S. ARMY WAY."⁶⁵ The advertisement guaranteed that consumers understood this was the product from the war by noting that INSECT-O-BLITZ contained the exact "formula used by [the] U.S. Army to protect men overseas."⁶⁶

Other companies also made sure that consumers knew they were buying a brand that helped win the war. The Bridgeport Brass Company sold their Aer-A-Sol one-pound bomb by emphasizing that the company had "made millions of these for the armed forces," and that their product bombed "malaria mosquitoes off Guadalcanal," which led to a seventy-percent drop in malaria casualties among Allied troops in the region.⁶⁷ Television and films drove these war effort messages home. Sherwin Williams created a number of short films and commercials for their Pestroy DDT brand that played in movie theaters throughout the United States. The opening scene for one such commercial showed footage of soldiers spraying Pestroy DDT from airplanes and foggers in the Pacific, and emphasized to viewers that the product "had saved millions of humans" and "killed billions of insects" during the war.⁶⁸

Although the war provided chemical companies with an easy marketing tool, leaders within the pesticide industry understood that they needed to maintain demand for their products. They did not want the wartime urgency to kill bugs to die down in the months after the Pacific conflict ended. Since there were no longer Axis powers or "insect saboteurs" in victory gardens to serve as common enemies for Americans, the chemical companies devised a new foe: diseases that threatened the American family. Around the middle of 1946, war imagery began to disappear from DDT marketing in favor of advertisements that extolled the benefits of killing insects for the sake of preserving human health. Penn Salt Chemicals of Philadelphia, for example, published an advertisement in *Time* magazine for their Knox-Out DDT powder that depicted a woman, produce, and farm animals happily

⁶⁵ Industrial Management Corporation, "INSECT-O-BLITZ" Advertisement, *Spokesman-Review*, July 31, 1947, 25.

⁶⁶ Industrial Management Corporation, "INSECT-O-BLITZ," 25.

⁶⁷ The Bridgeport Brass Company, "Aer-A-Sol 'BOMB' DDT Insecticide" Advertisement, *The Bakersfield Californian*, November 21, 1945, 4.

⁶⁸ Jerry Fairbanks, "Doomsday for Pests" (Sherwin-Williams Paints, 1946), MPEG video, 14:43, <https://archive.org/details/DoomsdayForPests>.

dancing while singing, “DDT is good for me-e-e-e!”⁶⁹ Penn Salt Chemicals claimed that purchasing their product led to “healthier and more comfortable homes” because it protected families from dangerous insects like flies, mosquitoes, ticks, and silverfish, which the company noted did not spread disease, but were such common pests that they included them in the list.⁷⁰ Other advertisements used fearmongering tactics to instill urgency in consumers and sell their products. “Do roaches spread cancer?” asked an advertisement for Tanglefoot spray, containing five-percent DDT powder, insinuating that cockroaches threatened humans and that eliminating them would wipe out cancer.⁷¹ Trimz DDT used a similar tactic against fleas, claiming that a single flea carried “6,600,000 bacteria” and that these germs spread typhus and polio to humans.⁷²

The intended audience for these advertisements was suburban women. Almost all of the advertisements that called for the destruction of bugs within homes and yards depicted suburban women wielding DDT products, spraying or dusting DDT around baby cribs or within the kitchen. Bison marketed its DIDIT spray under the phrase “The Ladies Know What’s Good!” and informed consumers that thousands of housewives across the country deemed their product to be the most effective way to kill disease-carrying insects.⁷³ One advertisement for Fly-Tox DDT spray featured a child peacefully sleeping in a crib with a giant fly over the baby’s head. The advertisement informed consumers that their “child [was] defenseless unless” they sprayed or dusted their nursery with DDT.⁷⁴ Other advertisements offered more direct messages, using phrases such as “Protect your Children!” and “For the Sake of Your Health KILL THEM,” and contained lists of various disease-propagating bugs that could be easily eliminated with DDT products.⁷⁵

While disease served as a useful foe for a number of pesticide companies, other companies claimed that their products lessened the burden of the suburban homemaker. Like the advertisements for timesaving appliances such as blenders, washing machines, and microwaves, chemical companies spread the message that

⁶⁹ Penn Salt Chemical, “DDT is good for me-e-e-e!” Advertisement, *Time*, June 30, 1947.

⁷⁰ Penn Salt Chemical, “DDT.”

⁷¹ Tanglefoot, “Do roaches spread cancer?” Advertisement, ca. 1950.

<http://i.imgur.com/0zjUGzp.jpg>.

⁷² Trimz, “PROTECT YOUR CHILDREN Against Disease-Carrying Insects!” Advertisement, *Woman’s Day*, June, 1, 1947, 69.

⁷³ Bison Laboratories, “The Ladies Know What’s Good!” Advertisement, ca. 1950, *Envisioning the American Dream*.

<https://envisioningtheamericandream.files.wordpress.com/2012/06/chemical-ddt-collage.jpg>.

⁷⁴ Fly-Tox, “Your Child is Defenseless Unless,” *Ladies Home Journal*, July 1955.

⁷⁵ Trimz, “PROTECT YOUR CHILDREN,” *Woman’s Day*.

DDT made housekeeping easier and more convenient. In a commercial for Sherwin William's DDT synthetic wall coating, the narrator emphasized how much time homemakers could save by using their product. "Unlike sprays and fogs that irritate the nasal passages...and require daily applications," the commentator states, Pestroy DDT "lasts week after week, month after month" and can be easily applied to screen doors and windows.⁷⁶ DuPont Chemical printed a story in their monthly magazine highlighting the timesaving advantages of DDT over older pesticides such as pyrethrum. "The discomfort and the chore of constant spraying...belong to an older day," the author contended. With DuPont's DDT home powder, the author claimed, it was no longer necessary to conduct daily sprayings, as DDT's "long-time killing power" made the product more advantageous than older pesticides.⁷⁷ Such advertisements told their readers that DDT was not only superior to older pesticides, but also that its persistence in the environment offered timesaving solutions to busy housewives.

Although pesticide executives were united in their adoption of marketing strategies toward women and against disease, they also vied against each other, seeking ways to make consumers purchase a given brand over its competitors. While only four companies held exclusive rights to DDT during the war, by 1945 the USDA listed fourteen companies as primary DDT producers, with an additional 261 small businesses joining the insecticide industry by 1954. This increase in the number of DDT producers left the companies scrambling to differentiate themselves.⁷⁸ Additionally, a number of pesticide companies flooded the market with new synthetic organic pesticides, an attempt to create a more powerful successor to DDT. As early as 1946, *Popular Science* began advertising new pesticides such as Hexi-kol, which claimed to be four times stronger than DDT, and DFDT, a pesticide sold under the claim that it was as safe as DDT, yet could "kill houseflies better than DDT."⁷⁹

In response to these new pesticides and the competition between DDT producers, pesticide companies devised a number of new technologies for their products, designed to set themselves apart from the competition. Since DDT was a versatile chemical—effective in both its powder and liquid form—companies used this fact to their advantage. Penn Salt Chemical developed a handful of variants for the chemical's liquid form, including an invisible polyurethane coating, and listed a number of potential uses for the product, such as screen doors, windows,

⁷⁶ Fairbanks, "Doomsday for Pests."

⁷⁷ George Albee, "DDT Yesterday and Today," *DuPont Magazine*, August-September 1946, 4-5.

⁷⁸ Perkins, 182-183.

⁷⁹ Hexi-kol Advertisement," *Popular Science*, October, 1946, 49; "New Poison Kills Pests," *Popular Science*, December, 1947, 224.

doorways, cupboards, gym lockers, and pianos.⁸⁰ Trimz created DDT stick-on wallpaper that featured Disney characters like Bambi and Mickey Mouse, designed for a child's nursery.⁸¹ In 1948, a number of different companies developed DDT fog machines that supposedly could coat an entire yard or field ten times faster than application with traditional spray guns and at ten percent of the cost.⁸² Aside from new technology, another strategy to differentiate their brand was to increase the dosage of DDT within their products. While government standards required pesticide companies to have at least five-percent DDT in their products, Pestroy increased its formula to six-percent DDT, a marketing strategy that the company promised would kill bugs more effectively than their competitors.⁸³ While scientific testing during the war demonstrated that only five-percent DDT was required to acquire the chemical's maximum effect, pesticides labeled with six percent would undoubtedly entice consumers, who would believe they were buying a stronger product for the same price.

The marketing strategies that brought about new pesticide technology also overshadowed the growing reports from the scientific community warning about DDT's potential dangers to humans and the environment. As early as August 1945, magazines ran stories describing the aftermath of regions sprayed with DDT. After the army tested DDT on a military installation in Newark, New Jersey in 1945, the *New York Times* reported that hundreds of dead fish washed up on shore due to DDT poisoning.⁸⁴ Military scientists discovered the first case of DDT poisoning in a human test subject in April 1945 and argued for greater research efforts to determine the long-term effects of the pesticide on mammals.⁸⁵ Following the pesticide's release to consumers, reports describing the chemical's dangers became more frequent. *Popular Science* published an article in 1946 entitled, "Don't Do This," arguing that, when consumed, DDT posed a severe health risk to animals and small children.⁸⁶ The author reported that overusing DDT directly harmed humans and animals, as the chemical lingered in fatty tissue for extended durations. Overuse led to the presence of DDT in the butter and cream of farm animals, putting human consumers at further risk.

Aside from the dangers to human health, frequent reports noted DDT's ability to disrupt ecosystems due to the chemical's indiscriminate killing of

⁸⁰ Penn Salt Chemical. "So... You wouldn't hurt a fly!" Advertisement, *Life*, May 31, 1946, 102.

⁸¹ Trimz, "PROTECT YOUR CHILDREN."

⁸² John Dos Passos, "Revolution on the Farm," *Life*, August 23, 1948, 95-104.

⁸³ Sherwin Williams, "Blitzes Bugs!" Advertisement, *Woman's Day*, June 1, 1947, 102.

⁸⁴ "Fish Killed By DDT in Mosquito Tests," *New York Times*, August 9, 1945, 23.

⁸⁵ V.B. Wigglesworth, "A Case of D.D.T Poisoning in Man," *British Medical Journal* (April 14, 1945): 517.

⁸⁶ "Don't Do This," *Popular Science*, February 1946, 71-74.

beneficial insects. In his essay, “DDT: the Insect-Killer That Can Either Boon or Menace,” naturalist Edwin Way Teale offered a grim depiction of America’s future if consumers failed to limit their DDT use. “If insects, the good, bad, and indifferent insects, were wiped out in a wide area,” Teale warned, “the effects would be felt for generations to come.”⁸⁷ He argued that killing insects, no matter how bothersome humans considered them to be, destroyed songbird populations that depended upon insects for food, as well as plants whose seeds required insects for pollination. Teale concluded that DDT could potentially save lives through controlled use, but the pesticide could also destroy entire ecosystems if its use went unregulated. “No drought, no flood, no hurricane could cause the widespread disaster that would follow in the train of the annihilation of the insects,” he contended.⁸⁸

For every article like Teale’s warning that DDT would upset the balance of nature, there were dozens more dismissing these claims as hysteria. *Reader’s Digest* called Teale’s contentions that DDT would upset the balance of nature “fantastic myths.”⁸⁹ A DuPont representative concurred with *Reader’s Digest* and gave an interview for *Fortune* magazine in which he denied DDT’s dangers outright. “Even though there was some anti-DDT talk,” he told the magazine, “most of it was unfounded. There has also been a scare about the ‘balance of nature,’ but this is based on a fallacy: there really is no such balance.”⁹⁰ The DuPont representative argued that if DDT was as toxic as Teale claimed, then federal agencies would have required a “skull and crossbones on its label.”⁹¹ Chemical engineer OT Zimmerman did not deny the existence of a balance of nature, but he was adamant that DDT would actually improve America’s environment. In his widely read handbook on the pesticide, *DDT, Killer of Killers*, Zimmerman noted that most of the insects that DDT killed were actually invasive species. He contended that, in using DDT to eliminate foreign insects, like the infamous Japanese beetle, there was a greater “chance that it [would] be for the better.”⁹² Zimmerman thought it was preposterous that DDT would destroy beneficial insects. Even if the United States paid the estimated three billion dollars to spray the entire continent with DDT, he argued, “We would soon find billions of

⁸⁷ Edwin Way Teale, , “DDT: the Insect-Killer that can Either Boon or Menace,” *Nature*, March 1945, 162.

⁸⁸ Teale, “DDT,” 162.

⁸⁹ Lois Mattox Miller, “What You Should Know About DDT,” *Reader’s Digest*, November 1945, 84.

⁹⁰ *Fortune*, January 1946, 45.

⁹¹ *Fortune*, 46.

⁹² Zimmerman, 137.

insect immigrants entering this country from Canada and Mexico.”⁹³ To Zimmerman, “The fear that DDT will destroy the balance of nature was unjustified” because insects will always migrate and reproduce quicker than the entire population could be eliminated.⁹⁴

The debates over DDT’s potential threats to human health and the environment that emerged in the wake of the Second World War eventually caught the attention of nature writer and Fish and Wildlife Service biologist Rachel Carson. Carson first spoke out against DDT in a *Reader’s Digest* article in 1945, but it was not until she received a letter from her friend Olga Owens Huckins in 1958 that she decided to focus her efforts on denouncing the pesticide. Within her letter, which was later published in the *Boston Herald*, Huckins described to Carson the mass poisoning of wildlife that she witnessed after the Massachusetts state government conducted an aerial DDT spraying near her home. Huckins informed Carson that the morning after the supposedly “harmless shower bath” of DDT, she discovered dozens of dead songbirds scattered throughout her yard, as well as dead trout floating in a nearby stream. After reading Huckins’s account, Carson realized she needed to help put a stop to the indiscriminate spraying of pesticides and began collecting research on the destruction wrought by pesticides on the environment.⁹⁵

Carson compiled her findings into a book, *Silent Spring*, which became an instant sensation after its publication in September 1962, selling over half a million copies and remaining on the best-seller list for thirty-one weeks.⁹⁶ The success of Carson’s book derived from her ability to synthesize scientific evidence about the dangers of overusing pesticides in clear and understandable language, allowing the book to appeal to the general public. One of the messages that Americans took away from *Silent Spring* was that the chemical companies’ claim that DDT would bring about a world without disease was a fallacy. In fact, Carson demonstrated to her readers that DDT actually increased the likelihood of disease among humans and wildlife. She warned her readers how DDT’s persistence within the environment allowed the chemical to enter the food chain and accumulate in the fatty tissues of wildlife and humans, resulting in cancer and other forms of genetic damage. Her opening chapter, “A Fable of Tomorrow,” depicted a nameless American town where DDT had “silenced” all life including fish, birds, and children. This introduction provided her readers with a powerful example of the

⁹³ Ibid., 138.

⁹⁴ Ibid., viii.

⁹⁵ Olga Owens Huckins to the Editor of the *Boston Herald*, January 28, 1958. Beinecke Digital Collections, Yale University: <http://brbl-zoom.library.yale.edu/viewer/1096584>.

⁹⁶ Russell, *War and Nature*, 222.

pesticide's indiscriminate destruction and allowed Americans to realize that this fictional setting could represent any number of towns in which DDT was used overzealously. Carson also criticized the link between consumerism and pesticide use that emerged in the postwar era:

Every hardware store, garden-supply shop, and supermarket has rows of insecticides for every conceivable horticultural situation. Those who fail to make wide use of this array of lethal sprays and dusts are by implication remiss, for almost every newspaper's garden page and the majority of the gardening magazines take their use for granted.

Although it was not Carson's intention to ban all chemical insecticides, she strongly believed that DDT's enormous consumer market had placed "poisonous and biologically potent chemicals into the hands of persons largely or wholly ignorant of their potential for harm" and urged the government to place greater restrictions on DDT use.⁹⁷

Silent Spring marked the beginning of the end for DDT and its role in the war on bugs. Following the book's publication, President John F. Kennedy, who felt disturbed by the excerpts he read in *The New Yorker*, requested that the Life Sciences Panel of the President's Science Advisory Committee investigate Carson's research. On May 15, 1963, the Committee released its report, validating Carson's claims and combating the chemical industry's vehement opposition to *Silent Spring*. The following day, a Senate Subcommittee met to discuss the dangers of pollution within American society, which included hearings on domestic pesticide regulations. In early June, the Subcommittee asked Carson to speak before Congress, where she urged the government to create a pesticide commission to regulate chemical insecticide use within the United States.⁹⁸ In her testimony, Carson called for the end of mass aerial DDT spray campaigns and asserted that pesticide use violated the most basic of human rights: the "right of the citizen to be secure in his own home against intrusion of poisons applied by other persons."⁹⁹ Carson lost her battle against breast cancer less than a year after her testimony, but her words resonated within American society for years to come. In 1970, the United States government established the Environmental Protection

⁹⁷ Rachel Carson, *Silent Spring: 40th Anniversary Edition* (Boston: Houghton Mifflin Company, 2002), 1-3, 176, 12.

⁹⁸ Testimony of Rachel Carson, Hearings before the U.S. Senate Subcommittee on Reorganization and International Organizations of the Committee on Government Operations, "Interagency Coordination in Environmental Hazards (Pesticides)," June 4, 1963, 88th Congress (1 sess.) (Washington, D.C.: Government Printing Office, 1964).

⁹⁹ Testimony of Rachel Carson, 9.

Agency to oversee and regulate toxic pollutants within the United States, and two years later, the EPA banned most domestic uses for DDT, as well as several other pesticides Carson mentioned in *Silent Spring* and in her testimony.¹⁰⁰ For Americans in the wake of *Silent Spring*, the urgency to eliminate bugs with pesticides was displaced by an urgency to protect the environment.

Conclusion

When American consumers rushed to their local supermarkets and hardware stores in the fall of 1945, their desire to purchase the latest and greatest bug-killing technology was a result of the messages they received from the popular press and the Department of War Information throughout the Second World War. These messages informed Americans on both the home front and the frontlines that insects were no longer just minor annoyances, but enemy soldiers that were detrimental to the war effort and threatened the Allied victory over the Axis Powers. When Americans heard of a new pesticide that was supposedly non-toxic to humans and was winning the war against disease in the European and Pacific Theaters, they imagined the ways in which this new pesticide could completely eliminate disease in postwar America. When the war ended in the fall 1945, this new vision of the postwar era allowed chemical companies to market their products as safe and easy solutions to America's battle against insect-borne illness. Chemical companies such as DuPont maintained this sense of urgency by employing fear-mongering marketing strategies, which further promoted the idea that insects were a threat to the stability of suburban life. Debates regarding DDT's toxicity to humans and wildlife continued, and it was not until the publication of *Silent Spring* in 1962 that American consumers recognized the ecological disaster they had wrought.

The effects of America's war on bugs during and after the Second World War are still visible today. A recent study from the United States Fish and Wildlife Service has found DDT in high concentrated volumes in the environment. Samples taken from sediment and groundwater in forty-one states indicate that DDT has persisted within the ecosystem since the chemical's ban in 1972. Although these concentrations have declined steadily since the 1970s, areas with higher DDT residue rates demonstrate depression of eggshell thickness among birds and traceable amounts of DDT within the tissue of fish populations.¹⁰¹ Regardless, the

¹⁰⁰ Russell, *War and Nature*, 229-239.

¹⁰¹ Robert J. Gilliom et al., *The Quality of Our Nation's Water: Pesticides in the Nation's Streams and Ground Water, 1992-2001* (Washington D.C.: US Geological Survey, 2006), 128-136, 172.

pesticide industry that boomed during the Second World War remains a multimillion-dollar industry. Companies like Monsanto and DuPont that made their fortunes during the war and postwar era still profit from pesticide sales and have developed a number of new insecticides and herbicides in the wake of DDT's ban in 1972. These modern pesticides have allowed the war on bugs to persist since the 1940s, and as pesticide sales continue to climb from year to year, there is no indication that a cease-fire will be called any time soon. As Rachel Carson warned in 1963, "Man is a part of nature, and his war against nature is inevitably a war against himself. [We are] challenged as mankind has never been challenged before to prove our maturity and our mastery, not of nature, but of ourselves."¹⁰²

Bibliography

Primary Sources

Albee, George. "DDT Yesterday and Today." *DuPont Magazine*, August-September 1946.

Aer-A-Sol "BOMB DDT" Insecticide, The Bridgeport Brass Company. November 25, 1945. Advertisement. *The Bakersfield Californian*, 4.

Aschenbach, Joy. "Victory Gardens that Sprouted in Wartime Still Feed the Body and Soul." *Los Angeles Times*, October 4, 1992.

Bartlett, Arthur. "Chemical Marvels Take: From DDT and Other War Developments, Homes Get Promise of Such." *Popular Science*, May 1945.

Better Homes and Gardens. "DDT... A Deadly New Bug Killer." May 1944.

Bishopp, Fred C. "Present Position of DDT in Control of Insects of Medical Importance." *American Journal of Public Health* 36 (1946): 593-606.

Bison Laboratories. Ca. 1950. "The Ladies Know What's Good!" advertisement. Envisioning the American Dream, <https://envisioningtheamericandream.files.wordpress.com/2012/06/chemical-ddt-collage.jpg>.

¹⁰² Rachel Carson, interview by Jay McMullen, *The Silent Spring of Rachel Carson*, CBS Reports, April 3, 1963.

Bureau of Entomology and Plant Quarantine. "Insecticides and Insect Repellents Developed for the Armed Forces at Orlando, Florida Laboratory." *Rockefeller Foundation*, (1945): 594–602.

Carson, Rachel. *Silent Spring: 40th Anniversary Edition*. Boston: Houghton Mifflin Company, 2002.

—. *The Silent Spring of Rachel Carson*. Jay McMullen: CBS Reports, April 3, 1963.

Carter, Keith. "How About D.D.T." *Nebraska Farmer*, July 6, 1946.

Chicago Tribune, April 1944.

Curran, C.H. "DDT—The Atomic Bomb of the Insect World." *Natural History*, November 1945.

Eichelberger, Robert L. *Our Jungle Road to Tokyo*. New York: Viking Press, 1950.

Fly-Tox. July 1955. "Your Child is Defenseless Unless," advertisement, *Ladies Home Journal*, 7.

Fortune, January 1946.

Hexi-kol. October 1946. Advertisement, *Popular Science*, 49.

Huckins, Olga Owens. Olga Owens Huckins to the Editor of the Boston Herald, January 28, 1958. Letter. From Yale University, Beinecke Digital Collections. <http://brbl-zoom.library.yale.edu/viewer/1096584>.

Margolius, Sidney. "DDT is No Cure All." *Collier's Weekly*, November 17, 1945.

Miller, Lois Mattox. "What You Should Know About DDT." *Reader's Digest*, November 1945.

New York Times. "Fish Killed By DDT in Mosquito Tests." August 9, 1945.

Office for Emergency Management, Office of War Information. 1943. "Don't be a dummy! Avoid Malaria!" The National Archives at College Park. <https://research.archives.gov/id/514128>.

—. 1943. “Enemies Both! It’s your Job to Help Eliminate them.” The National Archives at College Park. <https://research.archives.gov/id/514207>.

Passos, John Dos. “Revolution on the Farm.” *Life*, August 23, 1948.

Paul H. Müller, Paul H. “Dichloro-diphenyl-trichloroethane and Newer Insecticides.” Nobel Lecture, the Nobel Foundation, Stockholm, Sweden, December 11, 1948.

http://www.nobelprize.org/nobel_prizes/medicine/laureates/1948/muller-lecture.pdf.

Penn Salt Chemical. May 31, 1946. “So... You wouldn’t hurt a fly!” advertisement, *Life*, 102.

—. June 30, 1947. “DDT is good for me-e-e-e!” advertisement. *Time*, 15.

Pestroy, Sherwin Williams. June 1, 1947. “Blitzes Bugs!” advertisement, *Woman’s Day*, 102.

Popular Mechanics. “Our Next World War Against Insects.” April 1944.

Popular Science. “Flying Flit-Gun Strafes Insects with DDT.” May 1945.

—. “Don’t Do This.” February 1946.

—. “New Poison Kills Pests.” December, 1947.

Public Health Service, United States Office of Malaria Control. “Criminal At Large.” Archive.org, 12:59, 1943.

https://ia800502.us.archive.org/35/items/CriminalAtLarge1943/CriminalAtLarge1943_512kb.mp4.

Reader’s Digest. “Coming: Freedom From Insect Pests.” May 1944.

Roark, R.C., and N.E. McIndoo. *Digest of the Literature on DDT through April 30, 1944*. Washington D.C.: United States Bureau of Entomology and Plant Quarantine, 1944.

Robbins, L.H. "Joe and Jane Novice: Are Sophomores Now." *New York Times*, March 21, 1943, 14.

Science News-Letter. "Insect Saboteurs." October 9, 1943.

—. "DDT can Wipe out Plagues." July 8, 1945.

Sherwin-Williams Paints. "Doomsday for Pests." Archive.org, 14:43. 1946.
<https://archive.org/details/DoomsdayForPests>.

Simmons, James. "How Magic is DDT?." *Saturday Evening Post*, January 6, 1945.

Soper, F.L., W.A. Davis, F.S. Markham, and L.A. Riehl, "Typhus Fever in Italy, 1943-1945, and its Control with Louse Powder," *The American Journal of Hygiene* 45 (1947): 305-334.

Standen, Anthony. "Japanese Beetle." *Life*, July 17, 1944.

—. "Speaking of Pictures." *Life*, January 21, 1946.

—. "DDT: It will not rid the world of insect pests but it is still a wonder bug killer." *Life*, July 8, 1946.

Sunday Morning Star. "Insects Threaten Attack on Victory Garden Plants." April 25, 1943.

Tanglefoot. Ca. 1950. "Do roaches spread cancer?" advertisement.
<http://i.imgur.com/0zjUGzp.jpg>.

Teale, Edwin Way. "DDT: the Insect-Killer that can Either Boon or Menace." *Nature*, March 1945.

Testimony of Rachel Carson, Hearings before the U.S. Senate Subcommittee on Reorganization and International Organizations of the Committee on Government Operations, "Interagency Coordination in Environmental Hazards (Pesticides)," June 4, 1963, 88th Congress (1 sess.). Washington, D.C.: Government Printing Office, 1964.

Time. "Science: War on Insects." August 27, 1945.

Trimz. June 1, 1947. "PROTECT YOUR CHILDREN Against Disease-Carrying Insects!" advertisement. *Woman's Day*, 69.

Wigglesworth, V.B. "A Case of D.D.T Poisoning in Man." *British Medical Journal* (April 14, 1945): 517.

Zimmerman, O.T., and Irvin Lavine. *DDT, Killer of Killers* (Rochester, N.H.: The Record Press, 1946.

Secondary Sources

Allen, Will. *The War on Bugs*. White River Juncture, VT: Chelsea Green Publishing, 2007.

Baxter, James Phinney. *Scientists Against Time*. Cambridge, M.A.: The MIT Press, 1968.

Bennet, Judith A. *Natives and Exotics: World War II and Environment in the Southern Pacific*. Honolulu, University of Hawai'i Press, 2009.

Center for Integrated Pest Management, "Pesticide Usage in the United States." *CIPM Technical Bulletin* 105 (2003): 1-6.

Condon-Rall, Mary Ellen. "Malaria in the Southwest Pacific in World War II, 1940-1944." In *Science and the Pacific War: Science and Survival in the Pacific, 1939-1945*, edited by Roy M. MacLeod, 51-70. Dordrecht, Netherlands: Kluwer Academic Publishers, 2000.

Russell, P.F. Introduction to *Preventive Medicine in World War II VI*, edited by Colonel John Boyd Coates, Jr., 1-10. Washington D.C.: Office of the Surgeon General Department of the Army, 1963.

Gillespie, James. "Malaria and the Defense of Bataan." In *Preventive Medicine in World War II VI*, edited by Colonel John Boyd Coates, Jr., 497-511. Washington D.C.: Office of the Surgeon General Department of the Army, 1963.

Gilliom, Robert J., Jack E. Barbash, Charoles G. Crawford, Pixie A. Hamilton, Jeffery D. Martin, Naomi Nakagaki, Lisa G. Nowell, Jonathan C. Scott, Paul E. Stackelberg, Gail P. Thelin, and David M. Wolock. *The Quality of Our*

- Nation's Water: Pesticides in the Nation's Streams and Ground Water, 1992-2001*. Washington D.C.: US Geological Survey, 2006.
- Joy, Robert J.T. "Malaria in American Troops in the South and Southwest Pacific in World War II." *Medical History* 43 (1999): 192-207.
- Matthews, Allan, and Louise R. Bryson. "Arsenic." In *Minerals Yearbook, 1945*, edited by E.W. Pehrson and H.D. Keiser, 753-760. Washington, D.C.: Government Printing Office, 1947.
- McCoy, Oliver R. "War Department Provisions for Malaria Control." In *Preventive Medicine in World War II VI*, edited by Colonel John Boyd Coates, Jr., 11-59. Washington D.C.: Office of the Surgeon General Department of the Army, 1963.
- Patterson, Gordon M. *The Mosquito Crusades: A History of the American Anti-Mosquito Movement from the Reed Commission to the First Earth Day*. New Brunswick: Rutgers University Press, 2009.
- Perkins, John H. "Reshaping Technology in Wartime: The Effect of Military Goals on Entomological Research and Insect-Control Practices." *Technology and Culture* 19 (1978): 169-186.
- Russell, Edmund P. "The Strange Career of DDT: Experts, Federal Capacity, and Environmentalism World War II." *Technology and Culture* 40 (1999): 770-796.
- . *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring*. Cambridge: Cambridge University Press, 2001.
- Stapleton, Darwin H. "A Lost Chapter in Early History of DDT: The Development of Anti-Typhus Technologies by the Rockefeller Foundation's Louse Laboratory, 1942-1944." *Technology and Culture* 46 (2005): 513-540.
- Teyssot, Georges. ed. *The American Lawn*. New York: Princeton Architectural Press, 1999.
- Thobaben, Robert G. ed. *For Comrade and Country: Oral Histories of World War II Veterans*. Jefferson, N.C.: MacFarland, 2003.

Whorton, James C. *Before Silent Spring: Pesticides and Public Health in Pre-DDT America*. Princeton: Princeton University Press, 1979.